TECHNICAL SPECIFICATIONS

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

Division of Engineering

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the project. The Contractor shall perform all Work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

B. The Contract consists of Base Bid Items 1 through 9. The principal features of the Base Bid Items to be performed include but are not limited to:

1. Bid Item 1 - General Construction

a. Location of existing utilities (Contractor shall retain an independent contractor to assist in locating all on-site utilities associated with the work)

b. Installation of erosion control measures

c. Tree removal and site clearing

d. Removal and storage of items to be rehabilitated/reused

e. Disconnection or removal of utilities, piping, ductwork, etc.

f. Installation of new utilities, piping, ductwork, etc.

g. Removal of existing swimming pool and appurtenances

h. Construction of new pool and all work on the pool deck level

i. Concrete micropiles for pool foundation support (quantities shown on Drawing S-002) including all required proof test piles

j. Concrete micropiles for beach access ramp foundation support (quantities shown on Drawing S-015) including all required proof test piles

k. Provision of select fill or removal and disposal of suitable material, as needed to construct the pool and all other work

l. Construction of new Pool Equipment Room

m. Construction of North and South Vendor Space improvements

n. Construction of Bath House improvements

o. Construction of the Tunnel improvements

p. Construction of South Event Space improvements

q. Construction of new Beach Access Ramp

r. Repair of existing stucco, masonry and concrete defects (quantities shown on Drawing SR-115)

s. Repair of existing stucco, masonry and concrete to accommodate new work (doors, windows, walls, etc.)

t. Removal and disposal of contaminated material (quantities shown on Drawing H-)

u. Final site restoration and seeding

v. Final as-built survey.

2. Bid Item 2 – Additional Stucco (ACM) Removal and Disposal (to that shown on Drawing H-)

3. Item 3 – Additional Stucco Repair (to that shown on Drawing SR-115)

4. Item 4 – Additional Concrete Crack Repair (to that shown on Drawing SR-115)

5. Item 5 – Additional Concrete Spall Repair (to that shown on Drawing SR-115)

6. Item 6 – Additional Masonry Crack Repair (to that shown on Drawing SR-115)

7. Item 7 – Rock Removal and Disposal

8. Item 8 – Contaminated Soil Removal and Disposal

9. Item 9 – Additional Concrete Pile Foundations (to that shown on Drawings S-002 and S-015)

1.2 GENERAL

A. The Instructions for Bidders, General Conditions, Supplementary Conditions and Division 1 of the Technical Specifications, shall apply equally to all Work under the Contract for this Project.

B. Where the words "Contract" and "Contractor" are used in Sections of Division 1, they shall apply equally to all parties entering into agreements with the Owner to perform Work specified herein and to all Contracts derived from said agreements.

C. Where the word “Owner” is used in these Specifications, it shall refer to the Westchester County Parks Department and Westchester County Department of Public Works.

1.3 CONTRACT DOCUMENTS

A. The Work to be done is shown on the set of Contract Drawings entitled Playland Pool Rehabilitation, Playland Park.

1.4 GENERAL ARRANGEMENT

A. The Contract Drawings indicate the extent and general arrangement of the Work. The specific equipment proposed for use by the Contractor on the Project may require changes in the construction detailed on the Contract Drawings, and all such changes shall be performed in accordance with the requirements of the Supplementary Conditions and shall be made without additional cost to the Owner and shall include the increase in costs of the other Contracts.

1.5 TIME OF WORK

A. Overtime work shall conform to the requirements of Division 1, Supplementary Conditions, shall be considered as normal procedure under this Contract, and the Contractor shall make no claims for extra compensation as a result thereof.

B. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy or freezing weather. Only such work as will not suffer injury to workmanship or materials will be permitted. The Contractor shall carefully protect his Work against damage or injury from the weather, and when work is permitted during freezing weather shall provide and maintain approved facilities for heating the materials and for protecting the finished Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

+ + END OF SECTION + +

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SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. The items listed below beginning with Article 1.4, refer to and are the same pay items listed in the Itemized Proposal. They constitute all the pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, layout surveys, job signs, sanitary requirements, testing, reparation of damages produced by Contractor, safety devices, approval and Record Drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, Bonds, insurance, and all other requirements of the Contract, General and Supplementary Conditions. Compensation for all such services, things and materials shall be included in the price stipulated for the lump sum listed herein.

1.2 ESTIMATE OF QUANTITIES

A. The estimated quantities for unit bid prices, as listed in the Itemized Proposal, are approximate only and are included solely for the purpose of comparison of Bids. The Owner does not expressly or by implication agree that the nature of the materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith and reserves the right to increase or decrease any quantity or to eliminate any quantity as the Owner may deem necessary. Any allowance for a change in the unit price shall apply only to that portion of work in excess of 125% of the original contract item quantity, or to the actual amount of work performed if the quantity decreases below 75% of the original contract item quantity. The Contractor or the County, as the case may be, must make written notice to the other party of the change in the quantity of a major item if that party wishes to adjust the contract price or time of performance. Knowledge of a change in quantity could result from receipt of a change order (approved or unapproved), a letter directing a change in the contract work, review of plan details and estimates, review of work completed or progress payment quantities, or a combination of the above.

1.3 RELATED PROVISIONS SPECIFIED ELSEWHERE

A. Payments to Contractor: Refer to Contract, General Conditions and Supplementary Conditions.

1.4 BID PROPOSAL ITEMS

A. Bid Item A – Rehabilitation of Pool and Bathhouse, Playland Park General Construction

1. Payment for Bid Item A will be the lump sum bid under this item and will be full compensation for furnishing all labor, equipment and materials as shown on the Contract Drawings and as specified, unless otherwise included under other bid items.

2. The work under this item includes but is not limited to all work delineated in Section 01 11 00, Summary of Work.

B. Bid Item B - Additional Exterior Wall Stucco (ACM) Removal and Disposal (to that shown on Drawing H-100)

1. Measurement and payment for Bid Item B will be made only for the quantity of Additional Exterior Wall Stucco (ACM) required to be removed and disposed of in order to install the proposed work.

2. Measurement shall be in square feet measured in the field based on the payment limits shown in the Contract Drawings and approved by the Engineer.

3. The price bid per square foot for Additional Exterior Wall Stucco (ACM) Removal and Disposal shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified.

C. Bid Item C - Additional Stucco Repair (to that shown on Drawing SR-115)

1. Measurement and payment for Bid Item C will be made only for the quantity of Additional Stucco Repair required to be performed in order to install the proposed work.

2. Measurement shall be in square feet measured in the field based on the payment limits shown in the Contract Drawings and approved by the Engineer.

3. The price bid per square foot for Additional Stucco Repair shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified.

D. Bid Item D - Additional Concrete Crack Repair (to that shown on Drawing SR-115)

1. Measurement and payment for Bid Item D will be made only for the quantity of Additional Concrete Crack Repair required to be performed in order to install the proposed work.

2. Measurement shall be in lineal feet measured in the field based on the payment limits shown in the Contract Drawings and approved by the Engineer.

3. The price bid per lineal feet for Additional Concrete Crack Repair shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified.

E. Bid Item E - Additional Concrete Spall Repair (to that shown on Drawing SR-115)

1. Measurement and payment for Bid Item E will be made only for the quantity of Additional Concrete Spall Repair required to be performed in order to install the proposed work.

2. Measurement shall be in square feet measured in the field based on the payment limits shown in the Contract Drawings and approved by the Engineer.

3. The price bid per square foot for Additional Concrete Spall Repair shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified.

F. Bid Item F - Additional Masonry Crack Repair (to that shown on Drawing SR-115)

1. Measurement and payment for Bid Item F will be made only for the quantity of Additional Masonry Crack Repair required to be performed in order to install the proposed work.

2. Measurement shall be in lineal feet measured in the field based on the payment limits shown in the Contract Drawings and approved by the Engineer.

3. The price bid per lineal foot for Additional Masonry Crack Repair shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified.

G. Bid Item G - Rock Removal and Disposal

1. Measurement and payment for Bid Item G will be made only for the quantity of rock encountered and required to be removed and disposed of in order to install the proposed work. Refer to specification section 31 23 16.26.

2. Measurement shall be in cubic yards measured in the excavation based on the payment limits shown in the Contract Drawings or approved by the Engineer.

3. The price bid per cubic yard for Rock Removal and Disposal shall include the furnishing of all labor, tools, equipment and essentials necessary to complete the work specified including transportation to and disposal costs at an approved disposal facility. No payment will be made for rock removed to install piles.

H. Bid Item H – Additional 8" Concrete Micropiles (to that shown on Drawing S-002)

1. Measurement and payment for Bid Item H will be made only for the quantity of additional 8" Concrete Micropiles, above and beyond what's shown on the Contract Drawings, and ordered in writing by the Engineer to be furnished and installed where directed.

2. Measurement shall be in vertical lineal feet, measured in place.

3. The price bid per vertical lineal foot for this item shall be made from tip of elevation to cutoff elevation, as calculated from the pile installation records and shall include all labor, materials, and equipment for furnishing and installing the piles in accordance with the Contract Drawings and Specifications in the locations directed in writing by the Engineer.

I. Bid Item I – Additional 4" Concrete Micropiles (to that shown on Drawing S-015)

1. Measurement and payment for Bid Item I will be made only for the quantity of additional 4" Concrete Micropiles, above and beyond what's shown on the Contract Drawings, and ordered in writing by the Engineer to be furnished and installed where directed.

2. Measurement shall be in vertical lineal feet, measured in place.

The price bid per vertical lineal foot for this item shall be made from tip of elevation to cutoff elevation, as calculated from the pile installation records and shall include all labor, materials, and equipment for furnishing and installing the piles in accordance with the Contract Drawings and Specifications in the locations directed in writing by the Engineer.

J. Bid Item J – Contract Bonds and Insurance

1. This item provides payment for Contract Bonds and Insurances which must not exceed 3% of the subtotal of Bid Items A through I.

2. The lump sum price bid for this Item shall include all preparation effort required to complete the work.

K. Bid Item W-800 – Miscellaneous Work Allowance

1. This item provides for miscellaneous additional work to be accomplished as ordered by the Owner. The cost of this item is delineated on the Proposal Sheet and shall be included in the total amount bid for the project.

2. The basis for payment under this Allowance will be that amount substantiated by invoices from the supplier of equipment, materials or services selected and ordered in writing by the Owner plus Contractor's overhead and profit of 15%.

3. It is understood that should additional work i.e., equipment, materials, and/or services, be ordered by the Owner during the performance of the specified Contract, the cost for this additional work will be paid for under the dollar allowance included in the bid. Should no additional work be ordered by the Owner or if the value of the ordered additional work is less than the total dollar amount of the allowance included in the bid (as noted on the Bid Sheet) then the total final Contract amount (total dollar amount due Contractor) will be reduced by the dollar amount of allowance unused. Any work ordered above this allowable dollar amount will be paid in accordance with the General Conditions.

L. Bid Item W-851 – Testing of Materials and Field Testing Equipment

1. This item provides for Testing of Materials and Field Testing Equipment per Article "Testing of Materials and Field Testing Equipment (Item W-851)" of General Requirements, as ordered by the Owner. The cost of this item is delineated on the Proposal Sheet and shall be included in the total amount bid for the project.

1.5 DAMAGES BY CONTRACTOR

A. No payments shall be made for reparation of damages caused by Contractor.

1.6 CONTRACTOR PAY REQUISITIONS

A. The Contractors shall submit monthly payment requisitions, prepared as directed by the Engineer. A maximum of one payment requisition shall be submitted each month.

B. The Contractor may, at the approval of the Engineer, submit payment for unit cost items based upon agreed upon estimated amounts each month prior to completion of as built surveys.

+ + END OF SECTION + +

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This Section specifies the requirements for making submissions for the project.

1.2 IDENTIFICATION OF SUBMITTALS

A. Each and every submission shall be provided by the Contractor and shall be accompanied by a SUBMISSION TRANSMITTAL FORM. Identify each submittal and re-submittal using the form.

B. It is incumbent on the Contractor to initially assign the submission log number designation to each submission. Submissions not containing a log number, as specified above, will be returned to the Contractor un-reviewed by the Engineer/Architect.

C. Every submittal shall also be accompanied by a Transmittal Letter addressed to the Engineer/Architect's Project Manager.

1.3 COORDINATION OF SUBMITTALS

A. Prior to submitting to the Engineer/Architect, fully coordinate all interrelated work. As a minimum, do the following:

1. Determine and verify all field dimensions and conditions by field measuring existing conditions and the installed work of this Contract and work by others.

2. Coordinate with all trades, subcontractors, vendors, system and equipment suppliers and manufacturers, public agencies, and utility companies and secure all necessary approvals, in writing.

3. Provide a space approximately 4" x 4" on submission transmittal form, transmittal letter, and shop drawings to record the Engineer's review, approval markings and the action taken.

B. Make submittals in groups containing all associated items that in some way depend upon each other.

1. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

2. The Engineer/Architect may elect not to review partial or incomplete submissions, whereupon he will notify the Contractor of the additional submissions that are required before a review can be made.

1.4 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery. The Engineer/Architect will review submittals in a manner as expedient as possible, and will generally send a written response to the Contractor within seven (7) calendar days of receipt of submittals.

B. Submissions may be returned reviewed, rejected, returned conditioned upon submission of related items, or for other reasons set forth in the Contract Documents.

C. Make submissions well in advance as the returning, rejecting or disapproval of submissions or other similar circumstances are possible and are deemed “avoidable delays”. Costs for these delays or those attributed to Contractor’s tardiness in making submittals shall be borne by the Contractor.

D. Submittals requiring Engineer/Architect’s review (except operations manuals) as required under the technical specifications of these documents shall be submitted prior to installation.

E. Operations and maintenance manuals shall be submitted at least thirty (30) consecutive calendar days prior to scheduled start-up of the unit or system.

F. If material or equipment is installed before it has been deemed to be in general compliance with the Contract Documents, as determined by the Engineer/Architect, the Contractor shall be liable for its removal and replacement at no extra charge and without an increase in contract time.

G. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer

1.5 DESTINATION OF SUBMITTALS

A. Submissions shall be sent to the Engineer/Architect's office to the attention of the Project Manager whom will be named in the Notice to Proceed or at the Construction Kick-Off meeting.

B. When submitting samples, the contractor shall arrange for the delivery of said samples to the office of the Engineer. Samples shall be clearly marked with name of the project and the Engineer/Architect's project manager.

C. The Contractor is responsible for the pick-up of the sample from the Engineer's office following approval. In the event that a sample is not retrieved from the Engineer's office within thirty days of approval, it will be disposed of.

1.6 CONTRACTOR'S REPRESENTATION

A. By making a submission, the Contractor represents that he has determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving equipment into an enclosed space, materials, catalog and model numbers and similar data and that he has checked and coordinated each submission with other work at or adjacent to the project site as required

1.7 ENGINEER/ARCHITECT'S REVIEW

A. Engineer/Architect will review and comment on each submission conforming to the requirements of this Section.

1. Engineer/Architect's review will be for conformance with the design concept of the project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, laying lengths, tolerances, interference's, for coordinating the work by others or subcontractors.

2. The Engineer/Architect's review of a separate item, or portion of a system, does not represent a review of an assembly or system in which the item functions.

B. The Engineer/Architect will mark submittals as follows:

1. APPROVED_- No corrections, no marks. The content of this submittal has been reviewed by the Engineer/Architect and been found to be in general compliance with the Contract Documents. No further submission of this

submittal is required and the information contained in the submittal may be built into the work in accordance with the Contract Documents.

2. APPROVED AS NOTED - Minor amount of corrections. The content of this submittal has been reviewed by the Engineer/Architect and has been found in general to be in compliance with the Contract Documents. The notations made on the submittal by the Engineer/Architect shall be incorporated into the work in accordance with the terms and conditions of the Contract Documents. No further submission of this submittal is required.

3. REVISE AND RESUBMIT - The content of this submittal has been reviewed by the Engineer/Architect and this review has determined that additional data and/or modification to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and revised in accordance with the Engineer/Architect's comments and resubmitted to the Engineer/Architect for review. The information contained on the resubmittal shall not be incorporated into the work until the submittal is returned to the Contractor marked "APPROVED" or "APPROVED AS NOTED".

4. DISAPPROVED - The content of this submittal has been reviewed by the Engineer/Architect and has been determined not to be in accordance with the requirements contained in the Contract Document and requires too many corrections or other justifiable reason. The submittal shall be corrected and resubmitted or a submittal of an alternate shall be provided. No items are to be fabricated under this mark.

5. RECEIVED - This submittal is accepted on the project and filed for record purposes only, in accordance with the terms and conditions of the Contract Documents. Documents marked "RECEIVED" will not be returned.

C. No payment will be made on any item for which a submission is required if such submission:

1. Has not been made,

2. Has been made but was not stamped "Approved" by Engineer/Architect,

3. Has been made and stamped “Approved As Noted”, but contractor has not complied with Engineer/Architect’s notes marked on the submittal,

4. Has been made and stamped “Approved”, but item provided does not conform to the shop drawing nor to the Contract Documents.

D. Submittals not required by these specifications will not be recognized or processed.

E. Provide space for the Engineer/Architect’s review stamp.

1.8 RESUBMISSIONS

A. Prepare new and additional submissions, make required corrections, and resubmit corrected copies until found in compliance with the Contract Documents.

B. On, or with, resubmittals, clearly describe revisions and changes made, other than the corrections requested by Engineer/Architect, which did not appear on the previous submissions.

1.9 CONTRACTOR’S RESPONSIBILITIES

A. Engineer/Architect’s review of submittals shall not relieve the Contractor of his/her responsibility for any deviation from the requirements of the Contract Documents nor relieve the Contractor from responsibility for errors or omissions in the submittals.

B. No portion of the work requiring a submission shall be commenced until the Engineer/Architect has found the submission in general compliance with the Contract Documents.

C. The Contractor shall provide notification of any specification or drawing deviation.

1.10 MISCELLANEOUS SUBMITTALS

A. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.11 SUBCONTRACTOR LIST

A. The Contractor shall submit, on AIA Form G805, within ten (10) calendar days after the date of the Notice to Proceed, a list of all subcontractors, including the names of the major subcontractors that were submitted at the time of the bid.

1.12 MATERIAL SAFETY DATA SHEETS (MSDS)

A. Comply with “Right to Know” requirements of Chapter 551 of Laws of New York, 1980, concerning notification of the use of toxic substances.

B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled “Toxic and Hazardous Substances” shall be identified to the Owner/Engineer/Architect by the Contractor’s submission of a standard Material Safety Data Sheet (MSDS) in accordance with “Right To Know” requirements.

C. Products will not be permitted to be kept on site without a MSDS.

1.13 SHOP DRAWINGS

A. Submit shop drawings for all fabricated work, for all manufactured items and for items specifically required by the specifications.

B. Submit one (1) copy of each standard drawing, catalog cut, or other material. The Engineer/Architect will return one (1) copy to the Contractor. The Contractor shall be responsible for providing approved shop drawings to their own subcontractors.

C. Subcontractors shall submit shop drawings directly to the Contractor for checking. Thoroughly check subcontractors’ shop drawings for measurements, sizes of members, details, materials, and conformance with the Contract Documents.

1. Return submittals which are found to be inaccurate or in error.

2. Do not submit to the Engineer/Architect until all corrections have been made.

D. Clearly show the relationship of the various parts of the project and where the information provided on the submission depends upon field measurements and existing conditions.

E. The Contractor shall make all measurements, confirm existing conditions, and include them on the shop drawings before making a submission to the Engineer/Architect.

1.14 CERTIFICATIONS

A. Submit certifications of compliance indicated in the Contract Documents.

B. Certifications shall be complete and exact, they shall be properly authenticated by the written signature, in ink, of an owner, officer or duly

authorized representative of the person, firm or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

+ + END OF SECTION + +

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SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Engineer.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

3. Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification

Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

The Contractor shall employ and pay an independent agency, to perform specified quality control services.

Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.

B. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

C. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.

4. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

5. Security and protection of samples and test equipment at the Project site.

D. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Engineer and Contractor in performance of its duties, and shall provide

qualified personnel to perform required inspections and tests.

1. The agency shall notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

3. The agency shall not perform any duties of the Contractor.

1.4 SUBMITTALS

The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Engineer, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.

A. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

1. Date of issue.

2. Project title and number.

3. Name, address and telephone number of testing agency.

4. Dates and locations of samples and tests or inspections.

5. Names of individuals making the inspection or test.

6. Designation of the Work and test method.

7. Identification of product and Specification Section.

8. Complete inspection or test data.

9. Test results and interpretations of test results.

10. Ambient conditions at the time of sample-taking and testing.

11. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting.

1.5 QUALITY ASSURANCE

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

1.6 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for section 1045 "Cutting and Patching."

Protect construction exposed by or for quality control service activities, and protect repaired construction.

Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 55 26

TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This section includes the provisions of maintaining vehicular and pedestrian traffic within Playland Park and protection for both the public and the Contractor's employees from all damage to person and property during the site work improvements.

B. Maintenance and protection of traffic is the responsibility of the General Contractor.

1.2 SUBMITTALS

A. The Contractor shall notify the roadway Owner and the Engineer at least seventy-two (72) hours prior to the closing of any portion of a road as might be necessary to perform the work and shall adequately describe the detour to be followed.

B. The Contractor shall submit detailed drawings showing all signs, barricades, etc. for the closing of any portion of a road. These drawings shall be submitted for the Engineer’s approval prior to any road closings. Only after drawing approval can the Contractor submit a request for road closing 72 hours prior to the anticipated closure. These shop drawings must be in full conformance with the requirements of the Manual of Uniform Traffic Control Devices.

PART 2 - MATERIALS

2.1 TRAFFIC DEVICES

A. All temporary signs, delineators, barricades, lighting, and other warning and guiding devices shall be as shown and specified on the plans, the New York State Manual of Uniform Traffic Control Devices, the Traffic Maintenance Details of the standard details, and/or as required by the roadway owner.

B. Unless otherwise specified, all materials used will remain the property of the Contractor.

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall obtain, supply and pay for all required electrical energy, services, permits, equipment, certificates, etc.

3.2 PERFORMANCE

A. Traffic shall be maintained over a reasonably smooth traveled way, which shall be marked by signs, delineations, and/or other methods so that a person who has no knowledge of conditions can safely and with a minimum of discomfort and inconvenience, travel the area under construction. Standards for maintenance of traffic shall be based on the New York State Manual of Uniform Traffic Control Devices (referred to as "Manual") current edition.

B. Adequate advance warning according to the "Manual" must be provided whenever traffic is interfered with or lanes are closed. All signs, markings, signals, barricades, lighting devices, and flagger operations shall conform to the "Manual". All necessary traffic control devices shall be available and in place before the particular construction operations are started. In case of emergency construction where there is not sufficient time to prepare a traffic plan, the Contractor shall be responsible for following the guidelines set forth in the "Manual."

C. Access for emergency vehicles is of the utmost importance and provision shall be made by the Contractor to provide such access.

D. Adequate provisions shall also be made for business and commercial establishments, schools, and public buildings.

E. The Contractor shall generally maintain two (2) way traffic on streets where work is in progress and in no case shall he be permitted to work in adjacent streets.

F. The Contractor shall maintain within the work limits the entire pavement, drainage and sewage facilities, and other street elements unless otherwise specified. The traveled way shall be kept well drained, reasonably smooth, cleaned and hard at all times. Foreign objects, sand, rocks, spillage of materials shall immediately be removed and the area cleaned to the satisfaction of the Engineer. Spillage outside the work limits is the Contractor's responsibility and the Owner will entertain no claim for work necessary to clean the areas affected. The Contractor shall be required to remove snow on those streets where roads are not passable by snow plows due to the Contractor's operation.

G. Traffic delays shall be kept to a minimum. A period of five (5) minutes shall be considered the maximum time allowed for stopping traffic.

H. Detour signs, barricades, and other facilities shall be furnished and erected as called for on the contractors approved plan and/or as directed by the roadway owner. The route of the detour shall be clearly marked at the beginning and end with directions at intermediate points along its entire length.

I. The Contractor shall be responsible for notifying all interested agencies when detours or construction will interfere with the normal traffic flow. These agencies include, but are not limited to:

1. Westchester County Parks Department

2. City of Rye (for City roads)

J. The Contractor will not be permitted to store spoil, materials, equipment, or supplies that will interfere with sight distances within thirty (30) feet of an intersection or areas where sight distance is critical.

K. When travel must be diverted from the accustomed traveled way on to some other area, the Contractor shall grade, repair, stabilize, and provide ramps if necessary, to provide for the smooth flow of traffic. Upon completion of construction, the area utilized shall be restored to its original condition.

L. The Contractor shall construct and maintain, where called for on the plans or as directed by the roadway owner, temporary bridges or bridging over excavations, obstructions, and newly laid pavements to provide access for pedestrian and vehicular traffic and access to fire hydrants. During construction, the Contractor shall take particular care to allow the ingress and egress of emergency vehicles from firehouses, police stations, hospitals, etc. Adequate provisions shall also be made for business and commercial establishments, schools, and for public buildings. Plating and/or bridging is required at all main intersections and heavily traveled crossings.

M. Street signs, route markers, and other signs that fall under public jurisdiction, i.e., Bus Stop, Stop Signs, Parking Signs, etc., shall be protected and maintained or removed, stored, cleaned, and replaced when ordered by the roadway owner. The roadway owner may also order that these signs be temporarily relocated and then reinstalled in their original location. If in the course of construction, it becomes necessary to temporarily move a Bus Stop, the temporary site shall be approved by the County or local jurisdiction.

N. The Contractor shall provide protection from damage to person or property by protective screens, fences, devices, or methods that are approved by the roadway owner.

O. All signs, lights, barricades, and other materials installed to direct or warn the traveling public shall be maintained, repaired, and replaced by the Contractor. Vandalism or theft shall not preclude requirement and special attention shall be given to Traffic Maintenance and Protection during nonworking hours, weekends, holidays, and other periods or temporary shutdown of work.

P. Materials, equipment, and workmanship for lighted barricades shall be in strict compliance with the National Electric Code and only a licensed electrician may perform the work.

Q. Signs or markers lost, damaged, or removed by the Contractor shall be replaced at no cost to the Owner. Signs not to be replaced shall be cleaned and delivered to the Engineer.

R. Temporary reflectorized pavement markings shall be placed where existing markings are obliterated, whenever it is determined that the roadway would be void of traffic markings for two (2) weeks or more, or as otherwise directed by the roadway owner and Engineer. The temporary markings shall provide the same number of through travel lanes as the previously existing markings.

S. Sheeting

1. Sheeting around excavations shall project four (4) feet above the surface of the ground to form a tight barricade. Where this requirement cannot be met, the excavation shall be surrounded with a metal fabric supported by approved uprights, set at maximum eight (8) foot intervals.

T. Flagmen

1. Competent flagmen shall be provided by the Contractor when ordered by the roadway owner or Engineer or as directed by the specifications. These flagmen shall have no function other than the direction of traffic. They shall wear safety vests and shall direct traffic with a red flag as required by the New York State Manual of Uniform Traffic Control Devices.

U. Watchmen

1. The Contractor shall provide watchmen service, during all nonworking hours for continuous patrol of the work site whenever excavations are left open overnight or whenever temporary bypass pumping is in place.

2. The watchmen will be responsible for making sure all signs, barricades, flares, and markers are up and in good condition and that the bypass force main is in good working condition.

3. Watchmen shall maintain daily logs of their patrols. Copies of these logs shall be made available to the Owner.

4. In the event that any unusual or emergency condition arises, the watchmen shall immediately notify the Contractor, the Engineer and the appropriate regulatory agency or emergency agency for assistance.

5. The Contractor may apply to the Owner for suspension of the watchmen service following construction but prior to completion of the work (when punch list items remain).

6. A deduction of three hundred (300) dollars per eight hour shift will be made for watchmen services not provided when required.

+ + END OF SECTION + +

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SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and adjacent areas. Remove physical evidence of temporary facilities at completion of Work.

1.2 RELATED WORK

A. Not used.

1.3 NOISE CONTROL

A. Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and local codes.

1.4 DUST CONTROL

A. Contractor shall be responsible for controlling objectionable dust caused by his operation of vehicles and equipment, clearing or for any reason whatever to the satisfaction of the Engineer.

1.5 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or staging areas.

1. Employ methods and use materials which will not adversely affect conditions at the Site or on adjoining properties.

1.6 WATER CONTROL

A. Provide methods to control surface water and water from excavations to prevent damage to the Work, the Site, or adjoining properties.

1. Control fill, grading and ditching to direct water away from excavations, pits, and other construction areas; and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance.

B. Provide, operate and maintain equipment and facilities of adequate size to control surface water.

C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the Site or to adjoining areas and in conformance with all environmental requirements.

1.7 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.

1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.

1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.

1. Prevent toxic concentrations of chemicals.

2. Prevent harmful dispersal of pollutants into the atmosphere.

E. All Contractor's equipment used during construction shall conform to all current federal, state, local laws and regulations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – PAYMENT

3.1 MEASUREMENT AND PAYMENT

A. No separate payment for the item “Environmental Protection Procedures” will be made. The costs of same shall be included in the Lump Sum Base Bid.

+ + END OF SECTION + +

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

A. Contractor shall make all arrangements for transportation, delivery, storage and handling of equipment and materials required for prosecution and completion of the Work.

B. Shipments of materials to Contractor or Subcontractors shall be delivered to the Site only during regular working hours. Shipments shall be addressed and consigned to the proper party giving name of Project, street and city. Shipments shall not be delivered to Owner except where otherwise directed.

C. If it is necessary to move stored materials and equipment during construction, Contractor shall move or cause to be moved materials and equipment without any additional compensation.

PART 2 - PRODUCTS

2.1 DELIVERY

A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:

1. Work of Owner.

2. Limitations of storage space.

3. Availability of equipment and personnel for handling, products.

4. Owner's use of premises.

C. Do not have products delivered to Project Site until related Shop Drawings have been approved by the Engineer.

D. Do not have products delivered to Site until adequate storage facilities have been provided.

E. Have products delivered to Site in manufacturer's original, unopened, labeled containers. Keep the Engineer informed of delivery of all material to be incorporated in the Work.

F. Partial deliveries of component parts of material shall be clearly marked to identify the material, to permit easy accumulation of parts and to facilitate assembly.

G. Immediately on delivery, inspect shipment to assure:

1. Product complies with requirements of Contract Documents and reviewed submittals.

2. Quantities are correct.

3. Containers and packages are intact, labels are legible.

4. Products are properly protected and undamaged.

2.2 PRODUCT HANDLING

A. Provide equipment and personnel necessary to handle products by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

E. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

PART 3 - EXECUTION

3.1 REMOVING, HAULING, AND INSTALLING EQUIPMENT AND MATERIALS

A. The Contractor shall inspect all items including all boxes, crates and packages containing equipment and materials for damage that may have occurred during shipment prior to its removal from the truck or other conveyance. Any damage shall immediately be reported to the Engineer.

The Contractor shall then carefully remove the equipment and materials from the truck or trucks on which it is shipped. The equipment and materials shall then be transported to the place of installation at the job Site. The Contractor shall be liable for loss or damage that the equipment or materials may receive while being unloaded, transported, stored or installed. The Contractor shall employ competent workers experienced in the installation of the types of materials to be furnished, and shall ensure that all materials are installed in accordance with the recommendations of the manufacturer. All material that arrives at the job Site during normal working hours shall be unloaded as soon as practicable.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 01 71 23

FIELD ENGINEERING

PART 1 – GENERAL

1.1 GENERAL

A. The Contractor will establish benchmarks for use by the Contractor and his subcontractors, all other layout work shall be in accordance with the Contract Documents. The Engineer shall provide the Contractor with an AUTOCAD file of the design drawings for his use.

B. Contractor shall:

1. Provide civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.

2. Develop and make all detail surveys and measurements needed for construction.

3. Provide a transit and leveling instrument, stakes and accessories on the site at all times and a skilled instrument man employed or obtained whenever necessary for layout of the Work.

4. Provide all material required for benchmarks, control points, batter boards, grade stakes, and other items.

5. Be solely responsible for all locations, dimensions and levels. No data other than written order of the Owner shall justify departure from the dimensions and levels required by the Drawings.

1.2 DATUM PLANE

A. All elevations shown on the Contract Plans or specified refer to the Project Datum, which has its benchmark as shown on the Contract Plans.

1.3 CONTRACTOR'S FIELD ENGINEER

A. The Contractor shall employ and retain at the Site of the Work a field engineer and/or superintendent capable of performing all engineering tasks required of the Contractor. Tasks shall include as a minimum:

1. A projection of work to be completed the following day must be submitted to the Engineer by 4:00 p.m. of the preceding work day. This projection must include:

   a. Location of all areas in which construction will be done.

   b. Number of workers required each day

   b. Major construction equipment utilized.

   c. Equipment and materials to be installed.

2. Furnish all required lines and grades for construction operations. Check all formwork, reinforcing, subgrade, asphalt, other materials and equipment.

3. Maintain field office files and drawings, and Record Drawings. Prepare Layout and Coordination Drawings for construction operations.

4. Check and coordinate Work for conflicts and interferences and immediately advise the Engineer of all discrepancies noted.

5. Cooperate with Engineer in field inspections as required.

6. Follow without delay all instructions of the Engineer or assistants in the prosecution and completion of the work in conformity with this Contract. The Contractor's representative shall have full authority to supply labor and materials immediately.

7. The Contractor shall also have a competent representative available to receive telephone messages and provide a reasonable reply as soon as possible, but not later than 24 hours.

1.4 QUALIFICATIONS OF FIELD SUPERINTENDENT

A. Qualified superintendent acceptable to the Engineer and Owner.

1.5 CONTRACTOR COST FOR ENGINEERS SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment which are not "or equal" by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc. of the equipment and accessories furnished, or as a result of the Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents or if the Engineer

is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

B. For all Shop Drawings related to this Contract:

1. The Contractor shall respond to required submittals with complete information and accuracy to achieve required approvals within two submissions. All costs to the Consulting Engineer involved with subsequent submission of the Shop Drawings, Samples or other items requiring approval, will be back charged to the Contractor at a rate of $150 per shop drawing submittal or the actual cost based upon the number of hours to review the submittal times the Engineers' normal billing rate, whichever is greater. These costs shall be deducted from payments due for Work completed by the Contractor. In the event an approved item is requested by the Contractor to be changed or substituted for, all involved costs in the reviewing and approval process will likewise be back charged to the Contractor unless judged by the Engineer that the need for such deviation from previously approved data is beyond the control of the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 -EXECUTION (NOT USED)

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of work:

1. This Section specifies all cutting and patching to be completed to execute all cutting and patching, including excavation, backfill and fitting required to:

   a. Remove samples of installed Work as required for testing.

   b. Remove or relocate utilities and pipes installed by others which obstruct the Work to which connections must be made.

   c. Make connections or alterations to new facilities.

   d. Restore all areas to a state equal to that which it was in prior to cutting and restore new Work to the standards of these Specifications.

1.2 SUBMITTALS

A. Prior to cutting which may affect integrity and design function of Project or owner's operations, submit written notice to Engineer, requesting consent to proceed with cutting, including:

1. Identification of Project.

2. Description of proposed Work:

   a. Scope of cutting and patching.

   b. Contractor, Subcontractor or trade to execute Work.

   c. Products proposed to be used.

   d. Extent of refinishing.

   e. Schedule of operations.

   f. Alternatives to cutting and patching, if any.

g. Designation of party responsible for cost of cutting and patching.

h. Description of impact on traffic and permits required/ obtained if necessary

B. Should conditions of Work, or schedule, indicate change of materials or methods, submit written recommendation to Engineer, including:

1. Conditions indicating change.

2. Recommendations for alternative materials or methods.

3. Submittals as required for substitutions.

C. Submit written notice to Engineer, designating time Work will be uncovered, to provide for observation. Do not begin cutting or patching operations until authorized by the Engineer.

D. Provide shoring, bracing and support as required to maintain structural integrity of exposed areas and protect adjacent Work from damage during cutting and patching.

E. Conform to all applicable Specifications for application and installation of materials used for patching.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 GENERAL

A. Execute cleaning during progress of the Work, at completion of the Work, and as specified herein.

B. Requirements of Regulatory Agencies:

1. In addition to the requirements herein, maintain the cleanliness of the Work and surrounding premises within the Work limits so as to comply with federal, state and local anti-pollution laws, ordinances, codes and regulations when disposing of waste materials, debris and rubbish.

C. Scheduling of Cleaning and Disposal Operations: So that dust, wash water or other contaminants generated during such operations do not damage finished surfaces.

1. To prevent accumulation of dust, dirt, debris, rubbish and waste materials on or within the Work or on the premises surrounding the Work.

D. Waste Disposal:

1. Dispose of all waste materials, surplus materials, debris and rubbish off the site.

2. Do not burn or bury rubbish and waste materials on the construction site.

3. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

E. Cleaning Materials:

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

2. Use each type of cleaning material on only those surfaces recommended by the cleaning material manufacturer.

3. Use only materials which will not create hazards to health or property.

F. During Construction:

1. The Contractor shall remove and dispose of all debris resulting from work, at least twice a week and more often if same interferes with the work or presents a fire hazard. All debris and excess material shall be removed from the Owner's property. Burying of any debris or excess material within the premises will not be permitted. Burning of same will be strictly forbidden.

2. The Contractor shall provide a dumpster or other approved means of refuse removal for the use.

   a. Dumpster shall be located where directed by the Owner.

   b. Placing of the refuse in the dumpster shall be the responsibility of each individual Contractor.

   c. Dumpster shall be emptied and replaced as required so that refuse may be disposed of as quickly as possible.

3. Keep the work and surrounding premises within work limits free of accumulations of dirt, dust, waste materials, debris and rubbish.

4. Keep dust generating areas wetted down or apply approved dust palliative at no additional cost to the Owner.

5. Dispose of waste, debris and rubbish off Site at legal disposal areas in accordance with local, state and federal codes and regulations.

G. Owners Right to Clean

1. Should the Contractor fail or refuse or neglect to remove rubbish and waste materials and temporary work or clean the buildings and premises as required herein, then the Owner may or shall, without obligation to do so, remove and dispose of said rubbish, waste materials and temporary work, and clean the buildings and premises and deduct the cost thereof from any money due or to become due the Contractor under his Contract.

H. When Project is Completed:

1. Contractor shall clean and maintain the Site in accordance with Division 1, Section 01 77 00, Contract Closeout.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Inspection procedures.

2. Project record document submittal.

3. Operating and maintenance manual submittal.

4. Submittal of warranties.

5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

Advise Owner of pending insurance change-over requirements.

Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

Deliver tools, spare parts, extra stock, and similar items.

Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

Complete testing of systems. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.

1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the

date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer for the Owner's records.

G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency instructions.

2. Spare parts list.

3. Copies of warranties.

4. Wiring diagrams.

5. Recommended "turn around" cycles.

6. Inspection procedures.

7. Shop Drawings and Product Data.

8. Fixture lamping schedule.

1.6 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.

2. Record documents.

3. Spare parts and materials.

4. Tools.

5. Lubricants.

6. Fuels.

7. Identification systems.

8. Control sequences.

9. Hazards.

10. Cleaning.

11. Warranties and bonds.

12. Maintenance agreements and similar continuing commitments.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION +

SECTION 02 22 25

PROPERTY CONDITION ASSESSMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor shall retain a Licensed Professional Engineer to evaluate the condition of the existing buildings and structures within and adjacent to the project area. Property Condition Assessments are to be conducted both prior to and after the completion of construction, at properties within proximity to the site to gauge potential vibration impacts. Inspections will be completed to assess apparent damage from general construction, pile driving and differentiate that from existing damage. Structural inspections may require permission for access to be granted by building owners/tenants.

B. Buildings/locations to be assessed shall include the following:

1) Bathhouse (men's and women's locker rooms)

2) North and South Vendor Spaces (Including towers)

3) Children's Museum

4) South Event Space

5) Tunnel

PART 2 - PRODUCTS

2.1 REPORTS

A. A written Property Condition Assessment (PCA) report shall be prepared at the pre and post construction phase which includes photographs of adjoining properties and existing building interior and exterior.

B. Report shall identify the Peak Particle Velocity (PPV) tolerance limits for each structure based on findings so that the structure will not be impacted by the proposed construction operations.

PART 3 – EXECUTION (NOT USED)

+ + END OF SECTION + +

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SECTION 02 33 13

UNDERGROUND UTILITY LOCATOR SERVICE

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Field Engineering: Section 01 71 23.

1.2 REFERENCES

A. American Society of Civil Engineers, CI/ASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

B. American Public Works Association, Uniform Color Code.”

1.3 DEFINITIONS

A. Utility Quality Levels:

1. Level A: Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.

2. Level B: Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.

1.4 DESCRIPTION

A. Retain an independent utility locator service company to field locate and mark existing underground utilities and service connections. The word "independent" as used above means a person not in the

regular employment of the Contractor or having any vested interest in the Contractor's business.

1. Level B locator service shall be performed in all project areas where excavations, regrading of the ground surface, and penetrations of the ground surface are to be performed.

    a. Contractor shall include a minimum of 32 hours of Level A locator service to locate underground utilities as identified on the contract drawings or as identified during the Level B investigation that require more specific location, invert elevation, size, etc. Level A investigation shall only be performed at locations where shown or as directed.

    b. In heavy metal areas, such as near perimeter fences, ground penetrating radar shall be used to determine the location of underground utilities. The use of equipment that induce a tracing signal along the utility path (such as a Metrotech unit) can cause false readings, shall not be used within five feet of fences.

2. The Level A investigation shall be performed as follows:

    a. Hand excavation may be performed for depths of three feet or less.

    b. Vacuum excavation shall be performed at depths greater than three feet.

    c. All excavation test pits shall be backfilled by close of business that day.

3. Support and protect all utilities and service connections to remain in place.

4. The locator service shall field locate and mark underground utilities and service connections prior to excavation.

5. The contractor shall be responsible for coordinating the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.

6. All costs associated with the repair of underground utilities and service connections hit/damaged during the investigative work shall be the responsibility of the contractor.

7. Utility location services shall be in accordance with the provisions of CIASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

1.5 SUBMITTALS

A. Quality Control Submittals:

1. Submit detailed experience and qualification information about the underground utility locator service company and the persons that will be performing the Work. Detailed experience and qualification information shall include:

a. Minimum of five (5) years experience in field locating, marking and staking out of existing underground utilities and service connections.

1) Qualifying Experience: Project information of 5 similar projects, which the locator service company, had worked on during the past 5 years. Information shall include for each project:

a) Name and Address of project.

b) Dates worked on project.

c) Name and telephone Number of contact person at the project site for which the locator service was performed.

b. Description of types of utility locator equipment (investigation equipment) that company will utilize to perform the underground utility investigation.

c. Names of persons that the persons that will be performing the Work, including the number of years of experience and training that the persons have in the use of the equipment. Include copy of training certificates for locator equipment proving the person performing the locator service are trained on the equipment being used.

2. Submit Quality Control Submittals within 10 days of contract award.

B. Investigative Report:

1. Submit detailed written report and scaled drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified.

a. All documentation shall be referenced to existing data (horizontal and vertical) previously established.

b. Provide three (3) paper copies and one (1) electronic copy of detailed written report and drawings.

2. Submit Investigative Report at least two weeks prior to advancing construction within the scheduled areas of excavation within the project site.

1.6 COORDINATION AND SCHEDULING

A. Coordinate the Work to determine the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.

B. Coordinate the Work with the Westchester County personnel to minimize utility disruptions and facility operations. Provide a schedule for the Work required to the Westchester County personnel for approval. Upon approval of the schedule, notify the Westchester County personnel a minimum of three (3) working days prior to performing the Work.

C. Within the areas of excavation, all underground utilities and service connections shall be field located and their locations marked at least two (2) weeks prior to the performance of the required excavation work.

PART 2 PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 WORK AREAS AND PERFORMANCE

A. If any underground utilities and service connections are hit or damaged during the Work, immediately inform the Engineer for directions on how to proceed.

B. The utility locator service investigative work, field location and marking of underground utilities and service connections and

submission of the investigative report must be completed before any excavation work can begin.

1. Contractor shall maintain markings throughout the contract duration or until a time when directed (in writing) by the Engineer that maintaining of the markings are no longer required.

C. Provide subsurface investigation information, detailed written report and drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified, prior to the performance of the required excavation work.

D. If during the Level B investigations, unknown underground utilities are discovered, the Engineer shall be notified as soon as possible or before the close of that business day.

E. Field Marking of underground utilities shall follow the American Public Works Association (APWA) uniform color code:

White: Proposed Excavation.

Pink: Temporary Survey Markings.

Red: Electric power lines, cables, conduit and lighting cables.

Yellow: Gas, oil, steam, petroleum and gaseous material.

Orange: Communications, alarm, signal lines, cables or conduit.

Blue: Potable water.

Purple: Reclaimed water, irrigation and slurry lines.

Green: Sewer and drain lines.

+ + END OF SECTION + +

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SECTION 02 40 00

DEMOLITION, REMOVALS AND MODIFICATIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Contractor shall furnish all labor, materials, equipment and incidentals required for demolition, removals and disposal Work shown, specified and required to complete the project. Included are all modifications of existing facilities as shown and required to complete the Work.

B. Included, but not limited to, are demolition and removals of existing materials, equipment, or work necessary to install the new Work as shown and specified and to connect same with existing work in an approved manner. The Work includes foundations, wooden exterior structures, manholes, piping, power lines, electrical and mechanical equipment, appurtenances, paving, walks, trees, shrubs, utilities and similar existing facilities.

C. Demolitions, removals and modifications which may be specified under other Sections shall conform to requirements of this Section.

D. Protection of site work and adjacent structures.

E. Disconnection, capping and removal of utilities.

F. Dismantled items to be retained by the Owner and to be reinstalled.

G. No explosives are permitted.

H. Related Work Specified Elsewhere:

1. Section 31 23 16, Excavation.

1.2 SUBMITTALS

In accordance with the procedures and requirements set forth in the General Conditions and Division I, the Contractor shall submit the following to the Engineer for approval

A. Schedule: Submit for approval proposed methods, equipment, and operations sequence. Include coordination for shut-off, capping, temporary services, continuation of utility services, and other applicable items to ensure no interruption of sewage flow or treatment.

B. Submit selective demolition schedule.

C. Informational Submittals: Submit copies of any notifications, authorizations and permits required to perform the Work. Submit a shipping receipt or bill of lading for all universal waste shipped.

1.3 JOB CONDITIONS

A. Protection

1. Contractor shall execute the demolition and removal Work to prevent damage or injury to structures, existing building services, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.

2. Contractor shall provide interior and exterior shoring, bracing and support to prevent movement, settlement, or collapse of existing structures or facilities. The Owner assumes no responsibility for the actual condition of the structures or facilities adjacent to the Work or the structures or facilities designated for removal or modifications.

3. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials will not be permitted without proper permits and notifications, and all operations shall be conducted with a minimum interference to vehicular or pedestrian traffic.

4. Contractor shall erect and maintain barriers, lights, sidewalk sheds, and other required protective devices.

5. Contractor shall repair damages caused by his operation to facilities to remain, or to any property belonging to the Owner, utilities, or occupants of the facilities.

6. Contractor shall design, erect, install and maintain temporary partitions and enclosures required to eliminate dust, noise and debris from adjacent buildings.

7. The Work shall comply with the applicable provisions and recommendation of ANSI AIO.2, Safety Code for Building Construction, all governing codes and as hereinafter specified.

8. Contractor shall exercise precautions for fire protection. Burning of debris shall not be permitted.

B. Scheduling

1. Contractor shall carry out all operations so as to avoid interference with operations.

2. The Contractor shall proceed with the removal of the equipment, piping and appurtenances in a sequence designed to maintain stormwater and sanitary sewer flows.

3. The Contractor shall be solely responsible for making all necessary arrangements and for performing all necessary work involving the discontinuance or interruption of all utilities or services.

4. Any equipment piping or appurtenances removed without proper authorization, shall immediately be replaced to the satisfaction of the Engineer at no cost to the Owner.

C. Notification

1. At least 48 hours prior to commencement of a demolition or removal, Contractor shall notify the Engineer in writing of his proposed schedule therefore. Owner will inspect the existing equipment and review with the Contractor those items which are to remain the property of the Owner. No removals shall be started without the permission of the Engineer.

D. Explosives

1. Do not bring explosives on site. No explosives will be permitted for this Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. Disposition of Materials and Equipment.

1. All materials and equipment removed from existing work, shall become the property of the Contractor, except for those items which the Owner has identified and marked, to remain the property of the Owner. All materials and equipment so marked by the Owner shall

be carefully removed by the Contractor, so as not to be damaged, and shall be cleaned of all solids and stored on or adjacent to the site in a protected place specified by the Owner.

2. Contractor shall dispose of all demolition materials, equipment, debris, and all other items not to remain as property of Owner, off the site and in conformance with all existing applicable laws and regulations.

B. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the Work.

C. Demolition and Removals:

1. Unless otherwise approved by Engineer, proceed with demolition and removals from the top of the structure.

2. Locate, identify, disconnect and seal or cap off utilities in buildings/ structures to be demolished.

3. Demolish concrete and masonry in small sections.

4. Break up and remove foundations and slabs where shown.

5. Locate demolition and removal equipment throughout the structure in such a way and remove materials as frequently as necessary so as to not impose excessive loads to supporting walls, floors or framing.

D. The Contractor, Owner, and Engineer shall jointly survey the condition of the adjoining structures prior to the execution of the work. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims. Photographs shall be taken in accordance with the requirements of the General and Supplementary Conditions.

E. Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the

authorities having jurisdiction. Do not interrupt utilities servicing occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.

F. Cease operations if public safety or remaining structures are endangered. Perform corrective measures immediately. Notify authority having jurisdiction and the Owner. Do not resume operations until directed by the Owner.

G. Do not damage building/mechanical/electrical elements and improvements indicated to remain.

H. Do not use demolition debris as backfill.

3.2 STRUCTURAL REMOVALS

A. Contractor shall remove concrete and structures to the lines and grades shown unless otherwise directed by the Engineer. Where no limits are shown, the limits shall be 4 inches outside the item to be installed. The removal of masonry beyond these limits shall be at the Contractor's expense and these excess removals shall be reconstructed to the satisfaction of the Engineer with no additional compensation to the Contractor.

B. Locate, identify, disconnect and seal or cap off existing utilities in buildings, tanks, chambers and structures to be demolished.

C. Determine the thickness of existing concrete to be removed and the extent to which they are reinforced. No additional compensation will be made because of variations from the thickness shown or for variations in the amount of reinforcement.

D. All concrete, brick, tile, concrete block, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure shall be removed and taken from the site, unless otherwise approved by the Engineer. Demolished items shall not be used in backfill.

E. After removal of parts or all of masonry walls, slabs and like work which tie into new Work or existing work, the point of junction shall be neatly repaired so as to leave only finished edges and finished surfaces exposed.

3.3 PAVEMENT, CURB AND SIDEWALK REMOVALS

A. Remove existing pavement and gravel roadway including base and surface courses, stabilized sub-bases, curbs, and gutters as required to construct new facilities or as shown. Before removing, saw a straight joint at least

1-1/2-inches deep between sidewalk and pavement designated for removal and that left in place. Provide neat saw cuts at limits of pavement removal as indicated. Curbs and gutters shall be removed to the nearest construction joint beyond the end of demolition symbol shown on the Contract Drawings.

B. Determine the thickness of existing pavement, base, sub-base, curb, gutter, driveway pavement, and sidewalk to be removed and the extent to which they are reinforced. No additional compensation will be made because of variations from the thickness shown or for variations in the amount of reinforcement.

C. Provide for satisfactory transition between replaced pavement and sidewalks and the portions remaining in place.

3.4 MISCELLANEOUS REMOVALS

A. Contractor shall remove miscellaneous concrete walls, trees and shrubs, slabs, pipe supports, equipment pads, and curbs where shown on the Drawings or where necessary for the modification of the existing structures. Anchor bolts shall be cut back one inch below the surface and patched.

3.5 MODIFICATIONS AND CLOSURES

A. Modifications shall conform with all applicable Specifications, the Drawings, and the directions and approvals of the Engineer.

B. Where alterations require cutting or drilling into existing floors, walls, and roofs the damages shall be repaired in an approved manner. Contractor shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the Engineer. All repairs shall be smoothly finished unless otherwise approved by the Engineer.

C. Openings in existing concrete slabs, ceilings, roofs, masonry walls, floors and partitions which are not to be used in the new Work shall be closed and sealed as shown.

D. All existing structures are to remain in service, demolish the portions to be removed, repair damages, and leave the structure in proper condition for the intended use. Remove concrete and masonry to the lines designated by drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp straight edges that will result in neat joints with new construction or be satisfactory for the purpose intended. Where existing reinforcing rods are to extend into new construction, remove the

concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing flush with the surface.

E. New Work shall be keyed into the existing in an acceptable manner. In general, the same or matching materials as the existing adjacent surface shall be used. The finished closure shall be a smooth, tight, sealed, permanent closure with all exposed surfaces smooth finished and acceptable to the Engineer.

F. Where existing reinforcement is to be exposed and incorporated into new concrete work, this reinforcement shall be sand blasted clean of all rust and concrete residue and painted with a zinc-rich primer paint.

3.6 CLEANUP

A. Contractor shall remove from the site all debris resulting from the demolition operations as it accumulates. Upon completion of the Work, all materials, equipment, waste, and debris of every sort shall be removed and premises shall be left, clean, neat and orderly.

+ + END OF SECTION + +

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SECTION 02 80 00

WASTE TRANSPORTATION AND DISPOSAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish all labor, materials, supplies, equipment, power, facilities and incidentals necessary to label, sample, test, manifest, transport and dispose of all waste and materials generated by the Work, and designated for removal from the site by the Owner, and any other materials as shown on the Contract Drawings and as directed by the Owner.

B. Labeling, sampling, testing, manifesting, transporting and disposing of waste shall be performed in accordance with all applicable federal, state and local laws and regulations, including NYSDEC hazardous waste and transporter regulations (6 NYCRR Parts 364, 370-376) and USEPA PCB TSCA regulations (40 CFR Part 761) and the requirements of the disposal facility.

C. The Contractor shall prepare and issue all notifications and apply for and obtain all permits and approvals required to complete the Work. All fees for licenses, permits, tolls, approvals, taxes, transportation fees, etc. shall be the responsibility of the Contractor.

D. The Work shall be performed in accordance with all the approved submittals.

E. Materials removed from the site shall be transported directly to facilities which have received prior approval of the Owner.

F. Related Work Specified Elsewhere:

1. Section 02 40 00 – Demolition, Removals and Modifications.

2. Section 02 83 00 – Hazardous Materials Removal.

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

A. The Contractor shall provide all required notifications to federal, state and local agencies prior to transporting material off-site. Copies of all

notifications issued by the Contractor shall be transmitted to the Engineer at the time of issuance.

B. Contaminated materials removed from the site shall not be combined with non-contaminated material. Material characterized as hazardous waste, if any, shall not be combined with any other material.

C. The Contractor shall be responsible for all sampling and analyses required for disposal. The Contractor shall provide his own data for this purpose. All sampling shall be conducted with the Engineer present. The Contractor shall be required to obtain approval from the Engineer and the Owner of the sampling and analytical methods and the analytical laboratory to be used. The results of all analyses shall be submitted to the Engineer prior to removal of any material from the site. The time and date of collection and sample identification numbers shall be clearly indicated on the results of analyses furnished to the Engineer.

D. The Contractor shall acquire and complete all required manifest forms and bills of lading as required by applicable laws and regulations for transportation and disposal of materials off-site. The Contractor shall provide all required manifests and bills of lading to the Engineer along with all requested backup documentation. The Engineer or Owner's Representative shall sign manifests and bills of lading for the Owner. However, the Contractor shall be responsible for assuring that all notifications, labeling, documentation, sampling, analysis, transportation and disposal requirements of the disposal facility, and federal, state and local requirements are complied with and properly documented. Waste manifests submitted to the Owner and Engineer shall be furnished with a certification signed by the Contractor stating that all requirements of the disposal facility, and federal, state and local governments are complied with.

E. The Contractor shall provide letters of commitment from all disposal facilities to the Engineer. The letters of commitment shall state that the facility is able to accept the waste which the Contractor intends to ship to the facility.

1. Letters of Commitment shall be obtained by the Contractor from all waste haulers and from all transfer, treatment, storage and disposal facilities to which the Contractor intends to ship any and all waste and other materials generated by the Work. The letters of commitment shall specifically identify the types and quantities of waste that the facility will be able to accept from the Contractor, the permit numbers for all facilities at which the waste will be accepted and all waste characterization requirements. In the event that a facility (such as a privately owned treatment works) is prohibited from issuing a letter of commitment without a sample of the waste, a

conditional type letter will be acceptable. Such a conditional letter shall specifically state what types and quantities of waste the facility will accept. In addition, the following information shall be submitted:

a. For each waste hauler

1) Name and federal and state identification numbers.

2) Address.

3) Name of responsible contact for the hauler.

4) Telephone number for the contact.

5) List of types and sizes of all transport vehicles and equipment to be used.

6) A description of proposed transportation route, method and procedures for hauling waste material, including type of vehicles that will be used for each type of waste.

7) Copies of any and all necessary permits and authorizations for each type of waste transported, including the transporter's EPA ID Number and Part 364 Permit Number, if applicable.

b. For each transfer, treatment, storage and disposal facility, the Contractor shall submit the following information.

1) General Information:

a) Facility name and federal and state identification numbers

b) Facility location

c) Name of responsible contact for the facility

d) Telephone number for contact

e) Signed letter of commitment to accept waste as specified in this Contract

f) Unit of measure utilized at facility for costing purposes

2) Copies of all permits, licenses, letters of approval, and other authorizations to operate, held by the proposed

facility as they pertain to receipt and management of waste derived from this Contract.

3) The Contractor shall identify the unit(s) that the facility will use to manage the waste.

4) The Contractor shall provide the date of the proposed facility's last compliance inspection by all federal, state and local government agencies.

5) List of all active (unresolved) compliance orders (or agreements), enforcement notices, or notices of violation issued to the proposed facility.

6) For all facilities utilized for the disposal of metal coated with or containing lead, the Contractor shall provide all information required by 6 NYCRR Part 371.1(c)(7)(ii).

F. Vehicles used to haul materials shall be designed, equipped, operated and maintained to prevent leakage, spillage or airborne emissions during transport. The containers shall be lined with 10-mil polyethylene sheeting prior to loading, if determined necessary for the given waste type, as determined by the Engineer.

G. Certified weigh tickets showing the weight of the vehicle at the time of arrival and departure from the disposal facility shall be provided as a prerequisite to payment for all material transported off-site. The weight tickets shall be signed and dated by a representative of the Contractor certifying to the accuracy of all measurements, the date and time of arrival and departure of each vehicle, the disposal location and the vehicle identification number.

+ + END OF SECTION + +

SECTION 02 82 13

ASBESTOS REMOVAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Determination of asbestos content is based upon bulk sampling conducted in July 2019 and March 2020, and subsequent laboratory analysis via Polarized Light Microscopy (PLM), Polarized Light Microscopy for Non-Organically Bound Materials (PLM-NOB) and Transmission Electron Microscopy for Non-Organically Bound Materials (TEM-NOB). Refer to Appendix 3 of the Specifications for the hazardous materials assessment report prepared by D&B Engineers and Architects, P.C., which formed the basis for the identification and quantification of asbestos requiring removal. The following quantities are approximate and shall be field verified by all asbestos abatement contractors before submitting their bids.

1. Removal/Cleanup of the following asbestos-containing materials:

Material Description	Location	Approximate Quantity*	Abatement Procedure
Exterior Wall Stucco	North and South Vendor Spaces and Beachfront Elevation	6,350 SF	Full Containment with Attached Personal and Waste Decontamination Unit
Exterior Concrete Patch on Brick	North Vendor Space, Center of North Facing Wall	5 SF	
Waterproofing Tar Beneath Brick Coping Stone	Exterior Wall Facing Beach	112 SF	Exterior Project - Removal of ACM Materials with a Remote Personal and Waste Decontamination Unit
Roofing Materials (assumed)	Adjacent South Building	50 SF	

B. The Contractor shall sample and test all materials listed as “assumed” as part of the lump sum base bid (Bid Item No. 1). The Contractor shall include the cost for the abatement of the “assumed” materials in the lump sum base bid (Bid Item No. 1). Any “assumed” materials sampled and tested by the Contractor and determined to be asbestos containing materials shall be abated in accordance with the contract documents and paid for under the lump sum base bid (Bid Item No. 1). Any “assumed” materials sampled and tested

by the Contractor and determined not to be asbestos containing materials shall not be abated.

C. The above-referenced ACM materials shall be removed in accordance with all applicable Federal (EPA and OSHA) and New York State Department of Labor (NYSDOL) regulations (including any required variances), and the Contract Documents.

D. The Contractor shall be aware of all conditions of the Project and is responsible for field verifying quantities and locations of all asbestos-containing materials (ACMs) to be removed from the buildings prior to submission of any bid. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work. The quantities presented in this Specification are approximate and should not be used solely as the basis for any bid. The Contractor shall also rely upon the pre-bid walkthrough and above-referenced asbestos survey. In the event that suspect materials not included in this Specification are encountered while the work is in progress, such material shall be tested for asbestos content or assumed positive for asbestos content, and removed in accordance with the procedures herein. Any discovery of new ACM shall not delay the progress of the Work. The Contractor shall immediately notify the Engineer of the discovery of new ACM. If directed by the Engineer, the new ACM shall be removed as specified herein. Refer to the General Conditions for procedures for changes in the work and Contract Price which shall govern payment for such additional ACM.

E. Any special job conditions, including any variances (Site Specific or otherwise) are to be obtained by the Contractor, and any fees associated with procuring these variances shall be included in the Contractor's bid.

F. The Contractor's industrial hygiene practices during asbestos abatement will be monitored by the Owner's representative. The Contractor shall be responsible for monitoring his own construction safety work practices for compliance with the OSHA regulations.

G. Related Work Specified Elsewhere

1. Section 01 74 00, Construction Waste Management.

2. Section 02 40 00, Demolition, Removals and Modifications.

3. Section 02 83 00, Hazardous Materials Removal.

1.2 SPECIAL JOB CONDITIONS

A. Should a site-specific variance be required, it shall be prepared by the asbestos abatement contractor. Items to be included in the variance will be

discussed at the walkthrough, if a variance is determined to be necessary. The variance prepared by the Contractor shall be reviewed by the Engineer prior to submission to the New York State Department of Labor Engineering Division. Any fee associated with procuring this variance shall be included in the Contractor's bid.

1.3 SUBMITTALS

A. Pre-Work Submittals: The Contractor shall submit the following to the Engineer in accordance with the General and Supplementary Conditions:

1. Contractor license issued by NYSDOL.

2. A list of Projects performed within the past two (2) years. For each Project, include the dollar value and references (address, contact and phone number) for the Owner, consultant, and air monitoring firm.

3. Progress Schedule:

   a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.

   b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each work area, building, or phase.

4. Project Notifications as required by Federal and State regulatory agencies together with proof of transmittal.

5. Building Occupant Notification: As required by regulatory agencies.

6. Abatement Work Plan: Provide plans that clearly indicate the following:

   a. All work areas/containments numbered sequentially.

   b. Locations and types of all decontamination enclosures.

   c. Entrances and exits to the work areas/ containments.

   d. Type of abatement activity/technique for each work area/containment.

   e. Number and location of negative air units and exhausts. Also provide calculations for determining number of negative air pressure units required.

   f. Proposed location and construction of storage facilities and field office.

g. Location of water and electrical connections to building services.

h. Specifications for all equipment proposed to be used and Safety Data Sheets for all chemicals proposed to be used.

i. Waste transport routes through the building to the waste storage container.

j. The abatement contractor's health and safety plan shall be provided as an attachment to the abatement work plan.

7. Disposal Site/Landfill Permit from applicable regulatory agency.

8. NYSDEC Waste Transporter Permit.

9. Name, NYSDOH ELAP certificate and NVLAP Certificate from OSHA sample analytical laboratory.

B. Project Close-out Submittals: Within sixty (60) days of project completion, the Contractor shall submit the documents listed below to the Engineer.

1. **Originals** of all waste disposal manifests and disposal logs.

2. Approved abatement work plan.

3. OSHA compliance air monitoring records conducted during the Work.

4. Daily progress log, including the entry/exit log.

5. A list of all workers used in the performance of the Project, including name, NYSDOL certification number and type of certification (e.g., supervisor, asbestos handler, etc.).

6. Disposal Site/Landfill Permit from applicable regulatory agency.

7. Final project notifications and variances, as applicable.

1.4 CODES, PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules and regulations pertaining to Work practices, protection of workers, authorized visitors to the site, persons, and property adjacent to the Work.

B. Perform asbestos-related Work in accordance with Federal and New York State regulations. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. State Licenses: The Contractor must maintain current licenses pursuant to the New York State Department of Labor (NYSDOL) and New York State Department of Environmental Conservation (NYSDEC) for all Work related to this Contract, including the removal, handling, transport and disposal of asbestos-containing materials.

1. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in, or supervise Work on any asbestos project have a valid NYSDOL asbestos handling certificate. The Contractor shall comply fully with any variances secured from regulatory agencies in the performance of the work.

2. Should the Contractor choose to apply for any variance, approval from the Engineer is first required.

D. Agency Notifications: The Contractor shall prepare written notification to EPA Region 2 and to the NYSDOL at least 10 days prior to commencement of Work. The Contractor shall, therefore, be responsible for use and payment of any notifications required for performance of the Work.

E. It is the sole responsibility of the Contractor to determine what, if any, patents are applicable to the project. The Contractor shall pay all royalties and/or license fees. He shall defend all suits or claims for infringement of any patent rights and save the Owner and Engineer harmless from loss, including attorney's fees, on account thereof.

F. Before commencement of Work, the Contractor shall review and adhere to the Contract Documents. Failure to adhere to the Contract Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided; however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.5 APPLICABLE STANDARDS AND REGULATIONS

A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:

B. Federal Regulations:

1. 29 CFR 1910.1001, "Asbestos" (OSHA)

2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)

3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)

4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)

5. 29 CFR 1926, "Construction Industry" (OSHA)

6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)

7. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)

8. 40 CFR 61, Subpart A, "General Provisions" (EPA)

9. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)

10. 49 CFR 171-172, Transportation Standards (DOT)

C. New York State Regulations:

1. 12 NYCRR, Part 56, "Asbestos," Industrial Code Rule 56 (DOL)

2. 6 NYCRR, Parts 360 and 364, Disposal and Transportation (DEC)

3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)

4. New York State Department of Health (NYSDOH) Training Requirements

D. Standards and Guidance Documents:

1. American National Standards Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems

3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)

4. EPA 530-SW-85-007, Asbestos Waste Management Guidance

1.6 AUTHORITY TO STOP WORK

A. The Owner shall have the authority to stop the abatement work at any time a determination is made that conditions are not within Specification and applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Owner. Standby time to resolve the problems shall be at the Contractor's expense.

1.7 HEALTH AND SAFETY

A. Refer to Section 01 35 60, Health and Safety. The following additional health and safety provisions shall also apply to all ACM-related work.

B. Worker Protection: The Contractor shall comply with OSHA and provide and maintain all safety measures necessary to properly protect all individuals that enter the work area.

C. Emergency Actions: In an emergency affecting the safety of life, the work, or adjoining property, the Contractor shall immediately act in such a manner to prevent such threatened loss or injury.

D. Fire Protection and Emergency Egress: The Contractor shall be responsible for the security and safeguarding of all areas turned over by the Owner to the Contractor. The Contractor shall designate to his/her workers and other building occupants the means of egress in case of emergency.

1. The Contractor shall establish emergency and fire exits from the work area. First aid kit, two (2) full sets of protective clothing and respirators shall be provided for use by qualified emergency personnel in the clean room of the decontamination facility.

2. The Contractor shall provide fire watch (as necessary) and logbook throughout the entire term of the project, to protect against fire and unauthorized entry into and around the work area. Any intrusion or incident shall be documented in the logbook. Fire watch personnel shall be present during off-hours shift such as night shift, weekends and holidays when abatement work is not in progress.

1.8 PRE-CONSTRUCTION CONFERENCE

A. A pre-construction conference shall be held as outlined in the General Conditions. The following ACM-related items shall be addressed during the pre-construction conference:

1. Contractor's scope of work, work plan, and schedule to include number of workers and shifts.

2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.

3. Owner and Engineer’s duties, functions and authority.

4. Contractor's work procedures including:

a. Methods of job site preparation and removal methods.

b. Respiratory protection.

c. Disposal procedures.

d. Cleanup procedures.

e. Fire exits and emergency procedures.

5. Contractor's plan for twenty-four (24) hour project security both for prevention of theft and for barring entry of unauthorized personnel into work areas.

6. Temporary utilities.

7. Handling of furniture and other moveable objects.

8. Storage of removed asbestos-containing materials.

9. Waste disposal requirements and procedures.

B. In conjunction with the conference, the Contractor shall accompany the Owner and Engineer on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.9 PROJECT MONITORING, AIR SAMPLING AND INSPECTIONS

A. The Engineer shall serve as the Owner's Representative in regard to the performance of the asbestos abatement project and provide direction as required throughout the entire abatement period.

B. The Contractor is required to ensure cooperation of its personnel with the Engineer for the air sampling and project monitoring functions described below. The Contractor shall comply with all direction given by the Engineer during the course of the project.

C. The Engineer shall provide the following administrative services:

1. Review and approve or disapprove all submittals, shop drawings, schedules and samples.

2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.

3. Review and approve the Contractor's OSHA compliance testing laboratory.

D. The Engineer shall staff the project with a NYSDOL certified Project Monitor to act on the Owner's behalf at the job site. This individual shall be designated as the Project Monitor (PM).

1. The PM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the PM is on-site.

2. The PM has the authority to direct the actions of the Contractor verbally and in writing if the Contractor is not performing the work in compliance with the Contract Documents and all regulations. Such authority does not in any way diminish the Contractor's sole responsibility to perform all Work in accordance with the Contract Documents and regulations. However, only the Owner shall have the authority to Stop Work when gross work practice deficiencies or unsafe practices are reported by the PM or when ambient fiber concentrations outside the removal area exceed 0.01 f/cc or background level, whichever is greater.

   a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.

   b. Standby time required to resolve the situation shall be at the Contractor's expense.

3. The PM shall provide the following services:

   a. Inspection of the Contractor's work practices and procedures, including temporary protection requirements, for compliance with all regulations and Contract Documents.

   b. Provide abatement project air sampling as required by applicable regulations (NYSDOL, AHERA). Sampling will include pre-abatement (background), work area preparation, during abatement and clearance sampling.

   c. Verify daily that all workers used in the performance of the Work are certified by the appropriate regulatory agency.

   d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.

   e. Monitor, verify, and document all waste load-out operations.

   f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.

4. Inspections shall be conducted at various milestones as Work progresses by the PM. Additional inspections shall be conducted as required by work conditions. Progression from one phase of work to the next by the Contractor shall be permitted only after visual inspection and verbal approval by the PM.

E. The Engineer shall provide abatement project air sampling and analysis as required by applicable regulations (NYSDOL, AHERA). Sampling will include background, pre-abatement, during abatement and clearance sampling.

1. Unless otherwise required by applicable regulations, the Engineer shall have samples analyzed by Phase Contrast Microscopy (PCM) using NIOSH Method 7400. Results shall be available within 24 hours of completion of sampling.

2. If the air sampling during abatement reveals airborne fiber levels at or above 0.01 fibers/cc or the background level (whichever is greater) outside the work area, then the Owner shall issue an immediate Stop Work order. The Contractor shall then inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the work area. The Contractor shall bear the burden of any and all costs incurred by this delay.

1.10 CONTRACTOR AIR SAMPLING

A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every work shift in each work area during which abatement activities occur in order to determine that appropriate respiratory protection is being utilized (OSHA Monitoring).

B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.

C. The Contractor's laboratory analysis of air samples shall be conducted by an analytical laboratory certified by the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) and National Voluntary Laboratory Accreditation Program (NVLAP).

1.11 WORK SUPERVISION

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:

1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.

2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one-year experience as a supervisor.

3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the workers.

B. If the Project Supervisor is not on-site, all Work shall be stopped. The Project Supervisor shall remain on-site whenever asbestos removal is being performed. The Project Supervisor cannot be removed from the project without the written consent of the Owner and the Engineer.

C. The Project Supervisor shall maintain the Project Log Book required by New York State Department of Labor and a Waste Disposal Log.

D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the site. The Project Supervisor shall be the primary point of contact for the Project Monitor.

1.12 DELIVERY AND STORAGE

A. Deliver non-contaminated materials to the job site in original packages with containers bearing manufacturer's name and label.

B. Store all materials at the job site in a suitable and designated area.

1. Store materials subject to deterioration/damage away from wet/damp surfaces and under cover.

2. Protect materials from unintended contamination.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.13 TEMPORARY UTILITIES

A. Shut down and lock out all electrical power to the asbestos work areas.

B. Provide temporary 120-208 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos work area.

1. Where available, obtain from the Owner's existing electrical system. Otherwise provide power from other sources (e.g., generator).

2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.

3. Provide adequate "weatherproof" receptacles, to incorporate use by the PM for air sampling.

4. All power to the work area shall be brought in from outside the area through GFCIs at the source.

C. Provide temporary lighting with "weatherproof" fixtures for all work areas including decontamination chambers.

1. The entire work area shall be kept illuminated at all times work is in progress.

2. Provide lighting adequate for the purposes of performing required inspections.

D. All temporary devices and wiring used in the work area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.

E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet project demands.

PART 2 - PRODUCTS

2.1 PROTECTIVE CLOTHING

A. Provide personnel utilized during the project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

2.2 DISPOSAL BAGS, DRUMS AND CONTAINERS

A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with U.S. Department of Transportation required markings.

B. If the asbestos waste has the potential to damage or puncture the disposal bags, burlap sacks shall be utilized as a liner inside the polyethylene disposal bags to prevent puncture or damage to the disposal bags. In addition, 30 or 55 gallon capacity fiber or metal drums capable of being sealed air and water tight may also be used. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.

C. Containers and bags must be labeled with the names of the waste generator and the location at which the waste was generated in accordance with 40 CFR Part 61 (NESHAPs).

D. Labeled ACM waste containers or bags shall not be used for non-ACM waste. Any material placed in labeled containers or bags, whether turned inside out or not shall be disposed of as ACM waste.

2.3 HEPA VACUUM EQUIPMENT

A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

2.4 POWER TOOLS

A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Should the area beyond the work area(s) become contaminated with asbestos-containing materials or elevated fiber levels, immediately stop Work and institute emergency procedures. Contaminated non-work areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal. All costs incurred in decontaminating such non-work areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. NYSDOL certificates shall be on-site prior to admittance of any Contractor's employees to the asbestos work area.

C. Perform all asbestos removal Work using wet removal procedures. Dry removal procedures are not permitted.

D. The following documents shall be posted at the site in an easily accessible location:

1. Company Asbestos Abatement license.

2. Worker's asbestos handling certificates (copies are acceptable provided Workers have original certificates in their possession).

3. Contract Documents.

4. Notifications and variances.

5. Applicable regulations.

6. Material Safety Data Sheets.

7. Abatement Work Plan.

8. List of emergency telephone numbers.

9. Waste Disposal Log.

E. The work area must be vacated by building occupants prior to decontamination enclosure construction and work area preparation.

3.2 PERSONNEL DECONTAMINATION ENCLOSURE

A. Full (five room) Decontamination Facility: The Contractor shall provide a full decontamination enclosure system for large asbestos projects in accordance with OSHA and NYSDOL regulations.

B. Remote Decontamination Facility: The Contractor shall provide a remote personnel decontamination enclosure system for small asbestos projects, asbestos projects that utilize multiple tents, and exterior asbestos roof projects in accordance with OSHA and NYSDOL regulations.

C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Contractor.

3.3 WASTE DECONTAMINATION ENCLOSURE

A. Waste/Equipment Decontamination Enclosure System: This system is located adjacent to the work area and personnel decontamination system. If the decontamination chamber is accessible to the public, it shall be fully framed and sheathed to prevent unauthorized entry. A remote decontamination unit

may be used that complies with 12 NYCRR Subpart 56-7.5(d). This remote enclosure system must be on the property and stationary, within 50 feet of the building.

B. Where only one egress from the work area exists, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste washroom.

C. The waste washroom water shall be drained, collected and filtered as specified by NYSDOL regulations.

D. In small asbestos projects where only one egress from the work area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.4 WORK AREA ENTRY AND EXIT PROCEDURES

A. Personnel Entrance and Decontamination Procedures for Gross Removal Operations Utilizing Full Decontamination Facility:

1. All workers and authorized visitors shall enter the work area through the worker decontamination enclosure system.

2. All individuals who enter the work area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, contractor(s), the project, each work area and worker respiratory protection employed. The Project Supervisor shall be responsible for the maintenance of the log during the abatement activity.

3. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator (with new filters, if appropriate) and clean protective clothing before entering the work area through the shower room and equipment room.

4. Each worker or authorized visitor shall, each time he leaves the work area: remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except the respirator; still wearing the respirator, proceed to the shower room; clean the outside of the respirator with soap and water while showering; remove filters, wet them, and dispose of them in the container provided for that purpose; wash and rinse the inside of the respirator; and thoroughly shampoo and wash himself/herself.

5. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the work area is not permitted outside the work area.

B. Personnel Entrance and Decontamination Procedures for Removal Operations utilizing remote decontamination facility: The following entry/exit procedures shall be used for removal work areas.

1. All individuals who enter the work area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, Contractor, the project, each work area, and worker respiratory protection employed. The Project Supervisor shall be responsible for the maintenance of the log during the abatement activity.

2. Each worker shall remove street clothes in the clean room; wear two disposable suits, including gloves, hoods and non-skid footwear; and put on a clean respirator (with new filters) before entering the work area.

3. Each worker shall, before leaving the work area or tent, clean the outside of the respirators and outer protective clothing by wet cleaning and/or HEPA vacuuming. The outer disposable suit shall be removed in the work area and the worker shall then proceed to the shower room. The inner disposable suit and respirator shall be wet wiped and HEPA vacuumed thoroughly before removing and prior to aggressive shower.

4. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately.

3.5 WORK AREA PREPARATION

A. Work area preparation shall be performed in accordance with NYSDOL regulations and the approved Site Specific Variance, if applicable.

B. Temporary lighting within the work area and decontamination system shall be provided as required to achieve minimum illumination levels.

C. Remove all items attached to or in contact with ACM only after the work area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to their removal from the work area and before the start of asbestos removal operations.

3.6 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. Asbestos-containing materials shall be removed in accordance with NYSDOL regulations and the approved Site Specific Variance, if applicable.

B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.

C. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.

D. Power or pressure washers will not be allowed to be used for asbestos removal or clean-up procedures.

3.7 ACM WASTE CONTAINERIZING, DECONTAMINATION AND LOAD OUT PROCEDURES

A. Packaging of ACM shall conform to OSHA Standard 29 CFR 1926.1101, DOT 49 CFR 171, 172, and 173, and EPA Standard 40 CFR Part 61 and the requirements as herein specified. Materials to be transported through a non-work area building space shall be placed in hard wall shipping containers for handling.

B. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

C. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

D. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.8 WORK AREA CLEANING PROCEDURES

A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, decontamination procedures shall be followed as specified in NYSDOL ICR 56.

B. As a result of any air sampling results that indicate high fiber levels, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

3.9 ASBESTOS WASTE

A. Applicable Regulations: All asbestos waste shall be stored, transported and disposed of in accordance with the following regulations as applicable:

1. NYSDEC 6 NYCRR Parts 360 and 364

2. USEPA NESHAPS 40 CFR 61

3. USEPA Asbestos Waste Management Guidance EPA/530-SW85

+ + END OF SECTION + +

SECTION 02 83 00

HAZARDOUS MATERIALS REMOVAL

PART 1 – GENERAL

1.1 DESCRIPTION

A. The Contractor shall furnish all labor, materials, supplies, equipment, power, facilities and incidentals necessary to remove all hazardous materials that will be impacted by the proposed Work, as shown on the Drawings and Exhibit A of this specification, and as specified and as directed by the Engineer. The Contractor shall remove, transport and dispose of all hazardous materials identified in the buildings in accordance with all applicable federal, state and local regulations. Refer to Appendix 3 of the Specifications for the hazardous materials assessment report prepared by D&B Engineers and Architects, P.C., which formed the basis for the identification and quantification of hazardous materials requiring removal.

B. For bidding purposes, the Contractor shall assume that all paint chips generated during the work shall be managed as hazardous waste in accordance with 40 CFR 260 through 268 and 6 NYCRR 370 through 376. During the work, the Contractor shall be required to properly characterize all paint chip waste in accordance with 40 CFR 261.20 through 261.24 and manage the paint chips in accordance with that characterization, following approval by the Engineer. The waste characterization shall be performed in accordance with the requirements of the disposal facility selected by the Contractor but shall include, at a minimum, analysis for Resource Conservation and Recovery Act (RCRA) metals utilizing the Toxicity Characteristic Leaching Procedure (TCLP). The Contractor shall provide all waste characterization results to the Engineer for approval prior to the removal of any paint chip waste from the site.

C. Note that this specification is only applicable to hazardous materials removals other than asbestos. Refer to Section 02 82 13 (“Asbestos Removal”) for asbestos abatement work.

D. The Contractor shall removal and properly manage all hazardous materials prior to initiating any demolition activities, unless approval is granted by the Engineer. The Contractor shall furnish all labor, materials, services, insurance, permits and equipment necessary to carry out the proper removal, transportation and off-site disposal of these items in accordance with the requirements set forth in this specification. If the Contractor uses a subcontractor to perform the work required under this

Contract, these specifications shall apply to that subcontractor, which shall be referred to as the Hazardous Material Subcontractor. The Contractor's use of a Hazardous Material Subcontractor shall not relieve Contractor of full responsibility for the work to be performed. The requirements included are to be adhered to as they apply to this Contract. The Contractor and subcontractors are responsible for complying with all applicable federal, state and local laws, codes, rules and regulations. Lastly, the quantities of hazardous materials contained in this specification and shown on the Drawings are estimated. The Contractor and its subcontractor shall be responsible for verifying the quantities of hazardous materials and including the management of all such materials in its bid.

E. The project includes work in separate and distinct work areas in the building and/or facilities as described below:

1. Prior to any demolition activities, the Contractor shall utilize appropriately trained workers to perform the required hazardous materials removal. If asbestos is present and the Contractor elects to remove the specified hazardous materials prior to the performance of asbestos abatement, the Contractor shall utilize only New York State Department of Labor (NYSDOL) asbestos workers for the work, who will be working in the regulated abatement areas.

2. Lead abatement is not required as part of this project. However, Contractor shall ensure that all loads of lead-containing/coated materials to be managed as construction and demolition debris or other manner does not exceed the Toxicity Characteristic Leaching Procedure (TCLP) Regulatory Levels for metals (40 CFR 261.24). In the event that a load exceeds a TCLP Regulatory Level, the load must be managed as hazardous waste in accordance with 40 CFR 260 through 268 and 6 NYCRR 370 through 376. In the event that the lead containing/coated component is composed of metal and the Contractor intends to recycle the material as scrap metal, the Contractor shall submit to the Engineer for review and approval the information required by 6 NYCRR 371.1(c)(7)(ii) prior to the removal of any such material from the site. Lead in paint analytical results are summarized in the hazardous materials assessment report. The Contractor shall perform all work involving lead-containing/coated materials in accordance with OSHA's "Lead in Construction" Rule (29 CFR 1926.62).

3. Contractor shall assume that all fluorescent light ballasts contain over 500 parts per million (ppm) of PCBs, unless the ballasts are labeled "Non-PCB" or similar. All ballasts are to be

removed in USDOT-approved 55-gallon drums and recycled pursuant to 40 CFR 761.60-62 and 49 CFR 172.

4. Contractor shall remove and manage all lamps, batteries and thermostats as Universal Waste in approved containers pursuant to the New York State Department of Environmental Conservation's (NYSDEC's) Universal Waste regulations found at 6 NYCRR 274-3.

5. Contractor shall assume that the refrigerant-containing equipment contains chlorofluorocarbons (CFCs) regulated under the United States Environmental Protection Agency (USEPA) Protection of Stratospheric Ozone regulations found at 40 CFR Part 82. Contractor shall manage all refrigerants in accordance with 40 CFR Part 82.

6. Contractor shall perform a waste determination on all chemicals and miscellaneous wastes in accordance with 40 CFR 261 and 6 NYCRR 371. Contractor shall utilize product literature (e.g., Safety Data Sheet [SDS], technical data and literature, etc.) in performing the waste determination. In the event that the chemical or miscellaneous waste to be disposed is an unknown, the Contractor shall collect a sample of the waste and have it analyzed by a laboratory for the parameters necessary to perform a proper waste determination. The Contractor shall manage the chemical or miscellaneous waste at a facility authorized to manage such waste based on the Contractor's waste determination.

7. Contractor shall manage all used oil in accordance with 40 CFR 279 and 6 NYCRR 374-2 and perform all required sampling contained therein. If the petroleum product is a virgin product, the Contractor may send the product to a facility authorized for such reuse. In the event that the petroleum product does not meet the definition of "used oil" and cannot be reused, the Contractor shall perform a waste determination on the product in accordance with 40 CFR 261 and 6 NYCRR 371. Contractor shall utilize product literature (e.g., Safety Data Sheet [SDS], technical data and literature, etc.) in performing the waste determination. In the event that the petroleum product to be disposed is an unknown, the Contractor shall collect a sample of the product and have it analyzed by a laboratory for the parameters necessary to perform a proper waste determination. The Contractor shall manage the petroleum product at a facility authorized to manage such waste based on the Contractor's waste determination.

8. The Contractor shall prepare manifests and/or shipping papers for the waste. The Contractor shall provide prepared manifests and/or shipping papers to the Engineer for review and signature by the Owner or authorized agent.

9. Contractor shall provide sufficient containerized storage or secured stockpiles to allow for testing of the materials after removal, and before disposal, in accordance with the disposal facility's requirements. The Contractor shall have the appropriate permits for the disposal facilities to accept the material. Applicable permits or certification by the disposal facility that they will accept the material throughout the contract time is required.

10. All material shall be transported under bills of lading or manifests approved by the Owner.

11. If, at any time, the Engineer decides that work practices are violating pertinent regulations or, in its opinion, endangering workers or the public, the Engineer will immediately notify the Contractor (followed up in writing) that operations shall cease until corrective action is taken by the Contractor. The Contractor shall take such corrective action before proceeding with the Work. Loss or damage due to Stop Work Order(s) shall be the Contractor's responsibility.

F. Related Work Specified Elsewhere:

1. Section 01 35 60, Health and Safety.

2. Section 02 40 00, Demolition, Removals and Modifications.

3. Section 02 82 13, Asbestos Removal.

4. Section 01 74 00, Construction Waste Management.

1.2 PHASING OF WORK

A. The Contractor shall perform and complete the hazardous material removal activities as directed by the Owner and the Engineer, prior to any demolition activities so as to not commingle the waste streams. The Contractor shall prepare manifests and/or shipping papers for the waste and provide to the Engineer for review and signature by the Owner or authorized agent.

1.3 OWNER TO STOP WORK

A. The Owner and the Engineer shall have the authority to stop the work at any time that a determination is made that conditions are not within Specification and/or applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Owner and Engineer. Standby time and cost to resolve the problems shall be at the Contractor's expense.

1.4 HEALTH AND SAFETY REQUIREMENTS

This subsection is intended to supplement the requirements of Section 01 35 60 (“Health and Safety”).

A. General Description:

1. The Contractor shall be responsible for compliance with the most stringent provisions of the applicable statutes and regulations of the State of New York and the United States, and that, without limitation, the provisions of the United States Department of Labor Occupational Safety and Health Administration (OSHA) are observed and that the methods of performing the work do not involve undue danger to the personnel employed thereon, the public, and public or private property. Should charges of violation of any of the above be issued to the Contractor in the course of the work, a copy of each charge and resolution thereof, shall immediately be forwarded to the Owner.

2. The Contractor shall provide materials, equipment and training to its workers to ensure their protection from any chemical/biological hazards that may be identified during the course of this work.

3. Physical Hazards: The Contractor shall provide safety equipment and training to its workers to ensure their protection from any physical hazards including but not limited to trip/fall hazards, working at elevation, working on an inclined work area, heat stress, contact with energized (hot) active equipment, noise, overhead bump hazards, and electrical shock that may be present during the Work. Specific requirements include the development and implementation of a site-specific Health and Safety Plan (see Section 01 35 60). Documentation of training in the use of fall and fire protection equipment and methods shall be required for all site personnel. The Contractor shall provide a competent on-site person to supervise the project at all times.

4. Safety Act: The Williams-Steiger Occupational and Safety Health Act (OSHA) of 1970, as amended, shall be strictly complied with during the course of this project. This Act shall govern the conduct of the Contractor's workmen, tradesmen, material men, subcontractors, and visitors to the project site.

5. Accident Prevention: In order to protect the lives and health of his employees, the Contractor shall comply with all pertinent provisions of the latest edition of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc. and shall maintain an accurate record of all accidents which occur during the project. After attending to the injured person(s), the Contractor must immediately report an injury or loss of life to the Owner and Engineer, and a copy of the Contractor's report to his insurer of an accident must be provided to the Owner and Engineer.

6. Emergency Response: The Contractor shall establish an Emergency Response Team made up of members of his work force. Team members shall be trained, organized, and capable of responding in the event of an accident, fire, or other emergency. The Contractor shall designate a site Safety Coordinator to train team members regarding the location and use of site-specific fire/life safety equipment. As a minimum requirement, members of the Emergency Response Team shall be knowledgeable in standard first aid and CPR techniques, fire extinguisher use, and evacuation procedures.

7. Workmen Protection: The Contractor shall provide and maintain all safety measures necessary to properly protect workmen.

8. Emergency Actions: In an emergency affecting safety or life, the work or an adjoining property, the Contractor, to prevent such threatened loss or injury without special instruction or authorization from the Owner or the Engineer, is hereby permitted to act at his discretion.

9. Hazard Communication Act: The Contractor shall comply with the Hazard Communication Standard promulgated by the Occupational Safety and Health Administration (29 CFR 1910.1200). This program ensures that all employers provide the information and training that employees need to work safely and to design and implement an employee protection program. It also provides necessary hazard information to employees, so they can participate in, and support, the protective measures needed at their workplace. The Contractor shall ensure that labels or other forms

of warning are legible in English. The Contractor shall provide employees who speak other languages, as required, to communicate with employees in their language.

1.5 WORK SUPERVISION AND COORDINATION

A. Contractor's Supervisor: From the start of the Work through project completion, the Contractor shall have on-site a responsible and competent supervisor. The Supervisor shall be on-site during all working hours. When the Supervisor must leave the site during the Work, all work must cease unless a replacement Supervisor is present. The Supervisor must be fluent in speaking and writing English.

B. Quality of Work: The Supervisor shall supervise, inspect and direct the Work competently and efficiently, devoting such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Supervisor shall be responsible to see that the Work complies accurately with the Contract Documents, and that all Work is of good quality and workmanship.

1.6 SUBMITTALS:

A. The Contractor shall submit the following, as noted below, in accordance with the requirements specified in Section 01 33 00, Submittal Procedures.

Pre-Project Submittals shall be submitted prior to the performance of any work, as follows:

1. Hazardous Material Removal Work Plan: Provide a detailed written Hazardous Material Removal Work Plan that describes the procedures for the removal, characterization, packaging, loading, transportation and off-site disposal of the hazardous materials identified for disposal. The plan shall include, at a minimum, the following:

    a. Identification of proposed transporters and disposal/recycling facilities for the off-site disposal/reuse of hazardous materials (see Section 02 83 00). The waste to be sent to each disposal facility shall be specified.

    b. Copies of applicable permits for the proposed transporters and disposal/recycling facilities (see Section 02 83 00).

    c. Proposed level of worker training for each type of hazardous material to be removed.

d. Names and applicable licenses of key personnel.

e. Proof of appropriate training for workers.

f. Proof of a current medical surveillance program for all Contractor personnel to work on this project.

g. Safety Data Sheets (SDS) for any chemicals to be used on this project. All products to be used on this project must have an SDS approved by, the Engineer.

h. Proposed Detailed Work Schedule

i. Procedures for the characterization of unknown materials including, but not limited to, sample collection procedures, number of proposed samples and analytical methods.

j. Proof of experience required by Part 1.11 of this Section.

k. Detailed procedures for compliance with OSHA's "Lead in Construction" Rule (29 CFR 1926.62) for all work involving lead-containing/coated materials including, but not necessarily limited to, removal procedures, barrier locations and construction, dust mitigation measures, air filters, personal protective equipment, specific tools/equipment used (make, model number and manufacturer's spec sheet), waste management practices, housekeeping, dust removal and clearance.

2. A list that identifies the make, model, truck number and registration plate number of each of the trucks that will transport the material to the off-site facilities. Any change of trucks, or additional trucks, must have prior approval at least 24 hours in advance.

3. Results of all analytical sampling data and complete copies of all chain-of-custody forms shall be provided to the Owner at the completion of the work, unless specified otherwise.

B. During Work Submittals:

1. Schedule of Work Change: Any changes in the Schedule of Work proposed by the Contractor shall be submitted for approval no later than seven days prior to the commencement date of the proposed change.

2. A certified, signed, and completed copy of each waste shipment record form used, and receipts from the off-site disposal or recycling facility which acknowledge the Contractor's delivery(s) of material, shall be submitted to the Engineer and Owner within thirty days following removal of hazardous materials from the site.

C. Post Project Submittals:

1. A notarized "Release of Liens" in a form acceptable to the Owner. The Contractor shall use the Standard AlA form. Such notarized release of all liens shall certify that all subcontractors, labor suppliers, etc., have been paid their pro rata share of all payments to date, that the Contractor has no basis for further claim, and will not make further claim for payment in any account after the first payment is made to him.

2. Compilation of all completed and signed waste shipment record forms, bills of lading or disposal/recycling receipts pertaining to this project.

3. Contractor shall submit the following items as part of its final submittals: Paid invoice verifications for subcontractor, service contract agreement, insurance certificates, copies of the worker licenses, if required, and other submittals required for the Specification.

1.7 FIRE PROTECTION AND EMERGENCY EGRESS

A. The Contractor shall be responsible for the security and safeguarding of all areas turned over by the Owner to the Contractor. The Contractor shall identify to his workers and other building occupants the means of egress in case of emergency.

B. The Contractor shall establish emergency and fire exits from the work area. First aid kit, protective clothing and respirators shall be provided for use by qualified emergency personnel.

1.8 CLEANUP

A. Final Site Cleaning: Upon completion of the work, the Contractor shall remove all temporary construction, decontamination facilities, and unused materials placed on-site by the Contractor; leave the premises in a neat and clean condition; and perform all sweeping, cleaning and washing required to restore the condition of the site to its original condition.

1.9 CODES, PERMITS AND STANDARDS

A. The Contractor shall be solely responsible for compliance with all applicable federal, state and local laws, ordinances, codes, rules and regulations that govern the removal, characterization, storage, transportation and off-site disposal or recycling of the hazardous materials listed in the Contract Documents. The current issue of each document shall govern. All work shall comply with all applicable codes and regulations as amended. The applicable regulations for the removal, characterization, storage, transportation, and off-site disposal and/or recycling of the hazardous materials include, but may not limited to, the following:

Code of Federal Regulations (CFR)

1. 29 CFR 1910, Occupational Safety and Health Regulations for General Industry

2. 29 CFR 1926, Occupational Safety and Health Regulations for Construction

3. 40 CFR 261, Identification and Listing of Hazardous Wastes

4. 40 CFR 262, Standards Applicable to Generators of Hazardous Waste

5. 40 CFR 263, Standards Applicable to Transporters of Hazardous Waste

6. 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

7. 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

8. 40 CFR 268, Land Disposal Restrictions

9. 40 CFR 302, Designation, Reportable Quantities and Notification

10. 40 CFR 355, Emergency Planning and Notification

11. 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

12. 49 CFR 171-179, Hazardous Materials Transportation Act

Codes, Rules and Regulations of the State of New York (NYCRR) Title 6

1. Part 360, Solid Waste Management Facilities General Requirements

2. Part 361, Material Recovery Facilities

3. Part 362, Combustion, Thermal Treatment, Transfer and Collection Facilities

4. Part 363, Landfills

5. Part 364, Waste Transporters

6. Part 365, Regulated Medical Waste and Other Infectious Wastes

7. Part 370, Hazardous Waste Management

8. Part 371, Identification and Listing of Hazardous Wastes

9. Part 372, Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities

10. Part 373, Treatment, Storage, and Disposal Facilities

11. Part 374-2, Standards for the Management of Used Oil

12. Part 374-3, Standards for the Management of Universal Wastes

13. Part 376, Land Disposal Restrictions

14. Part 380, Prevention and Control of Environmental Pollution by Radioactive Materials

15. Part 381, Transporters of Low-Level Radioactive Waste

16. Part 596: Hazardous Substance Bulk Storage Facility Registration

17. Part 597: Hazardous Substances Identification, Release Prohibition, and Release Reporting

18. Part 598: Handling and Storage of Hazardous Substances

19. Part 613: Petroleum Bulk Storage

B. Where conflict among requirements or with these specifications exists, the more stringent requirements shall apply.

C. Permits, State Licenses and Notifications: The Contractor shall be responsible for obtaining necessary permits, licenses and certifications of personnel in conjunction with removal, hauling and disposition of

hazardous materials and shall provide timely notification of such actions as may be required by federal and state authorities. Fees and/or charges for these licenses, permits and notifications shall be paid by the Contractor. Contractor shall use all notification forms where applicable.

1.10 TERMINOLOGY

A. The following commonly used terms are defined in the context of these specifications:

1. Authorized Visitor: Representatives of any regulatory or other agency having jurisdiction over the project.

1.11 Requirements And Qualifications

A. Minimum Experience: The Contractor shall have a minimum of 3 years experience with removal of hazardous materials, as evidenced through participation in at least three projects of comparable complexity to this project.

B. Experience and Training: All personnel shall at a minimum receive information and training with regards to the hazardous materials in these specifications, as per OSHA 29 CFR, 1910.1200(h). Additional training requirements are as follows:

1. Workers shall have appropriate training for lead exposure, as specified by OSHA in Lead Exposure in Construction (29 CFR part 1926).

2. Workers shall have NYSDOL asbestos worker certifications unless asbestos abatement is not required or has been completed prior to hazardous material removals. Proof of such experience shall be submitted upon request by the Owner. Improperly trained, untrained or inexperienced personnel shall not be allowed in the work area(s). Personnel shall meet minimum training and experience requirements outlined in this Section.

3. All workers engaged in the removal of hazardous waste shall be 40-hour OSHA hazardous waste training per OSHA 29 CFR 1910.120(e)(3).

1.12 TESTING AND INSPECTION REQUIREMENTS AND RESPONSIBILITIES

A. Visual inspections will be performed by the Owner or Engineer during and after removal of hazardous materials to document compliance with these specifications.

1.13 QUALITY ASSURANCE

A. Qualifications

1. Companies specializing in performing the Work of this Section shall have a minimum of 3 years experience and shall have worked on 3 projects of similar size.

2. The work shall be performed by OSHA-certified workers, who are experienced in handling petroleum-contaminated material, hazardous materials and hazardous wastes.

B. Regulatory Requirements

1. Work of this Section shall conform to all requirements of all applicable regulations of governmental authorities having jurisdiction, including safety, health and anti-pollution regulations. Where more severe requirements than those contained in the Building Code or other applicable regulations are given in this Section, the requirements of this Section shall govern.

2. Work outside the street line shall conform to the requirements of the governmental authorities or utilities having jurisdiction (e.g., DOT, DEC, etc.). Where more severe requirements than those contained in the applicable regulations are given in this Section, the requirements of this Section shall govern.

3. The Contractor shall conform to the requirements of OSHA's Hazardous Waste Operations and Emergency Response, as required.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROTECTION

A. All Contractor personnel shall wear personal protective equipment and protective clothing consistent with the level of protection required for this work as specified by OSHA and the site-specific health and safety plan.

B. The Contractor shall be responsible for the safety of its operation, and for any damage that may result from the Contractor's work. Erect and properly maintain at all times, as required by the conditions and progress of the work, proper safeguards for the protection of workers and the public and post danger warnings as required by law or otherwise required by the Contract Documents regarding hazards created by the Contractor's operation. Furnish, install and remove after completion of the work, all signs, lights, barricades, fencing and other equipment as may be necessary for the safe execution of the Work.

3.2 DISPOSAL OF HAZARDOUS WASTES

A. Description of Work: All hazardous wastes (as defined in 40 CFR 261 and 6 NYCRR 371) shall be transported to an off-site disposal facility meeting the requirements of 40 CFR 264.

1. Hazardous Wastes: The Contractor shall stage hazardous wastes at the site pending off-site disposal. The Contractor shall contract with an approved off-site disposal facility meeting the requirements of 40 CFR 264 or 6 NYCRR 373. The Contractor shall provide the Owner with original copies of all manifests, weigh tickets and original invoices.

+ + END OF SECTION + +

EXHIBIT A

LIST OF HAZARDOUS MATERIALS [1]

SUMMARY OF MATERIALS CONTAINING GREATER THAN 50 PPM PCBs		
Waste Type	Location	Approximate Quantity
Exterior Foundation Wall Caulk	North Vendor Space, South Facing Wall	40 Linear Feet (69 ppm)

SUMMARY OF SUSPECT PCB-CONTAINING ITEMS		
Waste Type	Location	Approximate Quantity
Ballasts	Chlorine Room, South Vendor Space	4
	Women's Restroom - Slop Sink Room	1
	Women's Locker Room - Hot Water Heater Room	2
	Hall to Pool Filtration Room	2
	Pool Filtration Room	4

SUMMARY OF UNIVERSAL WASTE		
Waste Type	Location	Approximate Quantity
Fluorescent Lamps	Lamp Posts, Surrounding Pool	7
	Chlorine Room, South Vendor Space	16
	Women's Restroom - Slop Sink Room	2

SUMMARY OF UNIVERSAL WASTE		
Waste Type	Location	Approximate Quantity
Fluorescent Lamps (contd.)	Women's Locker Room - Hot Water Heater Room	4
	Hall to Pool Filtration Room	4
	Pool Filtration Room	8

SUMMARY OF REFRIGERANT-CONTAINING EQUIPMENT		
Waste Type	Location	Approximate Quantity
Refrigeration Units	North Vendor Space - Concession Area	8
Ice Machine	North Vendor Space - Concession Area	1

SUMMARY OF CHEMICAL AND PETROLEUM PRODUCTS		
Waste Type	Location	Approximate Quantity
Paint	South Vendor Space - Vacant/Storage	Twenty 1-Gallon Containers
Cleaner/Sanitizer	Women's Restroom - Slop Sink Room	One 5-Gallon Container
Fire Extinguishers	North Vendor Space - Concession Area	1
	Women's Locker Room	1
	Men's Locker Room	1

1. Reference: Hazardous Materials Assessment Report.

+ + END OF SECTION + +

SECTION 03 11 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 013300, Submittals

B. Section 017400, Construction Waste Management

C. Section 018113, Construction IAQ Management

E. Section 032100, Steel Concrete Reinforcement

F. Section 033000, Cast-In-Place Concrete

1.2 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

1.3 DESIGN REQUIREMENTS

A. The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of “Guide to Formwork for Concrete” (ACI 347-14).

1.4 SUBMITTALS

A. Product Data: Manufacturer’s catalog sheets, specifications, and installation/application instructions for the following:

1. Form systems and ties.

2. Textured (architectural) form linings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chamfer Strips: Wood, metal, PVC or rubber; 1-inch chamfer, unless otherwise indicated on the Drawings.

PART 3 - EXECUTION

3.1 PREPARATION OF FORM SURFACES

A. Apply form-coating material in accordance with manufacturer's instructions.

3.2 INSTALLATION

A. Provide chamfer on all exposed external corners of concrete.

B. Provisions for Work of Related Contracts: Provide openings in concrete formwork to accommodate Work of related contracts. Obtain information for size and location of openings, recesses and chases from contractor requiring such items.

C. Shores and Supports:

1. Concrete members subject to additional loads during construction shall be shored in such a manner as will protect the member from damage by the loads.

2. Do not remove shores until the member supported has acquired sufficient strength to safely support its weight and any weight imposed thereon.

3.3 REMOVAL OF FORMS

A. Forms and shoring used to support the weight of concrete in beams, slabs and other structural members shall be removed in accordance with recommendations in paragraph 3.2.5 of "Recommended Practice for Concrete Formwork" (ACI 347-14).

B. All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.

C. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

3.4 RE-USE OF FORMS

A. Split, frayed, delaminated or otherwise damaged form facing material shall not be used.

+ + END OF SECTION + +

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install concrete reinforcing.

2. Extent of concrete reinforcing is shown and indicated in the Contract Documents.

3. Work includes fabrication and placement of reinforcing including bars, ties, and supports, and welded wire fabric for concrete, encasements, and fireproofing.

B. Related Sections:

1. Section 01 33 00, Submittal Procedures

2. Section 01 74 00, Cleaning and Waste Management

3. Section 04 20 00, Unit Masonry Construction.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ACI 301, Specifications for Structural Concrete.

2. ACI 315, Details and Detailing of Concrete Reinforcement.

3. ACI 350.5, Specifications for Environmental Concrete Structures.

4. ANSI B212.15, Cutting Tools – Carbide-tipped Masonry Drills and Blanks for Carbide-tipped Masonry Drills.

5. ANSI/AWS D1.4, Structural Welding Code - Reinforcing Steel.

6. ASTM A82, Specification for Steel Wire, Plain, for Concrete Reinforcement.

7. ASTM A185, Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

8. ASTM A615, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

9. ASTM A706, Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

10. ASTM A767, Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

11. ASTM A775, Specification for Epoxy-Coated Steel Reinforcing Bars.

12. ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

13. Concrete Reinforcing Steel Institute (CRSI), CRSI 1MSP, Manual of Standard Practice.

14. ASTM E488, Test Methods for Strength of Anchors in Concrete and Masonry Elements.

15. ICC Evaluation Service (ES) AC 308, Acceptance Criteria for Post-Installed Anchors in Concrete Elements.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Testing Laboratory: Shall meet requirements of ASTM E329 and shall have experience in the testing welded splices of reinforcing steel and tension testing of reinforcing bars set in adhesive in hardened concrete.

2. Installer of Adhesive Dowels: Shall be experienced and certified by manufacturer of adhesive as possessing necessary training for installing manufacturer's products. Distributors or manufacturer's representatives shall not provide product training unless qualified as certified trainers by anchor manufacturer.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Drawings for fabricating, bending, and placing concrete reinforcing. Comply with ACI 301 and ACI 350.5.

b. For walls, show elevations at minimum scale of 1/4-inch to one foot.

1) Elevations shall show all openings and reference details that identify additional reinforcing required around each opening.

2) Elevations shall denote each wall intersection and reference a detail that identifies additional reinforcing required at wall intersection. As an alternate to providing separate details for each wall intersection, provide overall plan detailing only the additional wall intersection reinforcing for each wall intersection.

c. For slabs and mats, show top and bottom reinforcing on separate plan views.

1) Plans shall show all openings and shall reference details that identify additional reinforcing around each opening.

d. Show bar schedules, stirrup spacing, diagrams of bent bars, location of bar splices, length of lap splices, arrangements, and assemblies, as required for fabricating and placing concrete reinforcing unless otherwise noted.

e. Provide plans and elevations detailing location, spacing, and lengths of masonry wall dowels, where masonry is required. Coordinate location of dowels with masonry openings and with standard modular spacing. Submit masonry wall dowels with reinforcing submittal for element into which masonry dowel will be embedded. Coordinate with Section 042000, Unit Masonry Construction.

f. Splices shall be kept to a minimum. For slabs and beams, when splices are required, locate spices in bottom bars within 1/3 span from supports and for top bars locate splices in the middle 1/3 of the span.

g. Drawings detailing location of all construction and expansion joints, shall be submitted and approved before Shop Drawings for reinforcing are submitted.

h. Drawings detailing location, spacing, edge distance, and embedment depth of adhesive dowels. Adhesive system shall be submitted and approved before Shop Drawings with adhesive dowels are submitted.

2. Product Data:

a. Manufacturer's product data for adhesive, if not submitted under other Sections.

b. Adhesive manufacturer's test data and ICC ES report to verify specified capacity of adhesive dowels.

B. Informational Submittals: Submit the following:

1. Certificates:

a. Steel manufacturer's certificates of mill analysis, tensile, and bend tests for reinforcing steel.

b. Certification of welders and weld procedures for splices.

c. Adhesive manufacturer's certification verifying that installer is qualified and using proper installation procedures.

2. Manufacturer's Instructions:

a. Installation instructions for adhesive systems.

3. Field Quality Control Submittals:

a. Reports of all field quality control testing, where applicable.

b. Results of required inspection of welded splices of reinforcing bars.

c. Results of required tensile testing of adhesive dowels. Include size and location of bars tested.

4. Special Procedure Submittals; Description of reinforcing weld locations and weld procedures.

1.5 DELIVERY, HANDLING, AND STORAGE

A. Deliver concrete reinforcing products to Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings on approved Shop Drawings.

B. Store concrete reinforcing products to prevent damage and accumulation of dirt and excessive rust. Store on heavy wood blocking so that reinforcing does not come into contact with the ground.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: Shall be deformed in accordance with ASTM A615, and as follows:

1. Provide Grade 60 for all bars, unless indicated otherwise.

2. Epoxy-coated reinforcing bars, where required, shall be in accordance with ASTM A775.

3. Galvanized reinforcing bars, where required, shall be in accordance with ASTM A767.

B. Mechanical Couplers: Reinforcement bars may be spliced with mechanical connection upon approval by the Engineer. Connection shall be full mechanical connection that shall develop in tension or compression, as required, at least 125 percent of specified yield strength (fy) of bar. Where splices at the face of wall are shown or approved by Engineer, form saver-type mechanical couplers may be used. Form-saver couplers shall have integral plates designed to positively connect coupler to formwork.

C. Steel Wire: Shall be in accordance with ASTM A82.

D. Welded Smooth Wire Fabric: Shall be in accordance with ASTM A185.

1. Furnish in flat sheets, not rolls.

E. Column Spirals: Hot-rolled rods for spirals, conforming to ASTM A615.

F. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing in place.

1. Use wire bar type supports complying with CRSI 1 MSP recommendations, except as specified in this Section. Do not use wood, brick, or other unacceptable materials.

2. For slabs on grade, use precast concrete blocks, four inches square in plan, with embedded tie wire as specified by CRSI 1 MSP. Precast concrete blocks shall have same or higher compressive strength as specified for concrete in which they are located.

3. For concrete surfaces where legs of supports are in contact with forms, provide supports complying with CRSI 1 MSP as follows:

a. At formed surfaces in contact with soil, weather, or liquid, or located above liquid, supports shall be CRSI Class 1 for

maximum protection. Plastic coating on legs shall extend at least 0.5-inch upward from form surface. At surfaces not exposed to view or liquid, precast concrete blocks, three inches square in plan, with embedded tie wire shall be permitted. Precast concrete blocks shall have same or higher compressive strength as specified for concrete in which they are located.

b. At interior dry surfaces (not located above liquid), supports shall be either Class 1 or Class 2 for moderate protection.

c. At formed surfaces with an architectural finish, use stainless steel protected legs (Type B).

4. Over waterproof membranes, use precast concrete chairs.

5. For epoxy-coated reinforcing, use wire reinforcing supports coated with dielectric material including epoxy or another polymer for minimum distance of two inches from point of contact with epoxy-coated reinforcement.

G. Adhesive Dowels:

1. Dowels:

a. Dowel reinforcing bars shall be deformed in accordance with ASTM A615, Grade 60.

2. Adhesive:

a. Requirements for adhesive are specified in drawings.

2.2 FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with ACI 301, ACI 315 and ACI 350.5. In case of fabricating errors, do not re-bend or straighten reinforcing in manner that injures or weakens material.

B. Unacceptable Materials: Reinforcing with one or more of the following defects is not allowed:

1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.

2. Bends or kinks not shown on approved Shop Drawings.

3. Bars that do not meet or exceed their ASTM specification requirements when hand-wire-brushed, with respect to cross section, nominal weight, or average height of deformations.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine the substrate and conditions under which concrete reinforcing is to be placed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with applicable requirements of Laws and Regulations, applicable standards, and ACI 301, ACI 315 and ACI 350.5 for details and methods of reinforcing placement and supports.

B. Clean reinforcing to remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Position, support, and secure reinforcing against displacement during formwork construction and concrete placing. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

1. Place reinforcing to obtain minimum concrete coverages specified in the Contract Documents. Arrange, space, and securely tie bars and bar supports together with 16-gage galvanized wire to hold reinforcing accurately in position during concrete placing. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

2. Prior to placing concrete, using surveyor's level or string line, demonstrate to Engineer that specified cover of reinforcing has been attained.

3. Do not secure reinforcing steel to forms with wire, nails, or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.

D. Allowable Placing Tolerances: Comply with ACI 301, ACI 315 and ACI 350.5, except as specified in this Section:

1. Concrete surfaces in contact with liquid shall have minimum of two inches of concrete over reinforcing steel.

E. Provide sufficient number of supports of strength required to carry reinforcing. Do not place reinforcing bars more than two inches beyond last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Lap Splices:

1. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars as shown on the Drawings.

G. Install welded wire fabric in lengths as long as practical. Lap adjoining pieces at least one full mesh and lace splices with 16-gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

H. Mechanical Couplers:

1. Mechanical butt splices shall be in accordance with recommendations of mechanical splicing device manufacturer. Butt splices shall develop 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Bars shall be flame-dried before butt splicing. Provide adequate jigs and clamps or other devices to support, align, and hold longitudinal centerline of bars being butt spliced in straight line.

I. Welded Splices:

1. When field welding of reinforcing is required on the Drawings or allowed by Engineer in writing, welding of reinforcing bars shall conform to ANSI/AWS D1.4. Preheating and rate of cooling requirements shall be based on bar steel chemistry and ANSI/AWS D1.4. Welded splices shall be sized and constructed to transfer minimum of 125 percent of specified minimum yield tensile strength of spliced bars or of smaller bar in transition splices. Unless otherwise allowed by ENGINEER in writing, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and Engineer’s requirements for the particular application.

3. After completing welding on coated reinforcing bars, repair coating damage as specified in this Section. Welds and steel splice members, when used to splice bars, shall be coated with same material used for repair of coating damage.

J. Adhesive Dowels:

1. Comply with manufacturer's written installation instructions and requirements of this Section.

2. Drill holes to adhesive system manufacturer's recommended drill bit diameter and to specified depth. Drill holes in hammering and rotation mode with carbide-tipped drill bits complying with tolerances indicated in ANSI B212.15. Core-drilled holes shall not be permitted.

3. Before setting adhesive dowel, hole shall be made free of dust and debris by method recommended by adhesive system manufacturer. Brush the hole with adhesive system manufacturer-approved brush and blow hole clean with clean, dry, oil-free compressed air to remove dust and loose particles. Hole shall be dry as defined by adhesive system manufacturer.

4. Before injecting adhesive, obtain Engineer's concurrence that hole is dry and free of oil and other contaminants.

5. Prior to injecting adhesive into the drilled hole, dispense to an appropriate location for waste an initial amount of adhesive from the mixing nozzle until adhesive is a uniform color, indicating that product is properly mixed.

6. Inject adhesive into hole through injection system-mixing nozzle and extension tubes (as required) placed to bottom of hole. Withdraw nozzle's discharge end as adhesive is placed while keeping nozzle immersed to prevent formation of air pockets. Fill hole to depth that ensures that excess material is expelled from hole during dowel placing.

7. Twist dowel during insertion into partially-filled hole to ensure full wetting of rod surface with adhesive. Insert rod slowly to avoid developing air pockets.

8. Provide adequate curing in accordance to adhesive system manufacturer's requirements prior to continuing with adjoining or adjacent Work that could impose or impart load on the dowels. Do not begin adjoining or adjacent Work until dowels are successfully tested or when approved by Engineer.

9. Limitations:

a. Installation Temperature: Comply with manufacturer's instructions for installation temperature requirements. Provide temporary protection and other measures, such as heated enclosures, necessary to ensure that base material

temperature complies with requirements of adhesive systems manufacturer during installation and adhesive system curing.

b. Oversized Holes: Advise Engineer immediately if size of drilled hole is larger than recommended by adhesive system manufacturer. Cost of corrective measures, including but not limited to redesign of dowels due to decreased capacities, shall be paid by Contractor.

3.3 FIELD QUALITY CONTROL

A. Site Inspections and Tests:

1. General:

a. Do not place concrete until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

b. Do not close up formwork for walls and other vertical members until reinforcing is inspected, and permission for placing concrete is granted by Engineer. Concrete placed in violation of this provision will be rejected.

c. Correct defective Work by removing and replacing or correcting, as required by Engineer.

d. Contractor shall pay cost of corrections and subsequent testing required to confirm integrity of post-installed anchors.

e. Owner’s testing laboratory will submit test results to Contractor and Engineer within 24 hours of completion of test.

2. Site Tests:

a. Contractor will retain the services of an approved independent testing laboratory to perform field quality testing of adhesive dowels at the Site.

1) Testing shall comply with ASTM E488.

2) Test at least ten percent of each type of adhesive dowel. If one or more dowels fail the test, Contractor shall pay cost to test all dowels of same diameter and type installed.

3) Test dowels to 60 percent of specified yield strength. Engineer will direct which dowels are to be tested.

4) Apply test loads with hydraulic ram.

5) Displacement of dowels shall not exceed D/10, where D is nominal diameter of dowel.

3. Inspection of Welded Splices: Owner will employ testing laboratory to perform field quality control testing of welded splices. All welded splices shall be visually inspected. Radiographically test minimum of five percent of butt splice welds. Repair defective welds so that welds are completely sound.

B. Manufacturer's Services:

1. Provide qualified adhesive manufacturer's representative at the Site during initial installation of adhesive dowel systems to train installing personnel in proper selection and installation procedures. Manufacturer's representative shall observe to verify that installer demonstrates proper installation procedures for adhesive dowels and adhesive material. Each installer shall be certified in writing by manufacturer as qualified to install adhesive anchors.

+ + END OF SECTION +

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SECTION 03 21 16

EPOXY-COATED REINFORCEMENT STEEL BARS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall include materials, labor, services and incidentals necessary for completion of this Section of Work.

2. Work consists of supplying and installing epoxy-coated reinforcement steel and related accessories.

B. Related Sections:

1. Section 03 30 00– Cast-In-Place Concrete.

1.2 REFERENCES

A. Standard referenced in this Section are:

1. Manual of Standard Practice for Reinforced Concrete Construction.

2. ASTM A775A/775M-Standard Specification for Epoxy-Coated Steel Reinforcing Bars

3. ASTM B499-Standard Method for Measurement of Coating Thicknesses by Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals, Method B

4. Other ASTM numbers are noted in later text.

1.3 QUALITY ASSURANCE

A. Industry Standards, Specifications and Codes:

1. Comply with provisions of the codes and standards except as modified.

2. Referenced codes and standards including revisions and commentaries shall be the most currently adopted as of the date of these Contract Documents.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 requirements.

B. Samples:

1. When requested, provide Samples of epoxy-coated bars.

C. Certifications:

1. When requested provide:

a. Certification that bars have been coated in accordance with resin manufacturer's recommendations, these Specifications and ASTM A775.

b. Certification shall include, for each bar size, preheat temperatures, cure times, thickness checks, holidays detected and bend test results.

c. Certification statement that material furnished for coating of reinforcement steel is proper formulation and meets requirements of ASTM A775.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcement Steel:

1. Reinforcement bars shall conform to ASTM A-615, Grade 60.

B. Tie Wire:

1. Plastic coated tie wires of a contrasting color shall be used to secure bars and protect coated bars from physical damage during placement.

C. Supports:

1. Epoxy-coated reinforcement bars supported from formwork shall rest on coated wire bar supports or on bar supports made of dielectric material or other acceptable materials.

2. Wire bar supports shall be completely coated with dielectric material.

3. Reinforcement bars used as support bars shall be epoxy-coated when they are supporting epoxy-coated bars.

2.2 EPOXY COATING OF REINFORCEMENT BARS

A. General:

1. Epoxy coating process shall conform to ASTM A775.

2. Reinforcement required to be epoxy coated shall have a protective coating of epoxy applied by electrostatic spray method or electrostatic fluidized-bed method in accordance with resin manufacturer's recommendations and these Specifications.

3. Reinforcement shall have a workmanlike finish and shall be free of slivers and defects.

4. Coating shall be inspected for approval at coating plant.

B. Coating Material:

1. Coating material shall be a powdered epoxy resin meeting requirements of ASTM A775.

2. Not more than 10 percent reclaimed powder shall be reused with new powder.

C. Coating Thickness:

1. A film with a thickness after curing of 7 to 12 mils plus/minus 2 mils shall be applied in a uniform, smooth coat.

a. Thickness of film will be measured on a representative number of bars from each production lot.

D. Continuity of Coating:

1. Coating shall be checked after cure for continuity of coating and shall be free from holes, voids, contamination, cracks and damaged areas.

a. On average, there shall be not more than 1 holiday (pinholes not visually discernible) in each linear foot of coated bar. A 67-1/2-volt, AC powered, on-line holiday detector shall be used in accordance with manufacturer's instructions to check coating for holidays.

E. Patching Material:

1. Damaged epoxy coating shall be repaired with patching material conforming to ASTM A-775. Repair shall be done in accordance with patching material manufacturer's recommendations.

PART 3 - EXECUTION

3.1 FABRICATION

A. Bends and hooks shall conform to bend dimensions defined as "ACI Standard Hooks" in the CRSI Manual of Standard Practice unless otherwise shown on Drawings.

B. Field fabrication after epoxy coating is not allowed.

1. Minor bending of #5 dowels and smaller is allowed only if damage to coating is repaired as specified.

C. Reinforcement bars shall not be bent or straightened in a manner that will injure material.

D. Reinforcement bars shall conform accurately to dimensions shown on Drawings and within fabricating tolerances as shown in the CRSI Manual of Standard Practice.

E. Product Delivery, Storage and Handling:

1. Equipment for handling epoxy-coated bars shall have protected contact areas.

a. Bundles of coated bars shall be lifted at multiple pick-up points to minimize bar-to-bar abrasion from sags in bundles.

b. Coated bars or bundles of coated bars shall not be dropped or dragged.

c. Coated bars shall be stored on protective cribbing.

2. Fading of the color of coating shall not be cause for rejection of epoxy-coated reinforcement bars.

3. Coating damage due to handling, shipment and placing need not be repaired in cases where damaged area is 0.1 square inches or smaller.

4. Damaged areas larger than 0.1 square inches shall be repaired with patching material conforming to ASTM A775 in accordance with patching material manufacturer's recommendations.

5. Maximum amount of damage, including repaired and unrepaired areas, shall not exceed 2 percent of the surface area in each one foot of each bar.

a. Damage exceeding this amount shall be cause for rejection.

3.2 PLACING REINFORCEMENT STEEL

A. Placement of bars should conform to the CRSI Manual of Standard Practice.

B. Runways or another approved protection scheme shall be provided for reinforcement located in a pour or which extends into the pour in order to prevent damage from moving equipment or pumping equipment.

3.2 PATCHING

A. Patching material shall be applied to sheared ends and contact areas for hangers or couplers.

B. Patching materials shall be applied to damaged areas at points of occurrence such as at initial application, fabrication, destination or installation points.

C. Areas to be patched shall be clean and free of surface contaminants. Patched areas shall be promptly treated in accordance with resin manufacturer's recommendations, before detrimental oxidation occurs.

+ + END OF SECTION + +

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 013300, Submittals

B. Section 017400. Construction Waste Management

C. Section 018113. Construction IAQ Management

D. Section 031100, Concrete Formwork

E. Section 032100, Steel Concrete Reinforcement

F. Section 072613, Vapor Barrier Under Slabs on Grade

1.2 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of American Concrete Institute (ACI) and American Society for Testing and Materials (ASTM) documents.

1. ACI 301-05: Specification for Structural Concrete for Buildings.

2. ACI 302.1R-04: Guide for Concrete Floor and Slab Construction.

3. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

4. ACI 304.2R-96: Placing Concrete by Pumping Methods.

5. ACI 305R-10: Hot Weather Concreting.

6. ACI 306R-10: Cold Weather Concreting.

7. ACI 308.1-11: Standard Specification for Curing Concrete.

8. ACI 318 -05 Building Code Requirements for Structural Concrete.

9. ASTM C 94/C 94M – 11b: Standard Specification for Ready- Mixed Concrete.

10. ASTM C 494/C 494M - 11: Standard Specification for Chemical Admixtures for Concrete.

11. ASTM F 710- 11: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

12. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

13. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars.

14. Standard Practice ACI 226.R1, Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete.

1.3 DEFINITIONS

A. ACI 301, Section 1.2 - Definitions:

1. Add the following definitions:

a. Cementitious Material: Cementitious materials include cement, ground blast furnace slag and fly ash.

b. Corrosion Inhibitor Admixture: A liquid admixture, calcium nitrite that inhibits corrosion of concrete-embedded steel in the presence of chloride ions.

c. Pumped Concrete: Concrete that is conveyed by pumping pressure through rigid pipe or flexible hose.

d. Water-to-Cementitious Ratio (w/c): A ratio representing quantity in pounds of free moisture available for cement hydration divided by quantity of cementitious materials in pounds per cubic yard concrete.

1.4 SUBMITTALS

A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.

B. Product Data:

1. Mix Design: Submit proposed concrete design mix(es) together with name and location of batching plant at least 28 days prior to the start of concrete work.

a. Include test results of proposed concrete proportions based on previous field experience or laboratory trial batches in accordance with ACI 301, Section 4.

b. Pumped Concrete: Include test results of proposed design mix(es) tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.

2. Portland Cement: Brand and manufacturer's name.

3. Fly Ash: Name and location of source, and DOT test numbers.

4. Air-entraining Admixture: Brand and manufacturer's name.

5. Water-reducing Admixture: Brand and manufacturer's name.

6. High Range Water-reducing Admixture (Superplasticizer): Brand and manufacturer's name.

7. Corrosion Inhibitor Admixture: Brand and manufacturer's name.

8. Accelerating Admixture: Brand and manufacturer's name.

9. Aggregates: Name and location of source, and DOT test numbers.

10. Lightweight Coarse Aggregates: Brand and manufacturer's name.

11. Chemical Hardener (Dustproofing): Brand and manufacturer's name, and application instructions.

12. Chemical Curing and Anti-Spalling Compound: Brand and manufacturer's name, and application instructions.

13. Bonding Agent (Adhesive): Brand and manufacturer's name, and preparation and application instructions.

14. Expansion Joint Fillers: Brand and manufacturer's name.

15. Waterstop: Brand and manufacturer's name, and installation instructions.

C. Quality Control Submittals:

1. Batching Plant Records: At the end of each day of placing concrete, furnish the Director's Representative with a legible copy of all batch records for the concrete placed.

2. Concrete Pumping Equipment Data: Include manufacturer's name and model of principal components, type of pump, and type and diameter of pipe/hose.

3. Minutes of the previous pre-installation conference.

1.5 QUALITY ASSURANCE

A. Qualifications of Crew Pumping Concrete: Workers pumping concrete shall have had at least one year of experience pumping concrete.

B. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

C. Truck mixers for concrete shall be currently approved by the New York State Department of Transportation.

D. Pumping equipment for pumped concrete shall be subject to the approval of the Director.

E. Fly ash supplier shall be on the New York State Department of Transportation's current "Approved List of Suppliers of Fly Ash".

F. Source Quality Control: The Director reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:

1. Batching and mixing facilities and equipment.

2. Sources of materials.

G. ACI 301, Section 1.3 Reference standards and cited publications:

1. Add the following to the list of ASTM Standards:

a. C 311-11a Standard Methods of Sampling and Testing Fly Ash or Natural Pozzolans For Use as A Mineral Admixture in Portland Cement Concrete.

1.6 DELIVERY

A. ASTM C 94/C 94M, Article 14 - Batch Ticket Information: In addition to the information required by Paragraph 14.1, also include the following:

1. Type and brand, and amount of cement.

2. Weights of fine and coarse aggregates.

3. Class and brand, and amount of fly ash (if any).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C 150, Type II Portland cement.

B. Water: Potable

C. Air-entraining Admixture: ASTM C 260, and on the New York State Department of Transportation's current "Approved List".

D. Water-reducing Admixture: ASTM C 494/C 494M, Type A, and on the New York State Department of Transportation's current "Approved List".

E. High Range Water-reducing Admixture (Superplasticizer): ASTM C 494/C 494M, Type F, and on the New York State Department of Transportation's current "Approved List".

F. Corrosion-Inhibiting Admixture: ASTM C 494/C 494M, for use in resisting corrosion of steel reinforcement.

1. DCI Corrosion Inhibitor by W. R. Grace & Co., - Conn., 62 Whittemore Ave., Cambridge, MA 02140, (617) 876-1400 and Rheocrete CNI by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

2. DCI - S Corrosion Inhibitor by W. R. Grace & Co., - Conn., 62 Whittemore Ave., Cambridge, MA 02140, (617) 876-1400.

G. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting, and on the New York State Department of Transportation's current "Approved List".

H. Accelerating Admixture: Non-corrosive admixture, containing no chloride, complying with ASTM C 494, Type C or E, and on the New York State Department of Transportation's current "Approved List".

I. Fly Ash: ASTM C 618, including Table 1 (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.

J. ACI 301, Section 4.2.1.2 - Aggregates:

1. Add the following paragraph:

a. Fine aggregate for pumped concrete shall meet the requirements of ASTM C 33, except 15 to 30 percent shall pass the No. 50 sieve and 5 to 10 percent shall pass the No. 100 sieve. The fineness modulus of the fine aggregate for pumped concrete shall not vary more than 0.20 from the average value used in proportioning.

K. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C 171.

L. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.

1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

2. Cure & Seal by Symons Corp., 200 East Touhy Ave., PO Box 5018, Des Plaines, IL 60017-5018, (847) 298-3200.

3. Kure-N-Seal by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.

4. Day-Chem Cure & Seal UV 26 percent (J-22 UV) by Dayton Superior Corp., 721 Richard St., Miamisburg, OH 45342, (800) 745-3700.

5. Acrylseal HS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

M. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate.

1. Lapidolith by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.

2. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.

3. Pena-Lith by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.

4. FluoHard by L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (402) 453-6600.

5. Armortop by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.

6. Diamond by Kaufman Products , Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

N. Type 1 Expansion Joint Filler: Preformed, resilient, nonextruding cork units complying with ASTM D 1752, Type II.

O. Epoxy Bonding Agent (Adhesive): 100 percent solids epoxy-resin-base bonding compound, complying with ASTM C 881, Types I, II, IV and V, Grade 2 (horizontal areas) or Grade 3 (overhead/vertical areas), and Class B (40-60 degrees Fahrenheit) or Class C (60 degree Fahrenheit and above).

1. SurePoxy HM Series by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.

2. Sikadur Hi-Mod 32 by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071, (800) 933-7452.

3. Epogrip by Sonneborn/-BASF Building Systems, 889 Valley Park Drive, Shakopee, MN 55379, (800) 433-9517.

P. Waterstop: Extruded from virgin polyvinyl chloride plastic compound containing no scrap or reclaimed material or pigment.

1. Size: Minimum 6 inches wide by 3/8 inch thick, unless otherwise indicated.

2. Minimum Tensile Strength (ASTM D 412): 2000 psi.

3. Minimum Ultimate Elongation (ASTM D 412): 350 percent.

4. Shore A/10 Durometer Hardness (ASTM D 2240): Minimum 65; Maximum 83.

5. Maximum 24 Hour Water Absorption (ASTM D 570): 0.15.

Q. Expansion Joint Dowels: Smooth steel expansion joint dowel with minimum 5 inch long steel dowel cap, unless otherwise indicated.

2.2 PROPORTIONING OF MIXES

A. Cast-in-place concrete shall be air-entrained normal weight concrete.

1. Normal weight concrete, except as otherwise specified, shall have a minimum compressive strength of 4000 psi. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

2. Normal weight concrete for garage floors, and for exterior slabs, ramps and stairs shall have a minimum compressive strength of 4000 psi, with a minimum of 611 pounds of cement per cubic yard. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

3. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight and lightweight concrete up to a maximum of 15 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.

   a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.

   b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.

B. Slump for Pumped Concrete: When a water-reducing admixture is not used, maximum slump shall be 4 inches. When a water-reducing admixture is used, maximum slump shall be 6 inches and when a high-range water-reducing admixture (superplasticizers) is used, maximum slump shall be 8 inches.

C. Design Air Content: Design air content for concrete shall be 8 percent by volume, with an allowable tolerance of plus or minus 1.5 percent for total air content, except as otherwise specified. Use air-entraining admixture, not air-entrained cement.

D. Water-Cement Ratio: Cast-in-place concrete shall have a maximum water-cement ratio of 0.45.

E. ACI 301, Section 4.2.2.3: Change article to read as follows:

1. 4.2.2.3 - Size of Coarse Aggregates:

   a. 4.2.2.3.a Normal Weight Concrete: Coarse aggregates shall conform to graduation requirements for various sizes as tabulated in Table No. 2 of ASTM C 33. The sizes of coarse aggregates for various classes of Work shall be as follows with all percentages being determined by weight.

   b. 4.2.2.3.b For concrete floors, floor and roof slabs, reinforced beams and girders, columns and piles, concrete encasing underground electric conduits, and concrete in which the

space between restricting objects is 2 inches or less, the course aggregate shall be Size No. 67.

c. 4.2.2.3.c For other concrete Work having a minimum cross-sectional dimension of not more than 6 inches, the coarse aggregate shall be a well graded mixture of No. 67 and No. 57, provided that not more than 50 percent nor less than 30 percent shall be Size No. 67 and not more than 70 percent nor less than 50 percent shall be Size No. 57.

d. 4.2.2.3.d For other concrete Work having a minimum cross-sectional dimension greater than 6 inches and not more than 12 inches, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 467, providing that not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 467.

e. 4.2.2.3.e For other concrete Work having a minimum cross-sectional dimension of more than 12 inches, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 357, providing not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 357.

F. Application Rate for Corrosion-Inhibiting Admixture: The application rate for the corrosion-inhibiting admixture shall be four (4) gallons per cubic yard of concrete for all concrete placements where indicated on the drawings.

G. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Director.

H. ACI 301, Section 4.1.2.1 - Mixture Proportions:

1. Add the following to paragraph 4.1.2.1:

a. Proposed design mix(es) for pumped concrete and the pumping equipment shall have been tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.

2.3 JOINTS

A. ACI 301, Section 5.3.2.6 - Construction joints and other bonded joints:

1. Delete the following subparagraphs:

a. Use an acceptable adhesive applied in accordance with the manufacturer’s recommendations;

b. Use an acceptable surface retarder in accordance with manufacturer's recommendations;

c. Roughen the surface in an acceptable manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, or damaged concrete at the surface; or

d. Use Portland-cement grout of the same proportions as the mortar in the concrete in an acceptable manner.

2. Add the following in place of the above subparagraph:

a. The use of bonding agent (adhesive).

b. The use of cement grout.

B. Except as otherwise shown on the Drawings, expansion joints shall be as follows:

1. In joints required to receive a sealant, the joint filler shall be 1/2-inch-thick and recessed as required to form a caulking slot.

2. In joints not required to receive a sealant, the joint filler shall be 1/2-inch-thick and extend through the full cross-section of the concrete.

3. Tool edges of concrete with 1/8-inch radius edging tool.

2.4 PRODUCTION OF CONCRETE

A. Provide ready-mixed concrete, either central-mixed or truck-mixed, unless otherwise approved in writing by the Director.

B. Provide adequate controls to ensure that the temperature of the concrete when placed does not exceed 90 degrees F., and make every effort to place it at a lower temperature. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints. Ingredients may be cooled before mixing by shading the aggregates, fog spraying the coarse aggregate, chilling the mixing water or other approved means. Mixing water may be chilled with flake ice or well-crushed ice of a size that will melt completely during mixing, providing the water equivalent of the ice is calculated into the total amount of mixing water.

C. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.

B. Check items of aluminum required to be embedded in the concrete and ensure that they are coated, painted or otherwise isolated in an approved manner.

C. Install waterstops in accordance with manufacturer's printed instructions.

D. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.

E. Do not deposit concrete in water. Keep excavations free of water by pumping or by other approved methods.

F. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

G. Prior to placement of a concrete slab-on-grade, ensure roof is watertight and install polyethylene or other preventative measures to mitigate exposure to external moisture sources such as rainwater; runoff from adjacent slopes; landscaping water; water from curing; or wet grinding, sawing, and cleaning.

H. Place vapor barrier directly under concrete slab-on-grade with no cushion or blotter layer.

3.2 ADMIXTURE ADDITIONS AT THE SITE

A. Site additions shall be limited to high-range water-reducers, non-chloride accelerators, and corrosion inhibitors. Comply with manufacturers' printed instructions for discharge of admixtures shall be furnished.

B. High-Range Water-Reducers:

1. Concrete shall arrive at a slump of 2 to 4 inches (50 to 100 mm). Water additions at the Site shall be limited to comply with water-to-cementitious ratio requirements.

2. Following addition of high-range water-reduced concrete, a minimum of 70 revolutions or 5 minutes of mixing shall be completed to assure a consistent mixture.

C. All concrete with other admixture additions shall mix a minimum of 70 revolutions or 5 minutes to assure a consistent mixture.

3.3 PLACING

A. Conveying equipment:

1. When pumping concrete, the lubricating mortar for the delivery line shall not be discharged into an area of concrete placement.

2. The inside diameter of the delivery lines for pumped concrete shall be the greater of either a minimum of 5 inches or 3 times the maximum size of coarse aggregate.

B. Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.

C. Do not allow concrete to free fall more than 4 feet.

3.4 REPAIRING SURFACE DEFECTS

A. Finish patched areas to match the texture of the surrounding surface.

B. The patch mixture shall consist of a mixture of dry-pack mortar, consisting of one-part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for placing and handling. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.5 FINISHING FORMED SURFACES

A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:

1. Rough Form Finish for concrete surfaces not exposed to view.

2. Smooth Form Finish for concrete surfaces exposed to view.

B. Fins shall be completely removed on surfaces to receive waterproofing.

3.6 SLABS

A. Slabs on Grade: Provide key type joints unless otherwise shown. Tool exposed joints.

B. ACI 301, Section 5.3.4 – Finishing unformed surfaces:

1. Add the following paragraph to section 5.3.4.1 Placement:

a. Provide monolithic finishes on concrete floors and slabs without the addition of mortar or other filler material. Finish surfaces in true planes, true to line, with particular care taken during screeding to maintain an excess of concrete in front of the screed so as to prevent low spots. Screed and darby concrete to true planes while plastic and before free water rises to the surface. Do not perform finishing operations during the time free water (bleeding) is on the surface.

C. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:

1. Floated Finish for:

a. Treads and platforms of exterior steps and stairs.

b. Slabs and fill over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.

2. Troweled Finish for:

a. Interior slabs that are to be exposed to view.

b. Slabs and fill over which resilient wood flooring, resilient tile or sheet flooring, carpet, or thin-film coating system is required.

c. Slabs and fill over which thin-set ceramic tile is required, except fine-broom finished surface.

d. Treads and platforms of interior steps and stairs.

3. Broom or Belt Finish for:

a. Exterior slabs. Texture as approved by the Director's Representative.

4. Scratched Finish for:

a. Surfaces to be covered with ceramic tile set in a bonded thick mortar bed, except screed to a Class B tolerance.

b. Surfaces to be covered with floor topping.

D. Early-entry dry-cut saws are preferred in place of conventional wet-cut saws.

E. Begin saw-cutting as soon as the saw will not dislodge the aggregate or ravel the edge of the saw-cut, but in no case longer than 12 hours after the slab is placed. Saw-cut a minimum of one quarter of the slab depth leaving a clean, sharp edge in the pattern shown on the Contract Documents. Provide sufficient personnel and equipment to complete saw-cutting operations within 18 hours after the slab is placed.

F. Floor flatness and levelness tolerances: For flatness and levelness tolerances of floor slabs refer to ACI 302 Chapter 8.15. Floor surface tolerances shall be 1/8 inch over a horizontal distance of 10 feet in any direction, unless otherwise specified by floor profile quality classifications in ACI 302.

1. When flatness or levelness tolerances are not met then the floor shall be ground or scarified and repoured to meet specifications.

3.7 CURING AND PROTECTION

A. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.

B. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.

C. Curing and Moisture Mitigation for Resilient Flooring:

1 Acceptable curing and drying conditions include a minimum ambient temperature of 70 degrees F and a maximum relative humidity of 50%.

a. Air movement at 15 mph.

2. Do not cure slabs by adding water; ponding or wet burlap method.

3. Do not use curing compounds or cure-and-seal materials unless such use is approved in writing by the adhesive and floor covering manufacturers. The curing product manufacturer’s conformance to

ASTM c 1315 is not a substitute for the adhesive and floor covering manufacturer's approval.

4. Cure the slab by covering with waterproof paper, plastic sheets, or a combination of the two for 3 to 7 days.

3.8 CHEMICAL HARDENER (DUSTPROOFING)

A. Apply chemical hardener to all troweled finished interior floors which are to be left exposed.

B. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.

C. Prepare surfaces and apply chemical hardener in accordance with manufacturer's printed instructions and recommendations.

3.9 FIELD QUALITY CONTROL

A. Concrete construction is subject to special inspections as required by the 2015 New York State Building Code and listed in the Statement of Special Inspections.

B. Strength Tests for Pumped Concrete: Prepare strength test specimens and make strength tests from concrete samples obtained at the truck discharge chute and at the end of the pump delivery line in accordance with paragraph 16.3.4.4.

C. Make available to the Owner's Representatives whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the State and as accepted by the Director. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Director's Representative before using in the work.

E. Test results will be reported in writing to the Director's Representative, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

F. Nondestructive Testing: Impact hammer, Windsor probe, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

G. Additional Tests: The State shall make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Director's Representative. The testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Pay for such tests when unacceptable concrete is verified, including all inspection and Engineering fees when non-conforming work is verified.

H. Moisture Testing: Test all slabs-on-grade for moisture content that will receive resilient flooring. For a preferred moisture testing method and limits; consult the written instructions of the floor covering manufacturer, the adhesive manufacturer, the patching/underlayment manufacturer, or combination thereof. Test repeatedly until the desired moisture content is obtained.

I. pH Testing: Test concrete floors for pH level prior to the installation of resilient flooring. Do not exceed the recommended pH level of the resilient flooring manufacturer or the adhesive manufacturer, or both.

+ + END OF SECTION +

SECTION 03 36 10

SWIMMING POOL GUNITE/SHOTCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of all reinforced Gunite/Shotcrete work as shown on the drawings and as specified herein, including, but not limited to the following:

B. Provide:

1. Placing, curing and finishing of all reinforced Gunite/Shotcrete work for the pool and zero-entry portion of pool.

2. Erection and removal of formwork and shoring.

3. Placing of reinforcing steel and related accessories.

4. Installation of weirs, piping, connection bars and fasteners.

5. Installation of railing anchor sockets, slide supports, Gunite/ Shotcrete stairs.

6. Installation of joint fillers.

7. Installation of fill insulation in cavities and voids where indicated.

8. Coordination with all other trades for locating of all pipe sleeves, duct openings, keys, chases, electrical boxes and conduits, anchors, inserts, fastenings and other devices required by other trades.

9. Wet cure of exposed Gunite/Shotcrete for ten days.

10. Gunite/Shotcrete for encasement of main drains and PVC floor inlets.

11. Finish of Gunite/Shotcrete surfaces to accept specified pool waterproofing and finish.

1.2 REFERENCES (LATEST EDITIONS)

A. ASTM listed standards by the American Society for Testing and Materials.

B. ACI listed standards by the American Concrete Institute.

C. In case of conflict between the References and the Project Specification, the Project Specification shall govern. In the case of conflict between References, the more stringent shall govern.

D. When compliance with any such references is specified herein for materials or a manufactured or fabricated product, the Contractor, if requested, shall furnish an affidavit from the manufacturer or fabricator certifying that the materials or product delivered to the job meets the requirements specified. However, such certification shall not relieve the Contractor from the responsibility of complying with any added requirements specified herein.

E. Concrete Reinforcing Steel Institute (CRSI).

1.3 SUBMITTALS

A. Submit complete shop drawings and data for Pool Consultant's review and approval.

B. Provide submittals for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.

C. Provide submittals of forms for exposed Gunite/Shotcrete showing layout of joint patterns and exposed recesses at wall.

D. Provide Gunite/Shotcrete Mix Data as specified in Paragraph 2.05.

E. Provide manufacturers' data for other products.

F. Fabrication of any material or performing of any work prior to the final approval of the submittals will be entirely at the risk of the Contractor.

G. The Contractor is responsible for furnishing and installing materials called for in the Contract Documents, even though these materials may have been omitted from approved submittals.

1.4 QUALITY ASSURANCE

A. All materials, measuring, mixing, transportation, placing and curing shall be subject to inspection by the Pool Consultant or by the testing agency. However, such inspection, wherever conducted, shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract requirements, nor shall inspector's acceptance of material or workmanship prevent later rejection of same by the Owner or Consultant if defects are discovered.

B. Testing Service: Owner shall engage a qualified Testing Agency acceptable to Consultant to perform material evaluation, tests and inspections.

1. Materials and installed work may require testing and re-testing at any time during progress of work. Testing and re-testing of rejected materials shall be done at Contractor's expense.

C. Pre-construction Testing: Comply with requirements of ACI 506.2 and as specified. Make 3 test panels at least 30 inches by 30 inches for each mix being considered and for each shooting position to be encountered in project, complying with applicable provisions of ASTM C 1140. Make test panels by each application crew performing shotcreting work. Fabrication test panels to same thickness as structure to be gunited, but not less than 6 inches.

1. Provide same reinforcement in test panels as used in structure, placed in at least half the panel to check for proper Gunite/Shotcrete placement around reinforcing steel.

2. Take a minimum of five 3-inch cubes or 3-inch diameter core specimens from panels for testing. Test specimens for strength in accordance with ASTM C 42. The average compressive strength of 3 cores taken from test panels must equal or exceed 85 percent of specified compressive strength.

D. Testing During Construction: Test Gunite/Shotcrete for compressive and flexural strength by one or more of the following methods:

1. Test Panels: Gunned by Gunite/Shotcrete nozzleman who will do production work. Make one test panel with minimum dimensions of 30 by 30 inches by 6 inches, gunned in same position as work represented, complying with applicable provisions of ASTM C1140. Make test panel once each shift or once for each 50 cu. Yd. Of Gunite/Shotcrete placed through nozzle, whichever is more frequent. Moist cure panels unless otherwise directed by Pool Consultant. Cut a minimum of three 3-inch nominal diameter cores or three 3-inch cubes from each panel.

2. Samples from In-Place Gunite/Shotcrete: Cut three 3-inch nominal diameter cores from structure and test in accordance with ASTM C 42. Do not cut into steel reinforcement. Take a set of cores once each shift or once for each 50 cu. yd. of Gunite/Shotcrete place through nozzle, whichever is more frequent.

E. Strength Evaluation: Gunite/Shotcrete will be considered acceptable as follows:

1. Mean compressive strength of any group of cores taken from structure or test panel equals or exceeds specified compressive strength, with no individual core less than 75 percent of specified compressive strength.

2. Mean compressive strength of any group of cores taken from structure of test panel equals or exceeds 118 percent of specified compressive strength, with no individual cube less than 106 percent of specified compressive strength

F. Installer's Qualifications: Prior to commencement of work, demonstrate that proposed Gunite/Shotcrete personnel, materials, and equipment are capable of batching, mixing, conveying, and uniformly applying Gunite/Shotcrete in accordance with specified requirements.

1. Use nozzlemen having current certification in accordance with guidelines of ACI 506.3R for type of Gunite/Shotcrete required.

G. Unless otherwise approved by the Pool Consultant, compression tests shall consist of four (4) boxes for each test made, cured and tested by the Testing Agency during the progress of the job. At least one (1) test shall be made for each strength of Gunite/Shotcrete up to 50 cubic yards pour, and at least one (1) test per strength for each 50 cubic yard thereafter. Gunite/Shotcrete for each set of boxes shall be from one (1) sample representative of the entire batch. All boxes shall be standard 18" by 24".

H. When tests of control specimens fall below required strength, the Pool Consultant may require core specimens taken from Gunite/Shotcrete in question and tested in accordance with ASTM C 42. If these specimens do not meet strength requirements, Pool Consultant will have right to require additional curing, load tests, strengthening or removal and replacement of those parts of structure which are unacceptable, and in addition, removal of such sound portions of structure as necessary to ensure safety, testing, load tests, strengthening or removal and replacement of parts of structure shall be at the Contractor's expense.

I. Accept as final, results of tests made by the qualified Testing Agency engaged by Owner.

J. Testing required because of changes requested by the contractor in materials, sources of materials or mix portions, and extra testing of Gunite/Shotcrete or materials because of failure to meet the Specification requirements is to be paid by the contractor.

1.5 GUARANTEES

A. Provide standard written manufacturer's guarantee in the Owner's name for materials furnished under this Section where such guarantees are offered in the manufacturers' published product data.

B. Furnish written warranty for materials and workmanship of systems installed under this Section against defect in materials and workmanship for 1 year.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Forms for exposed Finish Gunite/Shotcrete: Plywood, metal or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Forms for Unexposed Finish Gunite/Shotcrete: Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed, uncoated.

B. Supports for Reinforcement: Bolsters, chairs, spacers, concrete bricks and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric and metal lath in-place. Use wire bar-type supports complying with CRSI specifications.

C. Refer to drawings for reinforcing size and layout.

2.3 GUNITE/SHOTCRETE MATERIALS

A. Portland Cement: ATM C 150, Type I.

B. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.

2. Local aggregates not complying with ASTM C 33 but that have shown by special test or actual service to produce Gunite/Shotcrete

of adequate strength and durability may be used when acceptable to Consultant.

C. Lightweight Aggregates: ASTM C330.

D. Water: Drinkable.

E. Admixtures, General: Provide admixtures for Gunite/Shotcrete that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

2.4 RELATED MATERIALS

A. Bonding Compound: Polyvinyl acetate or acrylic base.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to the following:

2. Products: Subject to compliance with requirements, provide one of the following:

a. Acrylic or Styrene Butadiene:

1) “Acrylic Bondcrete”, The Burke Company

2) “Acryl-Set”, Master Builders, Inc.

3) “Sonocrete”, Sonneborn-Rexnord

B. Extruded Polystyrene Board Fill Insulation, Type VII: ASTM C578, Type VII, 60-psi minimum compressive strength.

1. Manufacturer: Dow Chemical Co. or an approved equal.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.

4. Thickness: as indicated on drawings

2.5 PROPORTIONING AND DESIGN OF MIXES

A. General: Prepare mix designs for each type and strength of Gunite/Shotcrete by either laboratory trail batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Consultant for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

1. Submit written reports to Pool Consultant of each proposed mix for each class of Gunite/Shotcrete at least 15 days prior to start of work. Do not begin Gunite/Shotcrete production until Pool Consultant has reviewed proposed mix designs.

B. Design mix to provide normal-weight Gunite/Shotcrete with the following properties as indicated on drawings and schedules: 5000-psi minimum 28-day compressive strength, with an air content, when using the dry-mix process: 6-1/2 bags to 7 bags mix acceptable.

C. Adjustment to Gunite/Shotcrete mixes: Contractor may request mix design adjustments when characteristics of materials job conditions, weather, test results, or other circumstances warrant at no additional cost to Owner and as accepted by Pool Consultant. Testing Agency data for revised mix design and strength results must be submitted to and accepted by Pool Consultant before using in work.

2.6 GUNITE/ SHOTCRETE EQUIPMENT

A. Mixing Equipment: Capable of thoroughly mixing Gunite/Shotcrete materials in sufficient quantities to maintain continuous placement.

B. Air Supply: Provide uniform, steady supply of clean, dry air to maintain constant nozzle velocity while operating blow pipe for cleaning away rebound.

C. Dry-Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous steam of uniformly mixed material at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.

1. Provide water supply with uniform pressure at discharge nozzle sufficiently greater than operating air pressure to ensure complete mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.

D. Wet-Mix Delivery Equipment: The equipment shall be capable of not less than 365 cu. Ft. of actual free air per minute, at a minimum pressure of 45 lbs. per gunite placement and adequate “blow-out” jet requirements. Water under a pressure is also required. Pressure requirements increase with the height of operation above the gun and length of hose required.

1. The cement gun should be operated at a minimum air pressure of 45 lbs. per sq. in. of the gun tank when 100 ft. or less of material hose is used and the pressure should be increased 5 lbs. for each additional 50 ft. of hose required.

PART 3 – EXECUTION

3.1 BATCHING AND MIXING

A. General: Control mix proportions by weight batching, or by volume batching meeting requirements of ASTM C 685. If permitted by Pool Consultant, other batching procedures may be used provided a minimum of one weight batching check is made every 8 hours or for every 50 cu. yds. Passing through nozzle to ensure that specified mixture design is achieved.

1. Use batching and mixing equipment capable of proportioning and mixing ingredients (except water in the case of dry-mix equipment) at a rate that provided adequate production and with an accuracy that ensures uniformity of batches.

2. Use weighing equipment capable of batching with accuracy specified in ASTM C 94.

3. Use Volumetric equipment capable of batching with accuracy specified in ASTM C 685. In volume batching, adjust fine aggregate volume for bulking. Test fine aggregate moisture content at least once daily to determine extent of bulking.

3.2 SURFACE PREPARATION

A. Existing Concrete or Masonry: Remove unsound material before applying Gunite/Shotcrete. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Taper edges to leave no square shoulders at perimeter of cavity. Remove loose material from areas receiving Gunite/Shotcrete. Wet surface until damp but without visible free water.

3.3 INSTALLING FORMS

A. General: Design, erect, support, brace and maintain forms to support loads that might be applied until such loads can be supported by in-place Gunite/Shotcrete. Construct forms so Gunite/Shotcrete members and structures are secured to prevent excessive vibration or deflection during Gunite/Shotcrete placement.

1. Design forms to be readily removable without impact, shock, or damage to Gunite/Shotcrete surfaces and adjacent materials.

2. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gauges to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit the escape of air and rebound during guniting. Provide for openings, offsets, blocking, screeds, anchorages and inserts, and other features required in work.

3. Fabricate forms for easy removal without hammering or prying against Gunite/Shotcrete surfaces.

B. Ground Wires: Provide as required to establish indicated thickness planes of Gunite/Shotcrete. Install ground wires at corners and offsets not established by forms.

1. Pull ground wires taut, and position adjustment devices to permit additional tightening.

C. Provisions for Other Trades: Provide openings in Gunite/Shotcrete forms to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

3.4 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcing placement and supports and as herein specified.

B. Clean reinforcements of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond to Gunite/Shotcrete.

C. Accurately position, support, and secure reinforcements against displacement by formwork, construction, or Gunite/Shotcrete placement

operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, concrete blocks and hangers as required.

D. Place reinforcement to obtain minimum coverages for Gunite/Shotcrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during Gunite/Shotcrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed Gunite/Shotcrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjoining widths to prevent continuous laps in either direction.

3.5 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by Gunite/Shotcrete. Use setting drawing diagrams, instructions and directions provided by suppliers of items to be attached.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads ad intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting-type screeds.

3.6 INSTALLATION OF FILL INSULATION

A. On vertical edges and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.7 GUNITE/SHOTCRETE PLACEMENT

A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing Gunite/Shotcrete where form coatings are not used.

1. Apply temporary protection covering to guard against spattering during placement.

B. General: Comply with ACI 304 “Recommended Practice for Measuring, Mixing, Transporting and Place Concrete” and as herein specified.

C. Deposit Gunite/Shotcrete continuously or in layers of such thickness that Gunite/Shotcrete is not placed on material that has hardened sufficiently to cause the formation of seams or planes of weakness.

D. Placing Gunite/Shotcrete Slabs: Deposit and consolidate Gunite/Shotcrete slabs in a continuous operation within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate Gunite/Shotcrete during placing operations so that Gunite/Shotcrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surface to correct level with straightedge and strike off. Use bull floats, Fresno’s wall cutters or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during Gunite/Shotcrete placement operations.

E. Cold-Weather Placing: Protect Gunite/Shotcrete work from physical damage or reduced strength by frost, freezing or low temperatures in compliance with ACI 306 and as specified.

1. When air temperature has fallen to or is expected to fall below 40° F (4 ° C), uniformly heat water and aggregates before mixing to obtain a Gunite/Shotcrete mixture temperature of not less then 50° F (10° C) and not more than 80° F (27° C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place Gunite/Shotcrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators unless accepted in mix designs.

F. Hot-Weather Placing: When hot-weather conditions exist that would seriously impair quality and strength of concrete, place Gunite/Shotcrete in compliance with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain Gunite/Shotcrete temperature at time of placement below 90° F (32° C). Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool Gunite/Shotcrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes to hot, so that steel temperature does not exceed the ambient air temperature immediately before embedment.

3. Fog spray forms, reinforcing steel, and subgrade just before Gunite/Shotcrete is placed.

4. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

5. Wet cure concrete after finishing is complete. Continue wet cure for seven (7) days after installation.

3.8 SURFACE FINISHES

A. General: Provide natural gun finish to unexposed surfaces unless otherwise indicated.

1. Screed smooth areas on exposed face of structures to original plane, then lightly float and trowel for continuous, smooth finish. Remove ground wires or other alignment control devices.

2. Flash Coat: After screeding, apply a 1/8-inch to ¼-inch coat of Gunite/Shotcrete using fine-screened sand. Keep application nozzle at a greater distance than required for normal guniting.

a. Provide steel trowel finish after application of flash coat.

3.9 CURING AND PROTECTION

A. General: Protect freshly placed Gunite/Shotcrete from premature drying and excessive cold or hot temperatures.

B. Start initial curing as soon as free water has disappeared from Gunite/Shotcrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Continue curing for at least 7 days in accordance with ACI 301 procedures.

D. Curing Methods: Perform curing of Gunite/Shotcrete by curing and sealing compound, by moist curing, by moisture retaining cover curing and by combination thereof.

E. Curing Formed Surfaces: Cure formed Gunite/Shotcrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.10 REMOVAL OF FORMS

A. General: Forms not supporting weight of concrete may be removed after curing at not less than 50° F. for 24 consecutive hours after gunning, provided Gunite/Shotcrete is sufficiently hard to not be damaged by form removal operations and provided curing and protection operations are maintained.

1. Forms supporting weight of concrete may not be removed in less than 14 days and until Gunite/Shotcrete has attained design minimum compressive strength in 28 days. Determine potential compressive strength of in-place Gunite/Shotcrete by testing field-cured specimens representative of Gunite/Shotcrete location or members.

2. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal without loosening or disturbing shores and supports.

3.11 REUSE OF FORMS

A. General: Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material is not acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

3.12 REPAIR OF DEFECTS

A. General: Remove and replace Gunite/Shotcrete that lacks uniformity, that exhibits segregation, honeycomb overspray, rebound, or delamination or that contains dry patches single voids in excess of ½ inch in any direction, or sand pockets.

+ + END OF SECTION + +

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SECTION 03 60 00

GROUTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. General:

1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM C33 – Standard Specification for Concrete Aggregate.

2. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm Cube Specimens).

3. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing, and Polymer Concretes.

4. ASTM C939 - Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).

5. ASTM C1107 -Packaged Dry, Hydraulic Cement Grout (Non-Shrink).

6. CRD-C 621 -Corps of Engineers Specification for Non-Shrink Grout.

1.3 QUALITY ASSURANCE

A. The Testing Agency:

1. Testing of materials and of resulting grout for compliance with the technical requirements of the specification will be performed by QA/QC consultant employed and paid by the County.

a. The Contractor shall be charged by the County for the cost of any additional tests and investigation on work performed which does not meet the specifications.

1.4 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Shop drawings shall include, but not be limited to:

1. Material certifications and technical data sheets.

2. Samples of all materials to be used.

3. Proposed mix proportions for cement grout.

B. The Contractor shall also submit the following:

1. Certified test results verifying the compressive strength, shrinkage and expansion requirements specified herein.

2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

PART 2- PRODUCTS

2.1 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland cement, sand and water. The sand to be used shall be selected to suit the spacing for placement. Where sand is not usable, the grout shall be composed of cement and water only.

2. Gradation of sand for cement grout shall be in accordance with ASTM C33. Cement grout shall be proportioned such that it achieves a 28-day compressive strength of 4,000 psi. The Contractor shall be responsible for developing the mix proportions.

a. Gradation for Natural Sand:

Sieve Size	Spaces less than one (1) inch	Spaces one (1) inch or more
Passing 3/8”		100
Passing # 4	100	95-100
Passing # 8	95-100	80-100
Sieve Size	Spaces less than one (1) inch	Spaces one (1) inch or more
Passing # 16	70-100	50-85
Passing # 30	40-75	25-60
Passing # 50	10-35	10-30
Passing # 100	2-15	2-10
Passing # 200	--	--

3. Water shall be kept to a minimum, the amounts noted in the preceding table are the maximum for grout. Proportioning by volume shall be limited to small quantities mixed at the job site.

4. White Portland cement shall be mixed with the Portland cement as required to match the color of adjacent concrete.

B. Non-Shrink Grout

1. The grout material shall be an approved ready to use mixture requiring only water for use at the job site. The compressive strength of 2-inch cubes shall be 3,000 psi at 7 days.

2. Non-shrink grout shall conform to CRD-C 621 and ASTM C1107, Grade B or C when tested at a maximum fluid consistency of 30 seconds per ASTM C939 at temperature extremes of 45 degrees Fahrenheit and 90 degrees Fahrenheit and an extended working time of 15 minutes.

3. Non-shrink grout product and manufacturer shall be as specified in this Section.

4. Non-shrink grouts depending on oxidation to limit shrinkage and containing additives such as iron or steel particles shall not be used.

C. Epoxy Grout

1. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

2. Epoxy grout product and manufacturer shall be as specified in this Section.

D. Dry Pack

1. Dry pack (to be packed or tamped in place) shall be made at no slump consistency.

2. When mixing the batch, only enough water shall be added to the dry materials to produce a rather stiff mixture, then additions of water may be made in small increments until the desired consistency is obtained.

E. Curing Materials

1. Curing materials for cement grout shall be as specified in Section 03 30 00 - Cast-in-Place Concrete and as recommended by the manufacturer for prepackaged grouts.

PART 3 - EXECUTION

3.1 IMPLEMENTATION

A. Installation

1. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency shall be such that the grout is plastic and moldable but will not flow.

2. Measurements for cement grout shall be made accurately by weight or by volume using containers. All measurements shall be made in a manner satisfactory to the Engineer. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted, be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped.

4. For grouting beneath base plates, grout shall be poured from one side only and shall flow across to the open side to avoid air-entrapment.

5. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer.

3.1 FIELD TESTING / QUALITY CONTROL

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications.

2. Compression tests and fabrication of specimens for cement grout and non- shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.

3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.

B. All grout which has already been placed and which fails to meet the requirements of this Section is subject to removal and replacement by the Contractor at no additional cost to the City

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SECTION 03 73 20

CONCRETE REPAIR

PART 1 - GENERAL

1.1 GENERAL

A. Applicable provisions of the conditions of the Contract and Division 1, General Requirements, govern work in this Section.

1.2 SCOPE OF WORK

A. Provide all labor, materials, and equipment necessary and/or required for the complete execution of the work of this Section to repair all concrete with new polymer modified concrete. Repair all deteriorated, spalled, cracked, and previously patched and damaged concrete, on the top of the concrete slab with mortar repair material.

B. In general, the work shall include, but not necessarily be limited to, the following:

1. Sounding of exposed concrete, including cutting, chipping, and removing of all deteriorated, unsound concrete.

2. Proper surface preparation of the concrete area, in accordance with the instructions of the manufacturer of the repair material.

3. Preparation and coating of all exposed reinforcement steel.

4. All other concrete work as shown on the Drawings as hereinafter specified and as reasonably inferred to be necessary and required to complete the scope of work.

C. Related Work Specified Elsewhere:

1. Section 07 92 00, Sealants and Joint Materials.

1.3 QUALITY ASSURANCE

A. Materials Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

B. All materials shall comply with New York State Environmental Conservation Law, Part 205.

C. Applicator: Company specializing in concrete repair with minimum five years documented experience and qualified by materials manufacturer.

D. Welding: ANSI/AWS D1.4.

E. Follow ACI 546 "Concrete Repair Guide" and ICRI 03732 "Surface Preparation for Sealers, Coatings, and Polymer Overlays".

1.4 SUBMITTALS

A. General: Submit samples, product data, mock-up samples, test reports, data, and manufacturer's names for concrete repairs, certifications, and procedures.

B. Samples: Submit to Engineer for approval prior to purchase, fabrication or delivery:

1. Concrete repair materials; manufacturer's standard size of each material type.

2. Drilled-in and adhesive anchors.

3. Other products, materials and fixtures, mock-up samples, as specified herein and where requested by Engineer.

C. Certification for Repair Materials: Submit to Engineer, notarized documentation for compatibility of each repair material with all other concrete ingredients and with each applicable concrete surface treatment. Certify conformance to specifications and chloride ion content.

D. Submit purchase orders and delivery receipts of repair materials to Engineer demonstrating that adequate materials for the surface areas have been procured by the Contractor.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store products by means which will prevent mechanical damage and deterioration due to moisture, temperature changes, and corrosion.

B. Store materials off the ground in dry, weathertight, adequately ventilated and clean locations.

C. Materials shall be delivered to the site, ready to use, in manufacturer's original and unopened containers, bearing label as to type of material,

brand name and manufacturer's name and product expiration date. Delivered material shall be identical to approved samples.

D. Store accessories to prevent corrosion, dirt accumulation, and other deterioration.

E. Comply with manufacturer's and supplier's instructions for storage, shelf life limitations, and handling.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Pins for concrete spall repair to anchor new concrete or polymer mortar shall be 1/4" dia. threaded stainless steel expansion type pins conforming to AISI 304, as manufactured by Hilti, Rawl, Phillips Red Head, or approved equal.

B. The protective coating and bonding agent for exposed reinforcement shall be an epoxy-cementitious coating, Masteremaco P124 by BASF, or Sika Armatec 110 EpoCem, by Sika Corporation.

C. For concrete crack repairs, the following sealants shall be used:

1. For cracks:

Masterseal @NP 2 by BASF

Other acceptable concrete crack repair products:

Sikaflex 1a to surface seal cracks

Powercoat Epoxy Flexible Joint Sealant, by Vexcon.

Polyurethane Concrete Crack Sealant by Quickcrete

D. For spalls, deteriorated and/or disintegrated horizontal areas; a polymer-modified silica fume enhanced cementitious non-sag mortar shall be used as follows: (Unless otherwise shown on the drawings).

1. For deposits greater than 1", Masteremaco T1060 or Sikatop 122 Plus, or approved equal, with 3/8" pea gravel (course aggregate) in accordance with manufacturer’s instructions.

2. For deposits on horizontal surface less than 1", Masteremaco T1060 or

Sika Top 122 Plus, or approved equal.

2. For vertical or overhead surfaces for hand trowel application use Masteremaco N425 or Sika Top 123 Plus, or approved equal.

3. For form and pour application, use Masteremaco T1060 or Sika Top 111 Plus, or approved equal, with 3/8" pea gravel if greater than 1".

4. All mortars shall match the color of the existing concrete.

E. Epoxy bonding compound shall be Masteremaco P124 by BASF, or Sika Armatec 110 Epocem, or approved equal.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615 conforming to Grade 60 deformed bars and ASTM A706 weldable Grade 60 deformed reinforcing bars.

2.3 EPOXY ADHESIVE

A. Provide a two component, 100% solids, high modulus structural epoxy adhesive with a bond strength of 3,300 psi, shear strength of 3,200 psi and tensile strength of 3,500 psi, as manufactured by BASF or Sika Corp., or approved equal.

2.4 MIXING EPOXY MORTARS

A. Mix epoxy mortars in accordance with manufacturer's instructions for purpose intended.

B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

2.5 MIXING CEMENTITIOUS MATERIALS

A. Mix cementitious grout in accordance with manufacturer's instructions for purpose intended.

B. Include bonding agent as additive to mix.

2.6 PRE-REPAIR CONFERENCE

A. At least seven days prior to the beginning of the repair work, the Contractor shall hold a meeting to review the detailed requirements for the work. Meeting schedule shall be attended by General Contractor, Subcontractor, the Owner, and the Engineer. The Contractor shall send a pre-installation

agenda to all attendees ten days prior to the scheduled date of the conference. Surface preparation, proposed equipment and procedures, material mixing, placing and finishing procedures, schedules, climatic conditions, and sample repair areas shall be discussed and approved prior to the beginning of the work.

PART 3 - EXECUTION

3.1 APPLICATION - GENERAL

A. All products shall be applied in strict accordance with the manufacturer's specifications and recommendations for same and as indicated on the Drawings. Carefully observe mixing, application and curing recommendations for each product.

B. Prior to the start of all work in this Section, an on-site meeting between the contractor and the manufacturer is required.

3.2 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.3 SURFACE PREPARATION

A. When performing repair work, the Contractor shall take all necessary measures to protect adjoining structural elements and finishes which are to remain. All areas shall be protected from debris from cutting, chipping and all work performed under this Contract.

1. Work shall be done with approved mechanical power tools and equipment.

2. All repair work shall be done by competent workmen trained and experienced in the particular type of work.

3. No work shall be started prior to submission of material samples and shop drawings, and approval thereof. Submissions shall include color selection for sealants, mortar, epoxy, pins, etc.

B. The concrete surface preparation will be performed in strict accordance with the manufacturer's instructions. The surface must be mechanically prepared. Areas to be repaired must be clean, sound and free of contaminants. All loose and deteriorated concrete shall be removed by

mechanical means approved by the Architect/Engineer. Be sure the repair area is not less than 1/4" in depth. Where reinforcement steel is visible, chip, cut and remove concrete behind and all around the reinforcement to such a depth that existing reinforcement is encountered which is not rusted or deteriorated and so as to allow the preparation and coating of the back of the reinforcement steel. The depth cut behind the reinforcement steel shall not be less than 3/4". For areas patched with repair mortar, remove broken and soft concrete 3/4 inch minimum depth. Remove corrosion from steel.

C. Flush out cracks and voids with water to remove laitance and dirt. Cracks in the substrate in the area of the patching work must be treated as directed by the Architect/Engineer.

D. Extend all existing control and expansion joints through any patch. Install new joints as directed by the Architect/Engineer. Wire brush clean the exposed reinforcement steel surfaces. Mechanically cut away damaged portions of bar.

E. If cross-section loss of reinforcement steel is evident, splice on additional steel as directed by the Architect/Engineer.

F. Mechanically remove all dirt, grease, paint, laitance, rust and any other bond inhibiting material from the reinforcement steel.

G. All surfaces to be coated must be clean, dry, sound, and frost free with curing compounds, residues, previous coatings and other contaminants completely removed. An open textured sandpaper-like surface is ideal. The concrete surface preparation will be performed in strict accordance with the manufacturer's instructions. The surface must be mechanically prepared, by sandblasting, or high-pressure water blasting.

3.4 REPAIR WORK

A. Concrete Repair

1. All spalled, cracked, popped or otherwise damaged areas of concrete and other exposed concrete shall be repaired in accordance with the following procedure and as shown on Drawing.

2. Concrete Spalls:

a. Loose, broken and spalled concrete shall be removed. A rough, clean, sound concrete surface is to be provided by hammering (minimum 2 lb. hammer), or chipping. Minimum depth of concrete to be removed in damaged areas shall be 1-1/2".

b. For exposed, corroded or rusted reinforcement, prepare surface in accordance with SSPC SP-3 power tool cleaning, and then apply two coats of Masteremaco P124 or Sika Armatec 110 EpoCem on same day to each area cleaned, in full conformance with manufacturer's printed label instructions

c. Where more than 25 percent of the original reinforcement cross-sectional area has been lost to corrosion, the reinforcement must be replaced by cutting back concrete to sound reinforcing and welding a new reinforcement of the same size to the existing reinforcement.

d. Install 1/4 inch φ threaded stainless steel expansion Hilti type pins or approved equal at vertical, horizontal and overhead conditions into the prepared clean concrete surfaces. Minimum cover for pins shall be 3/4 inch. Pins shall penetrate a minimum of 2" into sound concrete surface.

e. After concrete surface has been prepared, apply repair material, as specified, to the concrete surface. Bonding compounds shall also penetrate into existing cracks. All work shall comply with the manufacturer's requirements.

f. Concrete surface is to be restored to the original shape and geometry. Some areas may require reforming, if so, form should be faced with polyethylene or approved releasing agent to prevent bond of the epoxy, polymer or concrete to the forms.

g. The polymer modified mortar shall be prepared and applied in accordance with the manufacturer's directions. The hand trowel polymer modified mortar shall be applied in layers of 1 inch maximum.

h. The form poured polymer modified mortar shall be installed in accordance with the manufacturer’s directions.

i. The minimum ambient temperature shall be 40 deg.F and the maximum shall be 90 deg.F when repair material is being applied.

j. Follow manufacturer’s recommendation regarding curing of repaired surfaces.

3. Concrete Cracks:

a. Chip out all disintegrated concrete around non-moving cracks, and "Vee" out crack minimum width and depth of ½".

b. Thoroughly clean crack of all loose material with oil-free compressed air or vacuum.

c. Seal crack using polymer-modified mortar manufactured by Sika after applying an epoxy bonding compound to the surface of the crack. The mortar must be applied while the bonding compound is still tacky, in accordance with Sika instructions.

B. Repair Exposed Reinforcing

C.

1. In areas where concrete has spalled or disintegrated, and reinforcing is exposed, the reinforcing shall be carefully inspected for deterioration.

2. All exposed reinforcing shall be thoroughly wire brushed clean. Exposed reinforcing shall be coated with epoxy cement coating. Masteremaco P124 or ARMATEC 110 EpoCem or equal to be applied in accordance with manufacturer's directions.

3. All deteriorated reinforcing must be replaced with rebars of the same size and spacing. Concrete shall be cut back to sound reinforcing, and new reinforcing rebar shall be welded to the existing reinforcing rebar.

4. Repair and replace deteriorated concrete as outlined in the concrete repair section.

3.5 CLEANING

A. Upon completion of all repair work, all areas shall be left broom cleaned and all new repaired surfaces left in a clean and neat condition. All debris shall be removed from the premises.

3.6 FIELD QUALITY CONTROL

A. All work surfaces are to be inspected by the Contractor's Field Supervisor prior to the start of the work.

B. It shall be the Contractor's responsibility to contact the Engineer, and to make arrangements for these inspections. The Contractor will not receive

any payment for work he performs unless authorized in advance by the Engineer.

C. During the progress of the work, personnel of the Engineer's office will make visits to observe the existing conditions and the corrective work. The Contractor shall afford the Engineer and the personnel of the Engineer's office and photographer the opportunity to make the observations that the Engineer deems necessary. There shall be no additional payment for time of either equipment or personnel expended during these observations. Inspections will be made on every phase of work. Notice for inspection shall be given to the Engineer in sufficient time. Accurate quantity lists shall be prepared by the Contractor for the Engineer's review prior to each phase of inspection.

+ + END OF SECTION + +

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SECTION 04 05 13

MORTAR

PART 1 - GENERAL

1.1 REFERENCES

A. Standards:

1. Mortar: ASTM C 270, except as otherwise specified.

2. Grout: ASTM C 476.

1.2 SUBMITTALS

A. Product Data:

1. Portland Cement: Brand and manufacturer's name.

2. Masonry Cement: Brand and manufacturer's name.

3. Lime: Brand and manufacturer's name.

4. Sand(s): Location of pit, name of owner, and previous test data.

5. Color Pigments: Brand and manufacturer's name.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials in a manner which will insure the preservation of their quality and fitness for the Work.

B. Store cement and lime on raised platforms under waterproof, well ventilated cover.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Submittals: Section 01 33 00.

B. Construction Waste Management: Section 01 74 00.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: One of the following complying with the indicated requirements:

1. Portland Cement: ASTM C 150, Type 1, of natural color or white as required to produce the desired color.

a. Fly Ash: Comply with ASTM C593.

1) Recycled Content: Minimum 15 percent pre-consumer recycled content at contractor's option.

a) Type 1: 81 g, 15 percent.

2. Masonry Cement: ASTM C 91, of natural color or custom color as required to produce the desired color.

a. Fly Ash: Comply with ASTM C593.

1) Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

a) Type M: 27 g, 5 percent; 108 g 20 percent.

b) Type S: 26 g, 5 percent; 102 g, 20 percent.

c) Type N: 24 g, 5 percent; 96 g 20 percent.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144, except that for joints less than 1/4 inch thick use sand graded with 100 percent passing the No. 16 sieve.

1. Sand for White Mortar: Natural white sand or ground white stone.

2. Sand for Colored Mortar: Ground marble, granite, or other sound stone, as required to match approved sample.

D. Grout Sand: ASTM C 404.

E. Color Pigments: High purity, finely ground, chemically inert, unfading, lime proof mineral oxides specially prepared for use in mortar.

F. Water: Clean and free of deleterious amounts of acids, alkalis, and organic materials.

2.2 MIXES

A. Mortar for Unit Masonry: Comply with ASTM C 270, proportion specifications, except limit materials to those specified.

1. Colored Mortar: Proportion color pigments with other ingredients as necessary to match required color, except limit pigments other than carbon black to a maximum of 10 percent of cement content by weight and limit carbon black to a maximum of 3 percent of cement content by weight.

B. Grout: Comply with ASTM C 476. If grout types are not indicated on Drawings, furnish type (fine or coarse) most suitable for the particular job conditions to completely fill cavities and embed reinforcement and other built-in items.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to sections of Specifications which require mortar and masonry grout.

3.2 MORTAR SCHEDULE

A. Where mortar types are not indicated on Drawings or specified, use types as follows:

1. Type M for unit masonry below grade in contact with fill materials.

2. Type S for concrete masonry units.

3. Type N for brick masonry units.

a. Proportion Portland cement, lime, and sand in a 1:1:6 ratio.

++ END OF SECTION + +

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SECTION 04 15 00

MASONRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide masonry accessories as shown and specified.

2. The types of masonry accessories required include the following:

a. Continuous horizontal wire reinforcing and ties.

b. Individual metal ties.

c. Anchoring devices.

d. Concrete inserts.

e. Miscellaneous accessories.

3. This Section specifies the masonry accessories for Work under the following Sections:

a. Section 04 20 10, Unit Masonry Construction.

B. Related Work Specified Elsewhere:

1. Section 04 05 13, Mortar.

2. Section04 20 10, Concrete Masonry Units.

3. Section 04 21 00, Brick Masonry.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Wherever a fire resistance classification is shown or scheduled for unit masonry construction (4-hour, 3-hour and similar designations), provide accessories complying with the

requirements established by UL and the New York State Uniform Fire Prevention and Building Code.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. ASTM A 82, Cold Drawn Steel wire for Concrete Reinforcement.

2. ASTM A 153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

3. ASTM A 240, Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and General Applications.

4. ASTM A 615, Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.

5. ASTM A 1064, Carbon-Steel Wire and Welded Wire Reinforcement, Plain or Deformed, for Concrete.

6. ASTM B 227, Hard-Drawn Copper-Clad Steel Wire.

7. ASTM D 1752, Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

8. UL, Design Number U907.

1.3 SUBMITTALS

A. Manufacturer's Data: Submit for approval to Engineer copies of manufacturer's specifications and installation instructions for each masonry accessory required. Include data substantiating that materials comply with specified requirements.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver accessories in original packages, plainly marked with identification of materials and manufacturer.

B. Storage of Materials: Store and cover materials to prevent corrosion and deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Continuous Wire Reinforcing and Ties for Masonry: Welded wire units prefabricated in straight lengths of not less than 10 feet, with matching corner "L" and intersection "T" units. Fabricate from cold drawn steel wire complying with ASTM A 1064, with deformed continuous 9 gage side rods and plain 9 gage cross rods, crimped for cavity wall construction, with unit width of 1-1/2 to 2 inches less than thickness of wall or partition. All reinforcing shall be hot dipped galvanized after fabrication with 1.5 ounces per square foot of zinc coating complying with ASTM A 153, Class B-2 unless otherwise specified.

1. For single-wythe masonry, use units fabricated as follows:

   a. Truss type fabricated with single pair of side rods and continuous diagonal cross-rods spaced not more than 16 inches on centers.

   b. Product and Manufacturer: Provide one of the following:

      1) 120 Truss-Mesh by Hohmann and Barnard Company.

      2) Or approved equal.

2. For multi-wythe masonry, use units fabricated as follows:

   a. Tab type fabricated with single pair of side rods in interior wythe and adjustable two piece rectangular box type crossties spaced not more than 16 inches on centers. Space side rods for embedment in each face of back-up wythe and extend ties for proper embedment in facing wythe.

   b. Product and Manufacturer: Provide one of the following:

      1) 165-2X Adjustable Truss by Hohmann and Barnard Company.

      2) Or approved equal.

B. Individual Wire Ties for Masonry: Fabricate from 3/16-inch cold drawn steel wire complying with ASTM A 1064, with 1.5 ounces per square foot of hot-dip coating complying with ASTM A 153, Class B-2 of the length required for proper embedment in wythes of masonry shown.

1. For use with hollow masonry units laid with cells vertical, provide rectangular shaped ties.

2. For use with solid masonry units or hollow units laid with cells horizontal, provide ties with ends bent to 90 degree angles to form hooks not less than 2 inches long.

3. Product and Manufacturer: Provide one of the following:

   a. Byna-Lok Seismic Wire Tie by Hohmann and Barnard Company.

   b. Or approved equal.

4. Where facing and backup joints do not align, use adjustable two piece ties with compression/tension bar.

   a. Product and Manufacturer: Provide one of the following:

      1) Adjustable Wall Ties (Pinlets and Eyes with 2X-Hook) by Hohmann and Barnard Company.

      2) Or approved equal.

C. Anchoring Devices for Masonry: Use straps, bars, bolts, and rods of the type and size shown and as follows:

1. Flexible Anchors: Where masonry is shown or specified to be anchored to structural framework with flexible anchors, use anchors which will permit horizontal and vertical movement of masonry but will provide lateral restraint, and as follows:

   a. For anchorage to concrete framework, use two piece anchors with 22 gage sheet metal dovetail with 1.5 ounces per square foot of hot dip zinc coating complying with ASTM A 153, Class B-2, or stainless steel, ASTM A 240, and 16 gage rectangular corrugated tie 1-inch wide sized to extend to within one inch of face of masonry or to a depth of 12 inches.

      1) Product and Manufacturer: Provide one of the following:

         a) BL-303 Corrugated Dovetail Brick Tie by Blok-Lok, a Division of Hohmann and Barnard Company.

b) Or approved equal.

b. Provide concrete inserts and other items shown, specified or required by others. Refer to Section 04201, Unit Masonry Construction, paragraph 1.1.B for requirements of coordination by others.

c. For anchorage to existing concrete and masonry use 16 gauge rectangular corrugated tie 1-1/4 inches wide sized to extend to within one inch of face or masonry.

1) Product and Manufacturer: Provide one of the following:

a) 345-SV by Hohmann and Barnard Company.

b) Or approved equal.

2) Lateral Supporting Masonry Wall Anchors: Provide 3/8-inch thick by 2-inches wide of length to extend to center of each wythe. Fabricate from steel with 1.5 ounces per square foot of zinc coating complying with ASTM A 153, Class B-2.

D. Miscellaneous Masonry Accessories:

1. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 of the sizes shown.

2. Compressible Filler:

a. Use foamed polyurethane strip saturated with polybutylene waterproofing material. When compressed to 50 percent of its original volume, filler shall provide a watertight joint. The manufacturer shall furnish a certificate of compliance with these requirements. Filler shall maintain its resiliency to allow for installation in temperatures as low as -14°F, but not above 95°F. Filler shall be waterproof when compressed to 50 percent of its original volume in temperatures from -40 F to +200 F. Elongation shall be at least 250 percent with a tensile strength of not less than 100 psi. No migration of polybutylene compound in the polyurethane strip will be allowed.

b. Product and Manufacturer: Provide one of the following:

1) NS-Closed Cell Neoprene Sponge by Hohmann and Bernard Company.

2) Or approved equal.

3. Premolded Control Joint Strips for Concrete Masonry Units: Solid rubber strips with a Shore A durometer hardness of 60 to 80, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration shall be as shown.

a. Cavity Fill Mesh: Provide 1/2-inch mesh hardware cloth, backed with asphalt impregnated cloth below. Install below all block courses that are to be filled with mortar.

b. Neoprene Control Joint Strips for Brick Masonry: Provide bellows type strip made from 1/16-inch cured, calendered neoprene with perforated flanges.

1) Product and Manufacturer: Provide one of the following:

a) Vertical wall expansion joints by Johns Manville.

b) RS Series-Rubber Control Joint by Hohmann and Barnard Company.

c) Or approved equal.

c. Weep Holes: Provide 1/4-inch outside diameter by 4-inches long clear plastic tubes as applicable or otherwise indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 042000, Concrete Masonry Units.

+ + END OF SECTION + +

SECTION 04 20 00

CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish concrete unit masonry work.

2. The extent of each type of concrete unit masonry is shown or is specified in schedules.

3. The types of concrete masonry units required include the following:

a. Hollow load-bearing units.

B. Related Sections:

1. Section 03 30 00, Cast-in-Place Concrete.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM A 82 / A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

2. ASTM A 153 - Standard Specification for Zinc-Coated (Hot Dip) on Iron and Steel Hardware.

3. ASTM A 496 / A 496M - Standard Specification Steel Wire, Deformed, for Concrete Reinforcement.

4. ASTM A 641 / A 641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

5. ASTM A 951 / A 951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.

6. ASTM C 1634 - Standard Specification for Concrete Facing Brick.

7. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

8. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units.

9. ASTM C 91 - Standard Specification for Masonry Cement.

10. ASTM C 140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

11. ASTM C 143 / C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

12. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.

13. ASTM C 150 - Standard Specification for Portland Cement.

14. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.

15. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

16. ASTM C 476 - Standard Specification for Grout for Masonry.

17. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

18. ASTM C 1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

19. ASTM C 1634 - Standard Specification for Concrete Facing Brick.

20. ASTM D 2240 - Standard Test Method for Rubber Property - Durometer Hardness.

21. ASTM E 488 - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.

22. International Building Code (IBC).

23. IBC - Chapter 7 Fire-Resistance-Rated Construction 721.3 Concrete Masonry.

24. IBC - Chapter 21 Masonry.

25. Masonry Standards Joint Committee (MSJC):

26. Building Code Requirements for Masonry Structures.

27. Specifications for Masonry Structures.

28. Masonry Veneer Manufacturers Association (MVMA): Installation Guide for Adhered Masonry Veneer.

29. Precast/Prestressed Concrete Institute (PCI): MNL-122 - Architectural Precast Concrete.

30. National Concrete Masonry Association (NCMA):

31. TEK Manual for Concrete Masonry Design and Construction.

32. American Concrete Institute (ACI): ACI 117- Specification for Tolerances for Concrete Construction and Materials.

1.3 QUALITY ASSURANCE

A. ASTM International (ASTM):

1.4 SUBMITTALS

A. Submit under provisions of Section 0130000 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Storage and handling requirements and recommendations.

2. Installation methods.

3. Cleaning and maintenance instructions provided by cleaning or another agent manufacturer.

C. Shop Drawings: Provide shop drawings indicating details of construction, control joints and installation requirements.

D. Certificates: Letter of compliance to specified performance requirements.

E. Test Reports: Submit manufacturer's Material Test Report (ASTM C140).

1. Dimensional Analysis.

2. Absorption Analysis.

3. Compressive Strength Analysis.

a. Selection Samples: Submit two sets of samples showing all available colors, patterns, textures, and finishes.

F. Verification Samples: For each product specified, two samples,

representing types, colors, textures, and finishes to be installed.

1.5 QUALITY ASSURANCE

A. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Construct a separate (not part of the actual building) sample wall panel not less than 4 feet by 4 feet (1.2 m x 1.2 m) with units in the pattern, type, color, texture, finish and shape as indicated on Drawings and specifications. Water repellent in mortar, cleaning agents, sealing agents if applicable, and methods shall be performed prior to approval of the sample panel.

2. Do not proceed with remaining work until workmanship, patterns, types, colors, textures, finishes, shape, application methods for water repellent in mortar, cleaning agents and sealing agents if applicable are approved by Architect in writing. Maintain Mock-up during construction for workmanship standard.

3. Rework mock-up area as required to produce acceptable work.

B. Control Joints: Comply with requirements on the Drawings, designed to reduce restraint and permit longitudinal movement, and as recommended by NCMA Tek Note 10-2C and 10-4.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Stack cubes only one cube high. Protect from damage.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver units in manufacturer's unopened, labeled, packaging. Units shall be inspected upon delivery. Defective units shall be removed immediately.

D. Storage: Store materials off the ground and keep free from groundwater, soil contamination, mud and dust. Materials shall be protected from precipitation and harmful weather conditions. Product with visible frozen moisture shall not be installed.

E. Handling: Units shall be handled in a manner that prevents breakage and damage.

1.7 PROJECT CONDITIONS

A. Temperature and Weather:

1. Protect concrete masonry units from rain and freezing temperatures prior to, during, and for 48 hours after installation of materials.

2. When ambient temperature is below 40 degrees F (4.4 degrees C) or exceeds 90 degrees F (32.2 degrees C), comply with requirements for project conditions in accordance with MSJC Specification for Masonry Structures including the following:

   a. Par. 1.8 C. Cold Weather Construction.

   b. Par. 1.8 D. Hot Weather Construction.

3. Do not continue masonry construction during heavy rains, as partially set or plastic mortar is susceptible to washout until 8 to 24 hours of curing occurs (depending upon environmental conditions).

4. When rain is likely, cover construction materials. Newly constructed masonry shall be protected from rain by draping a weather-resistant covering over the assembly. The cover shall be secured in place and extend over mortar that is susceptible to washout.

   a. Abide by manufacturer's absolute limits for storage temperature and direct sunlight, to prevent compromising wax coating.

PART 2- EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examination:

1. Verify field conditions are acceptable and ready to receive masonry.

2. Verify the foundations or bearing elements are within tolerances conforming to the requirements of ACI 117.

3. Verify built-in items are in proper location, and ready to receive masonry work.

4. Verify concrete brick masonry units are according to project specification and meet appropriate ASTM specification requirements. Commencement of installation constitutes acceptance of Concrete Face Brick, Concrete Masonry Units, Concrete Masonry Veneers, and Concrete Thin Veneers.

B. Preparation: Prepare surfaces and materials in accordance with MSJC Specifications for Masonry Structures. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

C. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

3.2 INSTALLATION - CONCRETE MASONRY UNITS

A. Concrete Masonry Units:

1. Install concrete masonry units in accordance with standard masonry practices, NCMA and MSJC Specifications for Masonry Structures and manufacturer's instructions.

2. Bond Pattern for Exposed Masonry: Running Bond.

3. Bond Pattern for Exposed Masonry: Stacked Bond.

4. Bond Pattern for Exposed Masonry: As indicated on Drawings.

5. Lay units by selecting product from more than one pallet at a time during installation.

6. Lay units with full mortar head and bed joints.

7. All cutting shall be done with masonry saw to provide, clean, sharp, unchipped edges.

8. Do not use masonry units with broken corners and edges in excess of ASTM C90 and ASTM C1634.

9. Temporary Formwork and Shores: Construct formwork to support reinforced masonry elements during construction.

10. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

B. Control Joints: Designed to reduce restraint and permit longitudinal movement. Per NCMA Tek Note 10-2C and 10-4, proper control joint spacing is required for concrete masonry walls.

1. Single-Wythe Concrete Masonry Units: Joints shall not exceed the lesser of: a maximum panel length to height ration of 1-1/2:1 or a distance of 25 feet.

2. Concrete Face Brick: Joints shall not exceed the lesser of: a maximum panel length to height ratio of 1-1/2:1 or a distance of 20 feet.

C. Mortar and Mortar Joints:

1. Mortar Mixing.

a. Mix mortar ingredients in accordance with ASTM C270.

b. Add mortar coloring.

c. Add water repellent admixture specified by manufacturer.

d. Mix mortar components between 3 and five minutes.

2. Mortar Joints

a. Tool exposed joints when mortar is thumbprint hard, using jointer larger than joint thickness.

b. Remove excess mortar smears as work progresses.

D. Horizontal Joint Reinforcement:

1. Place joint reinforcements in horizontal mortar joints in first course, at 8 inches above and below openings, and below bearing locations.

2. Install joint reinforcement in the bed joints 16 inches (406 mm) on center vertically in veneer applications, in the exterior wythe of composite and noncomposite wall construction, and in through-wall masonry construction.

3. Nonstructural, horizontal, joint reinforcement should not be installed continuously through control joints.

D. Veneer Anchors and Ties: Install to allow for vertical and horizontal movement. Ties must be securely attached to studs through sheathing and/or insulation and not to the sheathing/insulation alone.

E. Ambient Conditions: When ambient air temperature is outside the range of 40 to 90 degrees F (4.4 to 32.2 degrees C), implement procedures and comply with recommendations in accordance with MSJC Specification for Masonry Structures.

F. During construction and until the walls are roofed, the coping is installed, or the top bond beam course is grouted solid, keep walls covered to prevent rain or snow intrusion into the concrete masonry units cores or wall cavities.

G. Contractor shall keep masonry units, walls and surrounding work clean during construction following standard masonry practices. Mortar soiling (including but not limited to droppings, splatters, smears) shall be removed at the end of each day. Remove mortar soiling from masonry work and connecting work before its final set. Mortar droppings that adhere to the exposed face of the units shall be removed using brick/block scrap after being allowed to harden, without causing damage to the exposed face of installed brick. Remaining mortar shall be removed with a stiff fiber brush.

H. Keep concrete masonry units and walls clean during construction. Prevent grout or mortar from staining the face of masonry. Mortar and grout soiling (droppings, spatters, and smears) shall be removed at the end of each day following standard masonry practices.

I. All concrete masonry units shall be cleaned in strict accordance with specified cleaning agent manufacturer's instructions. Mild masonry detergents/cleaners and power washing systems shall be properly used. Strong acids, acid washes, or chemicals with a strong acid reaction shall not be used.

J. Loading:

1. Do not apply uniform floor or roof loads for a minimum of 12 hours after building masonry walls.

2. Do not apply concentrated loading for a minimum of 3 days after building masonry walls or columns.

K. Flashing and Weeps:

1. Install flashing as indicated on drawings, as specified herein and in all of the following locations:

a. Above grade at base of walls.

b. Under and behind sills.

c. Over openings.

d. At spandrels and shelf angles.

e. On top of bond-beams if used mid-wall.

2. Weep Vents shall be provided at all flashing locations at intervals not to exceed 32 inches (813 mm) O.C.

L. Cleaning:

1. All caulking and sealant materials shall be in place and cured prior to cleaning.

2. Application of cleaner above 50 psi. is prohibited.

3. A test panel shall be cleaned and approved by architect prior to general wall cleaning.

M. Contractor shall keep concrete units, walls and surrounding work clean during construction following standard masonry practices. Mortar soiling (including but not limited to droppings, splatters, smears) shall be removed at the end of each day. Remove mortar soiling from masonry work and connecting work before its final set. Mortar droppings that adhere to the exposed face of the units shall be removed using brick/block scrap after being allowed to harden, without causing damage to the exposed face of installed units. Remaining mortar shall be removed with a stiff fiber brush.

N. At installation completion of exposed concrete units, tuck-point holes and imperfections in joints of all exposed masonry surfaces, completely filling with mortar. Tool to match surrounding mortar joints. After pointing hardens, and within fourteen days of finished work, clean masonry surfaces of all excess mortar soiling and dirt.

O. Sealers:

1. A test panel shall be cleaned and approved by architect prior to general wall cleaning.

P. Protection:

1. Protect installed work from damage due to subsequent construction activity on the site.

2. Protect masonry materials during storage and construction to prevent moisture intrusion and soilage.

3. During erection, cover tops of walls to prevent moisture penetration into cores of concrete masonry units and cavities of wall system.

4. Provide final protection and maintain jobsite conditions that ensure concrete brick masonry is without damage, deterioration, or soiling.

+ + END OF SECTION + +

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SECTION 04 20 10

UNIT MASONRY CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide unit masonry construction as shown and specified. The Work also includes:

   a. Providing openings in masonry to accommodate the Work under this and other Sections and building into the masonry all items such as sleeves, anchor bolts, inserts and all other items to be embedded in masonry for which placement is not specifically provided under other Sections. Provide lintels in all openings or where directed by the Engineer.

   b. Providing openings in masonry to accommodate the work under other contracts and assisting other contractors in building into the masonry all items such as sleeves, anchor bolts, inserts and all other items required to be embedded in masonry under other contracts.

   c. Cutting and removing existing masonry for new openings and new abutting walls.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the masonry.

2. Notify other contractors in advance of the construction of the masonry to provide the other contractors with sufficient time for the installation of items included in their contracts that must be installed with the masonry.

3. This Section specifies the installation of unit masonry specified in the following:

   a. Section 042100, Brick Masonry.

b. Section 042200, Concrete Masonry Units.

C. Related Work Specified Elsewhere:

1. Section 033000, Cast-in-Place Concrete.

2. Section 041513, Mortar.

3. Section 041500, Masonry Accessories.

4. Section 042100, Brick Masonry.

5. Section 055000, Metal Fabrications.

6. Section 076000, Flashing and Sheet Metal.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Wherever a fire resistance classification is shown or scheduled for unit masonry construction (4-hour, 3-hour, and similar designations), comply with applicable requirements for materials and installation established by UL and other governing authorities.

B. Codes and Reference Standards: Comply with the applicable requirements of the New York State Uniform Fire Prevention and Building Code for the types of masonry construction shown and the following standards: ANSI A41.1 R70 Code Requirements for Masonry. ACI 531.1 Specifications for Concrete Masonry Construction Brick Industry Association, “Technical Notes on Brick and Tile Construction”. Brick Industry Association Technical Bulletin 1, “Cold Weather and Hot Weather Construction.” Brick Industry Association, Technical Notes on “Cleaning Brickwork”. National Concrete Masonry Association, “Guide Specifications” and “Technical Bulletins”. UL, Design Numbers U901 through U907.

C. Construction Tolerances: In accordance with ACI 531.1 and the following:

1. Variation from Plumb: For lines and surfaces of columns, walls and arises, do not exceed 1/4 inch in 10 feet, or 3/8 inch in a story height or 20 feet maximum, nor 1/2 inch in 40 feet or more. Except for external corners, expansion joints and other conspicuous lines, do not exceed 1/4 inch in any story or 20 feet maximum, nor 1/2 inch in 40 feet or more.

2. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4 inch in any bay or 20 feet maximum, nor 3/4 inch in 40 feet or more.

3. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/4 inch.

D. Presubmittal Meeting: Before erecting the job mock-up, the Contractor and his installer shall meet on-site with the Engineer to discuss approved products and workmanship to ensure a match to existing adjacent masonry.

E. Job Mock-up:

1. Prior to installation of unit masonry work, but after Engineer's approval of samples, erect job mock-up using materials, pattern bond and joint tooling shown or specified for final Work, to match existing adjacent masonry construction. Provide special features as directed including finished opening 1 foot-4 inches by 1 foot-4 inches, finished end, and expansion joint. Build mock-up at the site in location approved by the Engineer. The mockup shall be of full thickness and approximately 6 feet long by 4 feet high unless otherwise shown. Indicate the proposed range of color, texture and Workmanship to be expected in the completed work. Obtain Engineer's acceptance of visual qualities of the mock-up before start of masonry Work. Retain and protect mock-up during construction as a standard for judging completed masonry work. Do not alter, move or destroy mock-up until given written permission by Engineer. Masonry construction that does not meet the standards approved on the sample panel shall be removed and rebuilt as required by Engineer. Provide mock-up panel for typical exterior and interior sections to match existing adjacent areas.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver all materials to the site in the manufacturer's original unbroken, undamaged and unopened packaging with labels bearing the name of the manufacturer and the product. Masonry units and brick shall be factory packaged and strapped, delivered to the site and stored on skids.

B. Storage of Materials:

1. Protect masonry materials during storage and construction with a properly erected shelter from wetting by rain, snow or ground water and from soilage or intermixture with earth or other materials.

2. Store and handle all materials to prevent inclusion of water or foreign matter and to prevent damage of any nature. Packaged units kept in original unopened packages until time for use.

3. Distribute materials on floor slabs to prevent overloading. Designated live loads shown for floor shall not be exceeded.

C. Handling Materials:

1. Handle materials in a manner that minimizes chips, cracks, voids, discolorations or other defects which might be visible or cause staining in finished work.

1.4 JOB CONDITIONS

A. Environmental Requirements: Do not place any masonry when air temperature is 40°F and falling. Masonry may be placed when air temperature is 32°F and rising. In either case, it may not be placed if temperature is expected to drop below 32°F during next 72 hours unless adequate protection is provided as specified in 1.4.B.4.b. below.

B. Protection:

1. Protect partially completed masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 2 feet down both sides of walls and hold securely in place.

2. Do not apply uniform floor or roof loading for at least three days after completing masonry columns or walls.

3. Do not apply concentrated loads for at least seven days after completing masonry columns or walls.

4. Cold Weather Protection.

a. When surrounding air temperature is 48°F to 40°F protect masonry construction from rain or snow for a minimum of 48 hours by covering with nonstaining weathertight membrane.

b. When surrounding air temperature is 40°F and below maintain masonry construction temperature above 40°F for a minimum of 48 hours by enclosure and supplementary heat, electric heating blankets, infrared lamps, or other methods acceptable as directed by the Engineer.

5. Hot Weather Protection: Protect masonry construction, by methods acceptable to Engineer, from direct exposure to wind and sun when the surrounding air temperature is 99°F in the shade with relative humidity less than 50 percent.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer to the following Sections for required masonry materials:

1. Section 033000, Cast-In-Place Concrete.

2. Section 0405131, Mortar.

3. Section 041500, Masonry Accessories.

4. Section 042100, Brick Masonry.

5. Section 042000, Concrete Masonry Units.

6. Section 055000, Metal Fabrications.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which unit masonry Work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.2 PREPARATION

A. Clean dirt, debris, oil, grease and other materials which would effect the bond of mortar from all surfaces to receive work under this Section.

B. Wetting of Masonry Units:

1. Brick: Wet brick having ASTM C 67 absorption rates greater than 0.25 ounce per square inch per minute.

a. Determine absorption by placing 20 drops of water inside a circle the size of a quarter on typical units. If water is absorbed within 1-1/2 minutes, wet brick before laying.

2. Use wetting methods which ensure that each masonry unit is nearly saturated but surface dry when laid.

3. Except for absorbent units specified to be wetted, lay masonry units dry. Do not wet concrete masonry units.

3.3 INSTALLATION, GENERAL

A. Thickness: Build walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.

B. Build chases and recesses as applicable and shown or required by others. Refer to paragraph 1.1.B. herein for the requirements of coordination with others. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

C. Leave openings for equipment, piping, ducts, and other items to be installed subsequent to starting of masonry Work. After installation of said items, complete masonry Work to match Work immediately adjacent to openings.

D. Cut masonry units using motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining Work neatly. Use full size units without cutting wherever possible.

E. Matching Adjacent Existing Masonry Work: Match coursing, pattern bond color and texture of new masonry work with adjacent existing work.

3.4 LAYING MASONRY WALLS

A. General:

1. Mortar Types: Unless otherwise indicated, use mortar as specified in Section 04100, Mortar, and as follows:

   a. For all Work, use Type S mortar.

   b. Do not use mortar which has begun to set or if more than 1/2 hour has elapsed since initial mixing. Retemper mortar during the 1/2-hour period only as required to restore workability.

2. Layout walls in advance for accurate spacing of surface pattern bond with uniform joint widths and to properly locate openings, expansion

joints, returns and offsets. Avoid the use of less than half size units at corners, jambs and wherever possible at other locations.

3. Lay up walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other Work.

4. Pattern Bond: Lay exposed masonry in running bond and as shown to match adjacent existing masonry. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than 4-inch horizontal face dimensions at corners or jambs.

B. Mortar Bedding and Jointing:

1. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush in cross joints and do not furrow bed joints. Use trowel edge for flat bed joints. Fill all parapet blocks solid with grout.

2. Bed and lay brick and concrete masonry units at the proper angle with fully slushed joints.

3. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course of piers columns and pilasters and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.

   a. Maintain 3/8-inch joints, except for minor variations required to maintain half bond.

4. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials. unless otherwise shown.

5. Tool exposed joints slightly concave, to match existing. Rake out mortar in preparation for application of caulking or sealants where required.

6. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not hammer or otherwise force brick at corners, whether at jambs or changing the direction of a wall in order to force plumb the corner or jamb. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

C. Collar Joints:

1. Fill the vertical space between wythes solidly with mortar by parging the in-place wythe and shoving units into the parging, for the following masonry work:

a. All walls, except cavity walls, and interior walls and partitions.

D. Stopping and Resuming Work: Rack back 1/2-brick length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly, if required, and remove loose masonry units and mortar prior to laying new masonry.

E. Built-in Work:

1. As the Work progresses, build in items shown, specified or required by others. Refer to paragraph 1.1.B. herein for the requirements of coordination with others. Fill cores in one block width solidly with masonry around built-in items.

a. Fill space between hollow metal frames and masonry solidly with mortar.

b. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of cavity fill mesh in the joint below and rod mortar or grout into core.

F. Interior Walls:

1. Nonload-Bearing Interior Partitions and Interior Wythe of Cavity Walls: Build full height of story to underside of structure above, unless otherwise shown.

2. Tie walls at top and sides with masonry anchors as specified in Section 04150. Insert compressible filler, specified in Section 04150, in all horizontal and vertical joints where masonry terminates. Insert filler 3/4 inches from both faces of masonry. Use filler four times as thick as the widest part of the joint. Thickness of filler shall be a minimum of 4 times the compressed thickness. Compress filler to less than thickness of joint and insert. At splices, overlap strips by 3 inches and compress ends to form tight joint. Finish with backer rod and sealant.

3. At masonry walls requiring a fire rating use fire safing insulation specified in Section 07210. Insert insulation in a continuous,

vaportight, solid blanket to 3/4-inches from both faces. Finish with backer rod and sealant.

G. Horizontal Joint Reinforcing:

1. Provide continuous horizontal joint reinforcing as shown and specified. Refer to Section 04150, Masonry Accessories, for type of reinforcing units required. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing.

2. Reinforce all walls with continuous horizontal joint reinforcing unless specifically noted or specified to be omitted.

3. Provide continuity at corners and wall intersections by use of prefabricated “L” and “T” sections. Cut and bend units in accordance with manufacturer’s written instructions for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

4. Space continuous horizontal reinforcing as follows:

   a. For multi-wythe walls, solid or cavity, where continuous horizontal reinforcing also acts as structural bond or tie between wythes, space reinforcing as required by code but not more than 16 inches on centers vertically.

   b. For single wythe walls, space reinforcing at 16 inches on centers vertically, unless otherwise shown.

   c. For parapets, space reinforcing at 8 inches on centers vertically, unless otherwise shown.

5. Reinforce masonry openings greater than 12 inches wide, with horizontal joint reinforcing placed in two horizontal joints approximately 8 inches apart, immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 24 inches beyond jambs of the opening.

   a. In addition to wall reinforcing, provide additional reinforcing at openings as required to comply with the above.

H. Anchoring Masonry Work:

1. Provide anchoring devices of the type shown and as specified under Section 04150, Masonry Accessories. If not shown or specified, provide standard type for facing and backup involved.

2. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:

a. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.

b. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless otherwise shown.

c. Space anchors as shown, but not more than 16 inches on center vertically and 36 inches on center horizontally.

3. Anchor single wythe masonry veneer to backing with metal ties as follows:

a. Anchor veneer to structural members with metal anchors embedded in masonry joints and attached to structure. Provide anchors with flexible tie section, unless otherwise shown.

b. Anchor veneer to concrete back up with dovetail anchors.

c. Anchor veneer to existing concrete and masonry backup with corrugated anchors attached with stainless steel expansion bolts.

I. Control Joints:

1. Provide vertical expansion, control and isolation joints in masonry where shown. Build in related items as the masonry Work progresses. Rake out mortar in preparation for application of caulking and sealants. Refer to Section 07920, Caulking and Sealants.

a. Provide items specified under Section 04150, Masonry Accessories, where shown.

1) Build flanges of factory fabricated neoprene control joint into brick masonry and premolded control joint strips into concrete unit masonry. Refer to Section 04150.

2) Build in compressible fillers specified under Section 04150, Masonry Accessories, where shown. Install in accordance with manufacturer's written instructions.

2. Control Joint Spacing: Where location of control joints are not shown, place vertical joints spaced not to exceed 50 feet-0 inches on centers for clay masonry or 35 feet-0 inches on centers for concrete masonry wythes if reinforced. Locate control joints in the masonry Work as shown and including the following:

a. At structural column or joint between bays.

b. Above expansion or control joints in the supporting structure.

c. Above major openings at end of lintels upward and below at ends of sills downward. Place at one side of jamb for openings less than 6 feet-0 inches wide and at both sides for openings over 6 feet-0 inches wide.

d. At vertical chases, recesses and other points of reduction in wall thickness.

e. At locations where masonry wall height changes by more than 20 percent.

f. Where masonry abuts supporting structure.

g. At a distance equal to 1/2 the wall height from corners or intersections with other masonry.

h. Submit joint locations to Engineer for approval.

J. Lintels:

1. Provide steel lintels and masonry U-block lintels, where shown on the Contract Drawings, and specified in Section 055000, Metal Fabrications.

2. Provide masonry lintels where shown and wherever openings of 16 inches or more are shown without structural lintels. Provide precast or formed in place masonry lintels. Thoroughly cure precast lintels

before handling and installation. Temporarily support formed-in-place lintels.

a. Unless otherwise shown, provide one horizontal reinforcing bar for each 4 inches of wall thickness, of size-number not less than the number of feet of opening width.

b. For hollow masonry unit walls, use specially formed "U" shaped lintel units with reinforcing bars placed as shown, filled with Type M mortar.

3. Provide minimum bearing at each jamb, of 4 inches for openings less than 6 feet-0 inches wide, and 8 inches for wider openings.

K. Flashing of Masonry Work:

1. Provide concealed flashings in masonry Work as shown. Refer to Section 076000, Flashing and Sheet Metal, for type of flashing required. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/2 inch from face of wall, unless otherwise shown.

a. Extend flashings beyond edge of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior.

b. Install elastic flashings in accordance with manufacturer's instructions.

2. Provide 3/8" wide x 1 1/2" long plastic insert type weep joints in the head joints of the first course of masonry immediately above concealed flashings. Space 24 inches on center, unless otherwise shown.

3. Install reglets and nailers for flashing and other related work where shown to be built into masonry Work.

4. Install emergency scuppers as shown.

3.5 CUTTING AND REMOVING EXISTING MASONRY

A. Wherever existing masonry is shown to be cut and removed use methods that will produce sharp, true edges to accept new abutting work.

3.6 REPAIR, POINTING AND CLEANING

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.

C. Cleaning Exposed, Unglazed Masonry Surfaces:

1. Wipe off excess mortar as the Work progresses. Dry brush at the end of each day's work.

2. Final Cleaning: After mortar is thoroughly set and cured, clean sample wall area of approximately 20 square feet as described below. Obtain Engineer's acceptance of sample cleaning before proceeding to clean remainder of masonry work.

   a. Dry clean to remove large particles of mortar using wood paddles and scrappers. Use chisel or wire brush if required.

   b. Presoak wall by saturating with water and flush off loose mortar and dirt.

   c. Scrub down wall with stiff fiber brush and a solution of 1/2 cup of trisodium phosphate and 1/2 cup of household detergent dissolved in one gallon of water.

   d. Rinse walls, using clean, pressurized water, to neutralize cleaning solution and remove loose material.

   e. Acid cleaning of masonry will not be permitted.

3. Clear Coatings: See Section 09900, Painting.

D. Protection:

1. Protect the masonry Work from deterioration, discoloration or damage during subsequent construction operations.

2. When work on any brick or block masonry is finished for the day or discontinued on account of rain or snow, or where top of new work is

likely to be damaged by storms, sloping planks covered with tarred felt shall be placed over the top of walls.

+ + END OF SECTION + +

SECTION 04 21 00

BRICK MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide brick masonry, as shown and specified.

2. The extent of each type of brickwork is shown on the Drawings and in schedules.

B. Related Work Specified Elsewhere:

1. Section 040513, Mortar.

2. Section 041500, Masonry Accessories.

3. Section 042000, Concrete Masonry Unit Masonry Construction.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Wherever a fire resistance classification is shown or scheduled for brick masonry (4-hour, 2-hour and similar designations), provide brick complying with the requirements established by UL, governing authorities, and the New York State Uniform Fire Prevention and Building Code, for types of brick masonry shown.

B. Source Quality Control: Obtain brick from one manufacturer, of uniform texture and color or uniform blend in the variation thereof, for each continuous area and for visually related areas, to match adjacent existing masonry where applicable.

C. Presubmittal Meeting: Before submitting samples for approval, the Contractor and his supplier shall meet on-site with the Engineer to review the existing masonry to be matched and preview proposed products.

D. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 216, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).

2. ASTM C-62, Specification for Common Brick.

3. ASTM C64, Fire Clay Brick.

4. ASTM C67, Standard Methods of Sampling and Testing Brick.

1.3 SUBMITTALS

A. Samples:

1. Submit for approval straps of each type of brick specified to match the adjacent existing masonry or for new masonry construction. Select units to show the range of color and texture which can be expected in the finished Work. Compliance with all other requirements is the exclusive responsibility of the Contractor.

B. Manufacturer's Data: Submit for approval copies of the manufacturer's specifications and test data for each type of brick required, including certification that each type complies with the specified requirements. Include instructions for handling, storage, installation and protection of each type of brick. Provide test results of drying and shrinking of units performed within one year prior to delivery.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver brick in original unopened and undamaged packages and pallets, plainly marked with identification of materials and manufacturer.

B. Storage of Materials: Store and cover brick to prevent damage such as chipping and staining. Store and handle all materials to prevent inclusion of water or foreign matter and to prevent damage of any nature. Packaged units shall be kept in original unopened packages until time for use.

C. Distribute materials on floor slabs to prevent overloading. Designated live loads shown for floor shall not be exceeded.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Size: Unless otherwise shown provide nominal 8-inch by 2-5/8-inch by 4-inch brick, (7-5/8 inches by 2-1/4 inches by 3-5/8 inches, actual size) for exposed vertical brick work.

1. Provide special molded shapes where shown and for applications which cannot be sawed from standard brick sizes.

2.2 BRICK

A. Facing Brick: ASTM C 216.

1. Grade SW for all exposed brick.

2. Type FBS.

3. Texture, Colors and Blend: To match adjacent existing structures and as selected by the Owner for new construction.

4. Products and Manufacturer: Provide one of the following:

a. Merritt Brick Corporation.

b. Belden-Stark Brick Corporation.

c. Or equal.

B. Common Brick: ASTM C-62 1. Grade MW Brick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 04201, Unit Masonry Construction.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 04 43 00

STONE MASONRY VENEER

PART I – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-in-place concrete - Section 03 30 00

B. Mortar - Section 04 05 13

C. Unit Masonry Construction - Section 04 20 10

1.2 SUMMARY

A The work of this Section shall include but not be limited to the following:

1. Provide all material, labor, equipment necessary to supply and install stone masonry veneer with thermal finish on cast-in-place concrete walls as indicated on the drawings, as specified herein, and to the satisfaction of the Engineer.

2. Work will include the supply and installation of stone masonry veneer with thermal finish providing metal anchors and attachments, plastic shims, joint fillers, mortars, sealants and adhesives for mounting, bonding and scaling.

1.3 SUBMITTALS

1. Shop drawings: Contractor shall submit shop drawings indicating location and size of each fabricated item to the Engineer for approval. All shop drawings shall include detailed dimensioned plans, sections and elevations, large-scale details, profiles, methods of attachment and other components necessary to complete the work.

2. Samples: Contractor shall submit three (3) sets of samples of the proposed stones that are four (4) foot square to show the complete color range of stone to the Engineer for approval.

3. Product Data: Submit manufacturer's technical information for the following items:

   a. Mortar coloring pigments

   b. Anchors, dowels and other attachments or fasteners as required.

c. Sealants, and expansion joint materials.

4. Mock-ups: Provide full size mock-up in place for each type of installation. Mock up to be 8 square feet minimum, or large enough to provide a representative sample of work methods and quality, as agreed by Engineer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer with a minimum of five (5) years of similar experience in the completion stone masonry veneer work similar in material, design and extent to that indicated for the work in this Project and with a record of successful in-service performance. Contractor shall submit a list of a minimum of three (3) similar projects, including contract name, year completed, role, and approximate cost for review prior to the commencement of operations for the work of this Section.

1. Source Limitations for Stone: Whether specified in this Section or in another Section of the Specifications, obtain each variety of stone from a single quarry with resources adequate to provide material of consistent quality in appearance and physical properties without delaying the work.

2. Source Limitations for Mortar and Grout Materials: Obtain mortar ingredients of uniform quality for each cementitious component from a single manufacturer and each aggregate from one source or producer.

3. Mockups: Prior to installing stone masonry veneer, construct sample wall panels to verify selections made under sample submittals as described in 1.3 of this Section, and to demonstrate the aesthetic effects and qualities of materials and Contractor's ability to execute the work of this Section. Build mockups to comply with the following requirements, using materials indicated for completed work.

a. Locate mockups in the locations indicated, or if not indicated, as directed by the Engineer. If requested of the Engineer, and approved by the Engineer prior to the commencement of construction operations, a portion of the final wall may serve as the mock-up.

b. Build mockups for each type of stone masonry veneer in sizes approximately seventy-two (72) inches long by forty-eight (48) inches high by required thickness, including face and backup, and stone coping at top of mockup.

c. Notify Engineer seven (7) days in advance of the dates and times when mock-ups will be constructed.

d. Should the sample wall not be approved, a second sample wall shall be constructed and include the modification, corrections in materials and workmanship recommended by the Engineer.

e. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

f. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Maintain mortar above freezing until used in masonry.

g. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Maintain mortar above freezing until used in masonry. Use heat on both sides of walls under construction.

h. 20 deg F and below: Heat mixing water and sand to produce mortar temperatures between40 and 120 deg F. Maintain mortar above freezing until used in masonry. Heat stone to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within enclosures.

2. Cold-Weather Protection: When mean daily temperature is within limits indicated, provide the following protection:

a. 40 to 25 deg F: Cover masonry with weather-resistant membrane for 48 hours after construction.

b. 25 to 20 deg F: cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Use windbreaks when wind velocity exceeds I 5 mi./h.

c. 20 deg F and below: Provide enclosure and heat to maintain temperatures above 32 deg F within enclosure for 48 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until stone masonry veneer has dried out, but not Jess than seven (7) days after completing cleaning.

4. Hot-Weather Requirements: Protect stone masonry veneer

work when temperature and humidity conditions produce excessive evaporation of water from mortar. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 STONE

A. Sound Fieldstone or quarry stone of the same type and color to match the existing stone wall.

1. Material shall be machine split four edges in approximate heights of 6, 8, and 12 inches and is furnished in random lengths from 6 inches to 36 inches and a nominal depth of 3-inches to 5-inches. The bed face is to be exposed. Material shall conform to ASTM C568 with the following properties:

a. Maximum absorption rate of 3 percent when tested in accordance with ASTM C97.

b. Minimum density of 2560 kg/m3 when tested in accordance with ASTM C97.

c. Minimum compressive strength of 55 Mpa when tested in accordance with ASTM C170.

d. Minimum flexural strength of 8.27 Mpa when tested in accordance with ASTM C880.

B. Match Engineer's samples for variety, color, finish, and other stone characteristics relating to aesthetic effects.

C. Stone: All stone shall be as specified on plans, sound, durable, properly quarried, free from reeds, rifts, seams, laminations and minerals, which by weathering, would cause discolorations or deterioration. They shall be of the size as shown on the plans and shall be of a quality and color acceptable to the Engineer.

2.2 MORTAR MATERIALS

A. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C ISO, Type I or Type Ill, and hydrated lime complying with ASTM C 207.

1 . For pigmented mortars use colored Portland cement-lime mix of

formulation required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed ten (10) percent of Portland cement by weight for mineral oxides or two (2) percent for carbon black.

B. Aggregate: ASTM C 144 and as indicated below:

1. For joints narrower than 1/4-inch, use aggregate graded with 100 percent passing No. 16 sieve.

2. For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.

3. White-mortar Aggregates: Natural, white sand or ground, white stone.

4. Colored-Mortar Aggregates: Natural, colored sand or ground marble, granite, or other sound stone as approved by the Engineer.

C. Mortar Pigments: Natural and synthetic iron-oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in stone masonry mortars.

D. Latex Additive (water emulsion): Styrene butadiene rubber shall serve as replacement for part of or all gauging water of type specifically recommended by latex additive manufacturer for use with job-mixed Portland cement and aggregate arid not containing a retarder.

E. Water: Potable.

F. Products: Subject to compliance with requirements, provide one of the following:

1. Colored Portland-Cement Lime Mix:

a. Color Mortar Blend; Glen-Gery Corporation

b. Centurion Colorbond PL; Lafarge Corporation

c. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.

d. Riverton Portland Cement Lime Custom Color; Riverton Corporation

2. Mortar Pigments:

a. True Tone Mortar Colors; Davis Colors

b. Centurion Pigments; LaFarge Corporation

c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.

2.3 ANCHORS, DOWELS AND DOWEL ADHESIVE

A. Fabricate anchors, including dowels and shelf angles, from stainless steel, ASTM A 666, Type 304, temper as required to support loads imposed without exceeding allowable design stresses.

1. Fasteners for Stainless-Steel Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 for bolts and ASTM 594 for nuts, Alloy Group I.

B. Post-installed Fasteners for Concrete: Type indicated below, with capability to sustain, without failure, a load equal to four (4) times the loads imposed, for concrete, or six (6) times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

l. Post-installed Fasteners for Concrete: Chemical anchors, torque-controlled expansion anchors, or undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group l or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

C. Epoxy Adhesive for Dowels: Provide two-component, epoxy-based, mutt-purpose adhesive comprised of the following components:

1. Component A (Mastic): Epoxy resin.

2. Component B (Hardener): Modified medium-viscosity, reactive polyamine- based hardener.

3. Epoxy-based adhesive shall meet the following standards:

a. Tensile Strength (ASTM 0-638): 4000 psi

b. Compressive Strength (ASTM D-695): 10,000 psi

c. Linear Shrinkage: 0.00 I inch per inch maximum.

d. Tensile Elongation (ASTM A-638): 10% minimum.

2.4 STONE ACCESSORIES

A. Setting Buttons: Lead or resilient plastic buttons, non-staining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of joint sealants or causing third-side

adhesion between sealant and setting button.

B. Setting Shims: Strips of resilient plastic or vulcanized neoprene, 50 to 70 Shore A durometer, non• staining to stone, sized to suit joint thicknesses and depths of stone supports without intruding into required depths of joint sealants or causing third-side adhesion between sealant and setting shims.

C. Weep and Vent Tubes: Rectangular, cellular, polypropylene or clear butyrate extrusion, 3/8 by l-l/2- inches and of length required to extend from exterior face of stone to cavity behind.

D. Sealant Joint Materials: Refer to Part 3.7

2.5 FABRICATION

A. Stone: Fabricate as shown and as detailed on Drawings and Shop Drawings. Provide holes and sinkages cut or drilled for anchors, fasteners, supports and lifting devices,as necessary to secure stonework in place. Cut and back-check as required for proper fit and clearance. Allow for expansion and contraction within the limits of the joint material when cutting for anchorage devices.

B. Cut holes and other cutouts to accommodate the anchorage devices in the shop which will not impair the strength or the appearance of the stone and which will provide for the full concealment of all anchoring devices in the finished work

C. Cut accurately to shape and dimensions shown, maintaining fabrication tolerance or applicable stone associations. Accurately form radii, slopes and angles. Make arisses straight, sharp, true and continuous at joints.

D. Dress joints (bed and vertical) straight and at the angles indicated on the approved Shop Drawings.

E. Joint Width: Cut to provide joint widths as specified.

F. Fabricate special radial and angled cuts as noted.

G. Provide lifting devices for large members with holes to accommodate approved industry standard lifting devices. Holes shall not come closer than two (2)-inches from the finished face of the stone. Provide holes and cutouts for other metal items required for handling and setting of the stones. Holes and cutouts, required for handling, will not be permitted on exposed faces of the work.

2.6 MORTAR MIXES

A. General: Comply with referenced standards and with manufacturer's written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.

l. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water• repellant agents, anti-freeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.

2. Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.

B. Portland Cement-Lime Setting Mortar: Set granite with Type S mortar. Comply with ASTM C 270, Proportion Specification, for types of mortar indicated.

C. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match Architect's sample and comply with the following:

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ration of l: 10, by weight.

2. Point granite with Type S mortar.

D. Mortar shall be mixed in a batch type machine mixer. The size of the batch shall be as directed by the Engineer. The consistency shall be such that:

l. Mix shall be as stiff as is practicable.

2. The mortar shall show no free water when removed from the mixer.

E. The time of mixing shall not be less than two minutes for each batch. Mortar shall be used within thirty minutes after mixing. No re-tempering will be permitted.

F. Mortar used for filling vertical or inclined joints shall be of such consistency that it will require rodding. The mortar shall be rodded until it rises to the top and completely fills the joints.

PART 3- EXECUTION

3.1 EXAMINATION

A. Do not set patched, chipped, cracked, broken or other defective pieces of stone. Stains that cannot be Removed with clean water and fiber brushes shall be considered a defect, and such pieces shall not be used in the Work.

B. Surfaces to which this work is to be secured and the stone surfaces shall be free from frost, wetness, dirt, grease, visible rust and foreign materials which will be detrimental to the proper execution of the Work.

3.2 PREPARATION

A. Concrete surfaces that are to receive the mortar setting bed shall be cleaned of debris and broomed down town to produce a clean, acceptable surface free from grease, oil, or other materials that might prevent the bonding and/or set of the mortar.

B. Clean the surfaces of each stone before setting, removing foreign matter that might impair the bedding, bonding or appearance of the Work. During setting operations, dirt or setting materials in contact with exposed surfaces of the stone work shall be immediately removed.

3.3 SETTING STONE MASONRY VENEER, GENERAL

A. Employ skilled stone fitters at the Project site to do necessary field-cutting as stone is set. Use power saws to cut stone. Produce tines cut straight and true, with edges eased slightly to prevent snipping.

B. Arrange and trim stones for accurate fit with uniform joint widths, and to provide offset between vertical joints as indicated. Arrange stones for uniformity of appearance, with color and size variations uniformly dispersed and evenly blended.

C. Set stone to comply with requirements indicated on Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone masonry veneer in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

D. Maintain uniform joint widths, except for variations due to stone size variations and minor variations required to maintain bond alignment, if any. Lay walls with joints 3/8 to 1/2 inch wide.

E. Provide expansion, control, and pressure-relieving joints of widths and variations indicated.

l. Sealing expansion and other joints are specified in Section "Joints and Sealants."

2. Expansion joints free of mortar and other rigid materials.

F. Place weep holes and vents in joints where moisture may accumulate above shelf angles. Locate weep holes and vents at intervals not exceeding twenty-four (24)-inches horizontally.

1. Form weep holes by keeping head joints free and clear of mortar.

2. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4-inch in ten (10) feet, 3/8 inch in twenty (20) feet, or 1/2-inch in forty (40) feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4-inch in twenty (20) feet, or 1/2 inch in forty (40) feet or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4-inch in twenty (20) feet or 1/2-inch in forty (40) feet or more:

C. Variation of Linear Building Line: For position shown in plan and related portion of walls, and partitions, do not exceed 1/4-inch in twenty (20) feet, or 1/2-inch in forty (40) feet or more.

D. Measure variation from plumb, level and position shown in the plans as the position of the average plane of the face of each stone from a plumb, level or dimensioned plane.

E. Variation in Mortar Joint Thickness: Do not vary from joint size range indicated.

F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

G. Variation in Plane on Face of Individual Stone: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLING ANCHORED STONE MASONRY VENEER

A. Set relieving angles as required for proper support of stone. Before setting, clean stones and backing. Before setting in mortar saturate with water.

B. Set stone with two cushions per stone in every horizontal joint, extending full-depth of stone and to within the dimension from the face as required to permit installation of compressive rod and sealant. Alternate the installation of cushions using plastic in one horizontal course and neoprene in the next joint. Secure with anchors and dowels, as required for rigid and secure installation. Fill anchorage holes with accelerated setting mortar. Rigidly secure anchors to the backing.

C. Maintain joint widths with no lipping. Keep face of stone work free of mortar and protected against damage at all times. Remove excess mortar promptly as work proceeds.

3.6 STAINLESS STEEL ATTACHMENTS AND EPOXY BASED ADHESIVE

A. Contractor shall comply with recommendations of manufacturer for mixing, application, project conditions and hardening procedures. Work mixture for no longer than environmental conditions and manufacturer recommendations determine. Remove excess adhesive before it hardens with hydrocarbon components in accordance with manufacturer's instructions.

B. Set dowels using epoxy adhesive where shown on the plans. Surface to receive adhesive shall be completely dry, free of dust and grease. Set anchor cleats and split tail anchors in coordination with concrete and stonework. Finished installation shall be a rigid installation.

3.7 SEALING JOINTS

A. Clean surfaces and remove protective coatings that might interfere with bond of compound. Do not apply elastomeric compounds to joint surfaces previously treated with paint, lacquer, sealer, curing compound, water repellent or other coatings unless a laboratory test for durability of bond has been successfully completed in accordance with FS TT-S-00227E, paragraph 4.3.9.

B. Where joint filler is used as backup for bulk compounds, install filler continuously to depth and shape specified by compound manufacturer for proper application and performance of products. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint width and allow optimum sealant movement capability. Provide watertight and airtight comers and joint in a manner recommended by the manufacturer. Do not leave gaps between ends of joint fillers and do not stretch, twist, puncture, or tear joint fillers. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

C. Prime or seal substrates, except where manufacturer provides written reports of tests conducted by an independent testing agency which demonstrates that primer or sealer is not required for the conditions of use and the substrates involved. When priming, comply with the application instructions of the bulk compound manufacturer.

D. Install bond breaker in joints as shown and wherever recommended by the bulk compound manufacturer to prevent bond of the compound to surfaces where such bond might impair the work.

E. Provide masking tape or other precautions to prevent soiling adjacent surfaces.

F. Apply compounds in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for entire joint length and to allow optimum sealant movement capability.

G. Apply compounds to the depth and width ratio recommended by the bulk compound manufacturer.

H. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealant from surfaces adjacent to the joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer. Tool exposed surfaces of compound to the profile shown, or if none is shown, tool slightly concave to match configuration per Figure SA in ASTM C 1193, unless otherwise indicated.

I. Protect exposed horizontal and vertical compounds from damage during the construction period.

J. Remove excess compound promptly as the work progresses and clean the adjoining surfaces marred by the work of this item.

+ + END OF SECTION + +

SECTION 04 51 00

MASONRY CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all masonry cleaning Work as indicated on the Drawings and as specified herein, including, but not limited to the following:

1. Brick

1.2 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1.3 SUBMITTALS

A. Product Data:

Cleaning materials manufacturers' catalog sheets, specifications, and application instructions.

B. Quality Control Submittals:

1. Cleaning Subcontractor's Qualifications Data:

a. Firm name, address, and telephone number.

b. Period of time firm has performed masonry cleaning work, and names and addresses of the required number of similar projects completed by the firm.

2. Cleaners Qualifications Data:

a. Name of each person who will be performing the Work of this Section.

b. Employer's name, address, and telephone number.

c. Names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.

3. Cleaning Procedure: Proposed cleaning procedure for cleaning masonry including each step in the cleaning process, type of scaffolding, and type, size and location of equipment.

C. Submit a schedule of cleaning activities for each type of masonry to be cleaned. (Include location and a description of the cleaning sequence, all products, equipment and scaffolding, etc. to be used.

D. Submit a description of Protection Procedures for each condition and surface which requires protection.

1.4 QUALITY ASSURANCE

A. Cleaning Contractor's Qualifications:

The firm performing the Work of this Section shall have been regularly engaged in masonry cleaning work for a minimum of five years and shall have completed 5 similar projects using the cleaning method specified.

B. Cleaners' Qualifications:

The persons cleaning the masonry and their supervisors shall be personally experienced in the required method of masonry cleaning and shall have worked on 5 similar projects within the last 3 years.

C. Field Examples:

1. Before the building cleaning operations are started, clean a sample panel of approximately 100 square feet of each type of masonry required to be cleaned at a location on the building directed by the Engineer. If the sample panel is not satisfactory, as determined by the Engineer, modify the cleaning procedure and clean another sample panel. Continue cleaning sample panels until satisfactory results are obtained and approved by the Engineer. When a final approval is obtained, go back and re-clean all previously rejected panels.

   a. For cleaning procedures other than specified, but which generally follow the method(s) specified, submit proposed procedure for approval and clean additional sample panels adjacent to the above sample panels for comparison of results.

2. Approved panels and procedures will become the cleaning standard for the Work of this Section.

3. Cover the approved sample panels with six mil polyethylene plastic mounted on wood frames of adequate size and strength to protect the

panels until the completion of Work. The cover shall be easily removable for comparison with completed Work.

D. If unusual types of soiling agents are encountered, consult with the Authority's Representative before proceeding with the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver cleaning materials in manufacturer's packaging, with instructions for use.

B. Store, protect, and handle cleaning materials in accordance with manufacturer's instructions.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:

1. Make necessary provisions for the diversion and disposal of cleaning water and solutions, including the furnishing of pumps if required. Take precautions as required to prevent damage and contamination resulting from run off of cleaning solution.

2. Do not wet or wash down masonry surfaces when the temperature is below 40°F or may drop below 40°F within 24 hours.

B. Existing Conditions:

1. Take necessary precautions and protective measures to prevent injury to people and damage to property in areas adjacent to the Site, including damage due to wind drift of cleaning materials.

2. Pumping equipment will not be allowed in or on the building.

3. Ensure that painted surfaces (such as exterior doors, windows, window sills, etc.) are not affected by the washing, except for those surfaces designated by the Engineer for cleaning.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Materials:

Liquid detergents and water, and solutions of chemical cleaning agents and additives, that will remove the dirt, grime, carbon, surface residues, stains,

graffiti, and other foreign material from the masonry surfaces, but will not damage the masonry.

B. Acid Brick Cleaner, Manufacturer: Thompson's Acid Brick Cleaner, by Sherwin-Williams Diversified Brands, Ltd. Thorncliffe Park, Chapeltown, Sheffield, S35 2YP Tel: 01752 334350
Email: enquiry@thompsonsweatherproofing.co.uk
Web: thompsonsweatherproofing.co.uk

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection:

1. Protect windows, doors, fixtures, air conditioners, roofing, flashings, painted surfaces and other adjacent surfaces not required to be cleaned, from damage.

2. Protect landscaping, paving, and other improvements near the building from damage.

3. Construct temporary sidewalk sheds at building entrances and other areas to divert cleaning materials and debris away from entrance ways and to provide sheltered access to the building.

B. Surface Preparation:

1. Remove vines, bird nests, stalactite deposits, and heavy accumulations of dirt, bird droppings and other foreign materials from surfaces required to be cleaned. Remove material from the site.

2. Perform this preliminary cleaning by brushing, sweeping, wiping, scraping, vacuuming, and other approved methods as required by existing conditions. Use tools that will not damage the masonry.

3.2 CLEANING MASONRY

A. Chemical Solutions or Liquid Detergent and Water:

1. Prewet the masonry surfaces with water.

2. Prepare cleaning solutions and operate pressure spray equipment in accordance with cleaning materials manufacturer's recommendations, unless otherwise indicated.

a. Clean areas not accessible to spray equipment with bristle brushes.

B. Water Cleaning Methods:

1. Low pressure (water soak) for limestone and marble.

2. Medium pressure: Use 200 psi to 600 psi.

C. Clean masonry equal in appearance to the approved sample panels.

D. Clean masonry free of dirt, grime, soot, carbon, efflorescence, moss, stains, graffiti, tendrils, and other foreign materials. Leave masonry uniformly clean and undamaged.

E. Clean all features and appurtenances of the masonry such as sills, arches, lintels, returns, reveals, projecting courses, coping, entablature work, back of parapets and balustrades, balconies, friezes, fascias, cornices, chimneys and other features, except for those building features which are painted and are not included in the scope of work.

F. Thoroughly rinse off the masonry surfaces with water.

G. Apply Thompson's Acid Brick Cleaner in concentrated form or by diluting with water depending on how difficult the surface is to clean. Apply with a brush and allow to stand for 15-20 minutes before using a strong bristle or wire brush to scrub off the stains. Always wash or hose down after application as this will neutralize the cleaner and remove the loose dirt and grime. At all times use protective gloves and clothing, ensuring eyes and face are protected. Mix only in plastic containers.

3.3 CLEAN-UP

A. Clean and restore sidewalks, paving, and lawns soiled or damaged as a result of the cleaning operations. Remove all protective materials.

B. Wash all equipment with water. Do not leave Thompson's Acid Brick Cleaner in contact with metals as corrosion will occur rapidly

+ + END OF SECTION + +

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SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. Contractor shall furnish all labor, materials, equipment, and incidentals required to provide the structural steel, including surface preparation and shop priming, as shown and specified.

2. Structural steel is that work defined in AISC "Code of Standard Practice," Section 2, and as shown. The Work also includes:

a. Providing openings in and attachments to structural steel to accommodate the Work under this and other Sections and providing for the structural steel all items such as anchor bolts, studs and all items required for which provision is not specifically included under other Sections.

B. Verification of Existing Conditions: Contractor shall verify all existing dimensions, elevations and details prior to ordering material or preparation of Shop Drawings.

C. Coordination: Review installation procedures under other Sections and coordinate the Work that must be installed with or attached to the structural steel.

D. Related Work Specified Elsewhere:

1. Section 033000, Cast-In-Place Concrete (grout is specified therein).

1.2 Section 099000, Painting (surface preparation and shop priming is specified therein).REFERENCES

A. Reference Standards and Codes: Comply with applicable provisions and recommendations of the following except as otherwise shown or specified:

1. ASTM A 36, Structural Steel.

2. ASTM A 108, Cold Finished Carbon Steel Bars and Shafting.

3. ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.

4. ASTM A 325, High Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened washers.

5. ASTM A 490, Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

6. AWS D1.1, Structural Welding Code.

7. AREA, Manual of Railway Engineering.

8. AISC, Manual of Steel Construction.

9. AISC, Code of Standard Practice for Steel Buildings and Bridges.

10. AISC, Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings and including the Commentary and Supplements thereto as issued.

11. Specifications for Structural Joints using ASTM A 325 or A 490 Bolts, approved by the Research Council on Riveted and Bolted Structural Joints (RCRBSJ) of the Engineering Foundation, and endorsed by AISC.

B. Design of Members and Connections:

1. All details shown are typical; similar details apply to similar conditions, unless otherwise shown or specified. Verify dimensions at the site without causing delay in the Work.

2. Contractor shall examine conditions under which structural steel is to be provided, and notify Engineer in writing of unsatisfactory conditions existing or whenever design of members and connections may not be clearly indicated. Do not proceed with the Work until unsatisfactory conditions or deficiencies have been corrected.

C. Source Quality Control:

1. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

2. Fabrication shall be performed by a structural steel fabricating plant possessing a current certificate from AISC stating that the plant satisfies the requirements for certification for Category II of the AISC Quality Certification Program. The plant shall maintain this certification for the entire time fabrication for this project is being performed.

D. Qualifications for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code" D1.1, Section 5, Qualification.

2. Provide certification that all welders employed on or to be employed for the work have satisfactorily passed AWS qualification tests within the previous 12 months. Contractor shall ensure that all certifications are kept current.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

1. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that Work.

B. Stor[AM1]e materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

1.4 SUBMITTALS

A. Shop Drawings:

1. Submit for approval Shop Drawings including complete details and schedules for fabrication and shop assembly of members and details, schedules, procedures and diagrams showing the sequence of erection.

a. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.

b. Provide setting drawings, templates, and directions for the installation of anchor bolts and other anchorages.

2. Submit for approval, copies of manufacturer's specifications and installation instructions for products listed below. Include laboratory test reports and other data as required to show compliance with these specifications.

a. Structural steel of each type, including certified copies of mill reports covering the chemical and physical properties.

b. High-strength bolts of each type, including nuts and washers.

c. Unfinished bolts and nuts.

d. Touch-up field primer paint.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rolled Steel Plates, Shapes and Bars: ASTM A 36, except where other type steel is shown.

B. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise shown or specified.

C. High-Strength Threaded Fasteners: Heavy hexagonal structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325

D. Electrodes for Welding: E70XX complying with AWS D1.1, Design of New Buildings, Section 8. AWS D1.1.

E. Surface Preparation and Shop Priming: All structural steel shall be primed in the shop. Surface preparation and shop priming are included herein but are specified in Section 09900, Painting.

F. All galvanized elements that will be embedded or will come in contact with concrete and mortar will require a chromate coating. This coating shall be applied in the factory by either dipping the galvanized elements in a solution of sodium or potassium dichromate acidified with sulfuric acid or spraying this solution on the galvanized surfaces.

2.2 FABRICATION

A. Shop Fabrication and Assembly:

1. General:

a. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC, Manual of Steel Construction, and as shown on the Shop Drawings. Provide camber in structural members as shown.

b. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

c. Where finishing is required, complete the assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B. Connections:

1. Shop Connections:

a. Unless otherwise shown, shop connections may be welded or high strength bolted. Unless shown otherwise, all welds shall be 1/4-inch minimum (except as noted).

b. Wherever reaction values of a beam are not shown, the connections shall be designed to support the total uniform load capacity tabulated in the AISC tables for allowable loads on beams for the given shape, span, and steel specified for the beam in question.

c. Shop welded connections shall be designed to eliminate or minimize eccentricity. The size, extent, location and type of all shop welds shall be clearly shown on the Shop Drawings by use of AWS standard notations and symbols.

d. End connection angles fastened to the webs of beams and girders and the thickness of the angles, size and extent of fasteners or shop welds shall conform to tables of “Framed Beam Connections” in the AISC Manual. All connections shall be two sided, unless otherwise shown.

e. Bolted trusses, continuous plate girder and I-beam spans, skew portals, skew connections, rigid frames, bents, and towers shall be completely assembled in the shop and accurately adjusted to line and camber. Holes for field connections shall be drilled or reamed while assembled. Holes for other connections, except those in lateral, longitudinal, and sway bracing, shall be drilled or reamed in the shop with the connecting parts assembled; or drilled or reamed to a metal template with hardened bushings, without assembling. Long span truss work shall be assembled in lengths of not less than three abutting panels, the members adjusted for line and camber, and holes for field connections drilled or reamed while assembled.

2. Field connections:

a. All field connections unless otherwise specified below or noted shall be made with high strength bolts, and shall be bearing type connections.

b. Field welding is permitted only where noted or approved by the Engineer.

c. Field bolted joints for girders shall be completely assembled, the members adjusted for line and camber, and holes for field connections drilled or reamed while assembled.

3. High-Strength Bolted Construction:

a. Install high-strength threaded fasteners in accordance with AISC “Specifications for Structural Joints using ASTM A 325 or A 490 Bolts” (RCRBSJ).

b. High strength bolt design shear values shall be as specified in the AISC Manual for bolts with threads in the shear plane.

c. The minimum size of bolts shall be 3/4-inch diameter, unless otherwise noted.

4. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

a. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

5. Where rigid connections are required for conditions shown, web shear reinforcement and stiffeners per AISC Specifications shall be provided.

C. Holes and Appurtenances for Other Work:

1. Provide holes required for securing other work to structural steel framing, and for the passage of other work through steel framing members, as shown on the Shop Drawings. If large blockouts are required and approved, the webs shall be reinforced to develop specified shears. Provide threaded nuts welded to framing and other specialty items as shown to receive other work.

2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

3. Coordinate as specified in Paragraph 1.1.B.

PART 3 - EXECUTION

3.1 ERECTION

A. General: Comply with the AISC Specifications and Code of Standard Practice, and as herein specified.

B. Surveys: Provide services of a registered surveyor to check lines and elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices before steel erection proceeds. Discrepancies shall be reported immediately to the Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to the structural steel work have been agreed upon with the Engineer.Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of the structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete the Work. Contractor shall provide sufficient planking to meet OSHA requirement of a tightly planked substantial floor within 2 stories or 30 feet, whichever is less, below each tier of steel beams on which work is performed.

D. Anchor Bolts: Furnish anchor bolts and other connectors required for

securing structural steel to foundations and other in-place work.

1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

2. All bolted connections with high strength bolts shall use Direct Tension Indicator Devices in accordance with Paragraph 8(d)(4) of the "Specification for Structural Joints using ASTM A325 or A490 Bolts," approved by the Research Council on Structural Connections, November 13, 1985. High strength bolts shall be installed in properly aligned holes and tightened to at least the minimum tension specified in the table below. Alternately, calibrated wrench tightened may be used in lieu of Direct Tension Devices, provided the requirements of paragraph 8(d)(2) of the same specifications are met. Fastener Tension Required for Slip-Critical Connections and Connections Subject to Direct Tension.

	Minimum Tension in 1000's of Pounds (kips)	
Nominal Bolt Size (inches)	A325 Bolts	A490 Bolts
3/4	28	35
7/8	39	49
1	51	64
1-1/8	56	80
1-1/4	71	102
1-3/8	85	121
1-1/2	103	148

Wrenches may be manual torque or power wrenches designed by the manufacturer for use with high strength bolts. If manual torque wrenches are used, their dials shall be calibrated on the job. If power wrenches are used, the manufacturer's recommendations shall be carefully followed and proper working conditions of the machine demonstrated before the work is started.

The inspector shall approve the procedure for calibration of wrenches and installation of bolts and in general shall satisfy that all requirements of the specifications for "Structural Joints Using ASTM A325 or A490 Bolts" are met.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural

members on steel wedges or other adjusting devices.

2. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.

3. Place grout between bearing surfaces and bases or plates as specified in Section 033000. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.

4. Leveling plates and wood wedges will not be permitted.

F. Field Assembly: Set structural frames accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of the structure within tolerances as specified in AISC Manual. For members requiring accurate alignment, clip angles, lintels and other members shall be provided with slotted holes for horizontal adjustment at least 3/8 inch in each direction, or more when required.

2. Splice members only where shown or specified.

G. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

1. Comply with AISC Manual for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to field welds.

2. Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

H. Gas Cutting: Do not use gas cutting torches in the field for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

I. Touch-Up Painting:

1. Unless otherwise specified below comply with all requirements of in Section 09900, Painting.

2. Immediately after erection, clean field welds, bolted connections, and all damaged and abraded areas of the shop paint. Apply paint to exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Anchor Bolts: Installed under Section 03 30 00

B. Loose Bearing Plates: Installed under Section 04 20 00

C. Loose Lintels: Installed under Section 04 20 00

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals.

B. Section 01 74 00, Construction Waste Management.

C. Section 05 12 00, Structural Steel (including framing for floor grating).

D. Section 05 51 00, Metal Stairs.

E. Section 09 91 13, Exterior Painting.

1.3 REFERENCES

A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:

1. Design, Fabrication, and Erection: “Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design” adopted by the American Institute of Steel Construction, June 1, 1989 (AISC Specification).

   a. Design and Fabrication of Cold-Formed Shapes: “Specification for the Design of Cold-Formed Steel Structural Members”, by the American Iron and Steel Institute (AISI Specification).

2. Welding: “Structural Welding Code - Steel, AWS D1.1”, or “Structural Welding Code - Sheet Steel, AWS D1.3”, by the American Welding Society (AWS Codes).

B. Organizations:

1. AISC: American Institute of Steel Construction, One East Wacker Dr., Suite 700, Chicago, IL 60601-1802, 866-275-2472, www.aisc.org.

2. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.

3. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.

4. ANSI: American National Standards Institute, 1819 L Street, NW, 6th Floor, Washington, DC 20036, (202) 293-8020, www.ansi.org.

5. ASME: ASME International, 3 Park Ave., New York, NY 10016-5990, (800) 843-2763, www.asme.org.

6. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.

7. MPI: The Master Painters Institute Inc., 2808 Ingleton Ave., Burnaby, BC, V5C 6G7, (888) 674-8937, www.specifypaint.com.

8. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.4 SUBMITTALS

A. Shop Drawings: Show application to project. Machine duplicated copies of Contract Drawings will not be accepted.

1. Locate anchor bolts required for installation in other Work; furnish setting drawings and templates for required anchors.

2. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.

3. Floor Grating: Submit erection plan; include cutout areas and clearances.

B. Product Data: Catalog sheets, specifications, and installation instructions for each fabricated item specified, except submit data for fasteners only when indicated.

C. Quality Control Submittals:

1. Certificates: Copy of certificates required under Quality Assurance Article.

1.5 QUALITY ASSURANCE

A. Galvanizing: Stamp galvanized items with galvanizer's name, weight of coating, and applicable ASTM number.

B. Certificates:

1. Affidavit by the structural steel manufacturer certifying that structural steel items meet the contract requirements.

a. Submit evidence of steel material compliance with this Specification. Evidence shall consist of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.

1) Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.

2. The Contractor agrees that all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

1.6 DELIVERY AND STORAGE

A. Coordinate delivery of anchor bolts and other anchorage devices to be built into other construction to avoid delay.

B. Promptly cover and protect steel items delivered to the site.

PART 2 - PRODUCTS

2.1 MATERIALS (where applicable and indicated on drawings)

A. Wide Flange Structural Steel: ASTM A36992, except as specified or shown otherwise.

B. M and S-Shapes, Channels and Angles: ASTM A 36 or ASTM A 572, Grade 50.

C. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.

D. Steel Bars and Bar-Size Shapes: ASTM A 675, Grade 70; or ASTM A 36.

E. Merchant Quality Steel Bars: ASTM A 575, grade as selected by fabricator.

F. Cold-Finished Steel Bars: ASTM A 108, grade as selected by fabricator.

G. Hot-Rolled Carbon Steel Sheet and Strip: ASTM A 569, pickled and oiled.

H. Cold-Rolled Carbon Steel Sheet: ASTM A 366, oiled.

I. Galvanized Steel Sheet: ASTM A 526, with G90 hot-dip process zinc coating complying with ASTM A653.

J. Steel Hollow Structural Sections (Round, Square, or Rectangular): ASTM A 500, Grade B; or ASTM A 500, Grade C.

K. Cold-Drawn Steel Tubing: ASTM A 512, buttwelded, cold-finished carbon steel tubing, sink drawn and stress relieved.

L. Cast Iron Castings: ASTM A 48, gray iron castings, Class 30.

M. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.

N. Steel Castings: ASTM A 27, grade and class as required by use of item.

O. Steel Pipe: ASTM A 53, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified.

P. Rolled Steel Floor Plate, Raised Pattern: ASTM A 786; raised herringbone pattern unless otherwise indicated.

Q. Stainless Steel: Type 302/304; ASTM A 666 for plate, sheet and strip; ASTM A 276 for bars and shapes; ASTM A 269 for tubing.

R. Anchors: Except where shown or specified, select anchors of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, anchors shall be galvanized or of corrosive-resistant materials.

1. Threaded-Type Concrete Inserts: Galvanized ferrous casting, internally threaded to receive 3/4 inch diameter machine bolt; either malleable iron or cast steel.

2. Wedge-Type Concrete Inserts: Galvanized box-type ferrous casting, designed to accept 3/4 inch diameter bolt having special wedge-shaped head; either malleable iron or cast steel.

a. Bolts: Carbon steel bolts having special wedge-shaped heads, nuts, washers and shims.

3. Slotted-Type Concrete Inserts: Galvanized 1/8 inch thick pressed steel plate complying with ASTM A 283; box-type welded construction with slot designed to receive 3/4 inch diameter square head bolt and with knockout cover.

4. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.

a. Carbon Steel: Zinc-Plated; ASTM B 633, Class Fe/Zn 5.

b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.

S. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, fasteners shall be galvanized.

1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.

2. Stainless Steel Fasteners: ASTM A 666; Type 302/304 for interior Work; Type 316 for exterior Work; Phillips flathead (countersunk) screws and bolts for exposed Work unless otherwise specified.

3. Eyebolts: ASTM A 489.

4. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.

5. Machine Screws: ASME B18.6.3.

6. Lag Screws: ASME B18.2.1.

7. Wood Screws: Flat head, ASME B18.6.1.

8. Plain Washers: Round, ASME B18.22.1.

9. Lock Washers: Helical, spring type, ASME B18.21.1.

10. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.

T. Shop Paint (General): Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

U. Shop Paint for Galvanized Steel: Epoxy zinc-rich primer; complying with MPI#20 and compatible with topcoat.

V. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

W. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

X. Bedding Mortar:

1. Cement Grout: Portland cement complying with ASTM C 150, Type I or III, and clean uniformly graded natural sand complying with ASTM C 404, size No. 2; mixed at a ratio (by volume) of 1.0 part cement to 3.0 parts sand, with only the minimum amount of water required for placement and hydration.

2. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:

a. Embeco 636 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.

b. Ferrolith G-NC by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.

c. Ferro-Grout by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.

d. Vibra-Foil by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.

3. Shrink-Resistant Grout (Non-Staining): Factory-packaged, non-ferrous mortar grouting compound selected from the following:

a. Masterflow 713 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122 (800) 227-3350.

b. Sonogrout by Sonneborn, Chemrex, Inc., 57-46 Flushing Ave., Maspeth, NY 11378, (800) 433-9517.

c. Five Star Grout by Five Star Products, Inc., 425 Stillson Rd., Fairfield, CT 06430, (800) 243-2206.

d. Crystex by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NB 68152, (800) 362-3331.

e. Non-Corrosive, Non-Shrink Grout by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.

2.2 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate metal framing and supports, which are not a part of the structural steel framework, to support related items required by the Work.

B. Fabricate units to the sizes, shapes, and profiles indicated or, if not indicated, of required dimensions to receive adjacent Work to be retained by the framing. Except as otherwise indicated, fabricate from structural steel shapes, plates, and bars, of all welded construction, with mitered corners, necessary brackets and splice plates, and a minimum number of joints for field connection. Punch, drill, and tap units to receive hardware and similar items to be anchored to the Work.

C. When required to be built into masonry or cast-in-place concrete, equip units with integrally welded anchor straps. Unless otherwise indicated, anchors shall be minimum 1-1/4 x 1/4 x 8 inch steel straps, spaced 2 feet oc.

D. Galvanize exterior steel framing and supports.

E. Ladders:

1. Ladders shall be provided in mechanical room under access door as indicated on plans. Ladders, safety devices and safety cages shall be as required by state and federal regulations.

a. Ladders shall be provided down to the floor in each location.

b. Ladder side rails shall be a minimum 3/8 inch by 2 1/2 inch with a 16 inch clear spacing. Rungs shall be minimum 3/4 inch diameter, spaced at 12 inch centers and plug welded into holes drilled in the side rails.

c. Ladders shown against structures shall be secured to the adjacent structure by brackets located at intervals not

exceeding 10 ft. Brackets shall be of sufficient length to provide a minimum distance of 7 inches from the center of rung to the nearest permanent object behind the ladder.

d. Portable Ladder extension

1) Manufacturer:

a) The BILCO Company, P.O. Box 1203, New Haven, CT 06505; 1-203-934-6363, Fax: 1-203-933-8478
Internet address: http://www.bilco.com

b) Or approved equal

2) Furnish and install where indicated on plans ladder safety post Model LU-2, The ladder safety post shall be pre-assembled from the manufacturer.

a) Performance characteristics:

(1) Tubular post shall lock automatically when fully extended.

(2) Safety post shall have controlled upward and downward movement.

(3) Release lever shall disengage the post to allow it to be returned to its lowered position.

(4) Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14” on center and clamp brackets to accommodate ladder rungs up to 1-3/4” in diameter.

(a) Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.

(5) Material of construction: Shall be steel (LU-2);

(6) Balancing spring: A stainless steel spring balancing mechanism shall be provided

to provide smooth, easy, controlled operation when raising and lowering the safety post.

2. Hardware: All mounting hardware shall be Type 316 stainless steel.

3. Finishes: Factory finish shall be hot dip galvanized steel (Model LU-2).

2.3 MISCELLANEOUS STEEL TRIM

A. Fabricate trim of shapes, sizes, and profiles shown. Fabricate units from steel shapes, plates, and bars, with continuously welded joints and smooth exposed edges, unless otherwise indicated. Use concealed field splices wherever possible. Furnish cutouts, fittings, and anchorages as required for assembly and installation.

B. Galvanize exterior steel trim.

2.4 LOOSE BEARING PLATES

A. Steel plates fabricated flat, free from warp or twist, and of required thickness and bearing area. Drill plates as required for anchor bolts and for grouting access. Furnish bearing plates where shown and where required for steel items bearing on masonry or concrete construction.

2.5 LOOSE LINTELS

A. Structural steel shape lintels, fabricated for openings and recesses in masonry walls and partitions as indicated. Loose lintels bearing on masonry or concrete shall have a minimum end bearing length of 6 inches at each end, unless otherwise shown.

B. Galvanize lintels to be installed in exterior walls.

2.6 SHELF ANGLES

A. Galvanized structural steel shelf angles of sizes shown, fabricated for attachment to concrete framing. Angles shall have slotted holes, to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches oc, unless otherwise shown.

1. Furnish wedge-type concrete inserts and fasteners for attachment of shelf angles to cast-in-place concrete.

2.7 STRUCTURAL STEEL DOOR FRAMES (where applicable and indicated on drawings)

A. Fabricate structural steel door frames of structural shapes and bars as indicated, fully welded, uniform, square, and true. Plug weld built-up members. Continuously weld exposed joints; grind exposed welds smooth. Unless otherwise indicated, fabricate stops of 5/8 x 1-3/4 inch steel bars, plug welded to frames except where removable stops are indicated. Secure removable stops to frame with countersunk machine screws uniformly spaced not more than 10 inches oc. Secure necessary reinforcements, and drill and tap as required for finish hardware.

B. Wall Anchors: 1/8 x 2 inch steel strap anchors of length required for 8 inches minimum embedment into adjoining concrete or masonry. Weld an anchor to jambs of frame 12 inches maximum from both bottom and head of frame, and weld intermediate anchors spaced 16 inches oc maximum.

C. Floor Anchors: Steel angle clip welded to back of frame at bottom of each jamb. Prepare clips for anchorage to floor construction indicated.

D. Prepare frames to receive approved finish hardware. Form slots in frames for hardware strikes unless otherwise specified. Reinforce frames where indicated, and attach 12 gage welded steel plate box closures on back of frames where slots for hardware occur.

E. Galvanize exterior structural steel door frames and anchors.

2.8 STEEL PIPE RAILINGS AND HANDRAILS

A. Fabricate railings and handrails of 1-1/2 inch (nominal) diameter steel pipe, unless otherwise shown.

B. Railings: Unless otherwise shown, railings shall consist of top rail and intermediate rails, with posts spaced not more than 4 feet oc. Close ends of rails which do not terminate with a flange or continuous return.

1. Space rails so that a sphere 4 inches in diameter cannot pass through the openings between the rails.

2. Join posts, rails, and corners by one of the following methods:

a. Flush-type steel railing fittings, welded and ground smooth, with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.

b. Coped and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding joints smooth. Butt railing splices and

reinforce by a tight-fitting interior pipe sleeve not less than 6 inches long secured in place.

3. Railings may be bent at corners instead of joining, provided the bends are uniformly formed in jigs, with cylindrical cross-section of pipe maintained throughout the entire bend.

4. Unless otherwise shown, fabricate railings and accessories as necessary to secure posts and rail ends to construction as follows:

   a. Anchor posts in concrete by means of post sleeves preset into the concrete.

   b. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.

   c. Anchor rail ends into concrete and solid masonry with round steel flanges welded to rail ends and anchored into the wall construction with expansion anchors.

   d. Anchor rail ends to steel with oval or round steel flanges welded to rail ends and bolted or welded to the steel supporting members.

5. Post Sleeves: Galvanized steel pipe not less than 6 inches long, and having an inside diameter not less than 1/2 inch greater than the outside diameter of the pipe post. Sleeve shall have a plate closure, sized to extend not less than 1 inch beyond the outside diameter of the sleeve, secured to the bottom of the sleeve.

   a. Cover Flange: Round steel flange, sized to closely fit post and cover the sleeve.

6. Fabricate removable railing sections as indicated on the Drawings.

7. Kickplates: Flat steel bars 3/16 inch thick by not less than 6 inches high. Secure kickplates as shown.

C. Handrails: Pipe handrails shall be secured to walls by means of wall brackets, and shall have a wall return fitting at each end of handrails unless otherwise shown.

1. Wall Brackets: Malleable iron castings, with 3 inches projection from the finish wall surface to the center of the handrail, and with the wall plate portion of the bracket drilled to receive one 3/8 inch diameter bolt. Brackets shall be located approximately 6 inches from each end of handrails and intermediate brackets equally spaced at

intervals not exceeding 5 feet oc. Fabricate wall brackets to secure to wall construction as follows:

a. Anchor into concrete and solid masonry with expansion anchors.

b. Anchor into hollow masonry and stud partitions with toggle bolts having square heads.

2. Wall Return Fittings: Cast iron castings, flush-type, with the same projection as specified for wall brackets.

D. Galvanize all exterior railings and handrails, and interior railings and handrails where indicated on the Drawings, including pipe, flanges, fittings, brackets, fasteners, and other ferrous metal components.

2.9 SAFETY NOSINGS

A. Nosings: Cast, abrasive non-slip type, of profiles indicated, extending full length of concrete treads or other concrete edges to be protected unless otherwise indicated. Equip each nosing with integrally cast, welded, or riveted anchors located not more than 4 inches from each end of nosing and intermediate anchors spaced not over 15 inches oc. Abrasive grain shall be integrally cast into the wearing surface.

1. Tread Nosing Units: 4 inches wide x 5/16 inch thick, with 1 inch minimum deep protective front lip.

2. Curb Bar Nosing Units: 2-1/2 x 2-1/2 x 1/2 inch thick.

3. Curb Bar Nosing Units: 1-1/2 x 1-1/2 x 3/8 inch thick.

4. Surface Design: Cross-hatched abrasive.

5. Surface Design: Fluted abrasive.

2.10 TRENCH COVERS

A. Acceptable Products:

1. R-4990 Series, heavy duty, Type L bolted trench frame with a Type A grated cover by Neenah Foundry Company, 2121 Brooks Ave., Neenah, WI 54956, (800) 558-5075, www.nfco.com.

2. B-H20G Series, heavy duty, Type L bolted trench frame with Type A grates by Barry Pattern & Foundry Company's, 3333 35th Ave. North, Birmingham, AL 35207, (800) 524-1809, www.barrycraft.com.

B. Frames: Heavy duty rated, gray cast iron castings with continuous rabbet to receive grating cover, and with integrally cast tie-anchor lugs and anchors spaced not more than 24 inches oc. Furnish frame end piece at each end of trench, and tie bolts for tie-anchor lugs.

1. Auxiliary Flat Bar Anchors: Steel bar anchors 3/16 inch thick x 1 inch wide x approximately 4 inches long, with 1-1/2 inch long bent end, and hole for tie bolt in other end. Furnish flat bar anchor at each pair of tie-anchor lugs and at the single tie-anchor lugs at trench ends, except at joints in concrete slab.

C. Grated Covers: Heavy duty rated, gray cast iron castings fabricated into 2 feet long sections.

D. Removable Dams: Steel plate, fabricated as shown, and galvanized.

2.11 FLOOR GRATING (as applicable or as indicated on drawings)

A. Grating: Rectangular, welded steel bar grating designed to support 200 lb/sq ft with deflection not exceeding 1/180. Fabricate with bearing bars on edge, and with all intersecting and abutting members joined by the electro-pressure welding method for the full depth of cross bar. Steel Bars: ASTM A 569.

1. Top Surface of Bearing Bars: Serrated.

2. Finish: One coat of grating manufacturer’s standard shop paint.

3. Fasteners for Removable Panels: Saddle clip anchor assembly, with self-drilling screw or weldable stud bolt. Clips shall have same finish as grating.

4. Banding: Continuous steel bar of same material and size as bearing bars, welded to grating panel.

5. Close Outs at Steps and Stairs: Special grating panel with nosing edge for platform ending at top of stairs.

6. Toeplate: Flat steel bar curb secured to outer edge of grating where shown.

2.12 FABRICATION

A. Use materials of the sizes and thicknesses indicated on the Drawings. If not indicated, use material of required size and thickness to produce adequate strength and durability for the intended use of the finished product.

B. Fabricate items to be exposed to view of material entirely free of surface blemish, including pitting, roller and seam marks, rolled trade names, and roughness. Remove surface blemishes by grinding or by welding and grinding prior to cleaning, treating, and finishing.

C. Form metal true to line, with accurate angles, surfaces, and straight edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the metal.

D. Weld corners and seams continuously. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces.

E. Form exposed connections with flush, smooth, hairline joints. Use concealed fasteners wherever possible. Use Phillips flathead (countersunk) screws or bolts for exposed fasteners, unless otherwise shown or specified.

F. Prepare fabricated items for anchorage of the type indicated, coordinated with the supporting structure. Fabricate and space anchoring devices as indicated or, if not indicated, as required to produce adequate support for the intended use of the item.

G. Punch, reinforce, drill, and tap fabricated items as required to receive hardware and other appurtenant items.

H. Galvanizing:

1. In addition to specific items specified or noted to be galvanized, galvanize items attached to, embedded in, or supporting exterior masonry (including interior wythe of exterior masonry walls) and concrete Work.

2. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:

a. ASTM A 123 for plain and fabricated material, and assembled products.

b. ASTM A 153 for iron and steel hardware.

I. Shop Painting:

1. Cleaning Steel: Thoroughly clean all steel surfaces. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC

SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, or SSPC SP-7 “Brush-Off Blast Cleaning”.

2. Galvanized Items:

   a. Galvanized items which are to be finish painted under Section 099101 shall be rinsed in hot alkali or in an acid solution and then in clear water.

   b. Welded and abraded areas of galvanized surfaces shall be wire brushed and repaired with a coating of cold galvanizing compound.

3. Apply one coat of shop paint to all steel surfaces except as follows:

   a. Do not shop paint steel surfaces to be field welded and steel to be encased in cast-in-place concrete.

   b. Apply 2 coats of shop paint, before assembly, to steel surfaces inaccessible after assembly or erection, except surfaces in contact.

   c. Do not paint galvanized items which are not to be finish painted under Section 09 91 13.

4. Apply paint and compound on dry surfaces in accordance with the manufacturer’s printed instructions, and to the following minimum thickness per coat:

   a. Shop Paint (General): 4.0 mils wet film.

   b. Shop Paint for Galvanized Steel: 3.0 mils wet film.

   c. Galvanizing Repair Paint: 2.0 mils dry film.

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporarily brace and secure items which are to be built into concrete, masonry, or similar construction.

B. Isolate non-ferrous metal surfaces to be permanently fastened in contact with ferrous metal surfaces, concrete, or masonry by coating non-ferrous metal surface with bituminous mastic, prior to installation.

3.2 INSTALLATION

A. Fit and set fabricated metal items accurately in designed locations, at proper elevation and alignment.

B. Use anchorage devices and fasteners of required type, size, and number as required to provide a secure, rigid installation.

C. Fit exposed connections accurately to form tight hairline joints. Weld connections which are not intended to be left as exposed joints, but cannot be shop welded because of size limitations. Grind welded joints smooth. Cut off exposed threaded portion of bolts flush with nut.

D. Attached Work: Drill holes for fasteners with power tools to exact size required. Unless otherwise shown on the Drawings, fasten metal Work to concrete and solid masonry anchorage with expansion anchors. Fasten metal Work to hollow masonry and stud partitions with square head toggle bolts.

E. Field Welding: Comply with AWS Codes for the procedures for shielded metal arc welding, for the appearance and quality of welds, and for the methods used in correcting welding Work.

F. Railings: Adjust railings prior to securing in place to insure alignment and proper matching at joints. Plumb posts in each direction. Secure posts and rail ends to construction as follows:

1. Anchor posts in concrete with post sleeves preset into the concrete. After the posts have been inserted into the sleeves, fill the annular space between post and sleeve solid with molten lead or an exterior quick-setting hydraulic cement. Cover anchorage joint with a cover flange.

2. Anchor posts to steel with steel flanges, angle type or floor type as required. Weld flanges to posts, and bolt to the steel supporting members.

3. Anchor rail ends to concrete and masonry with round steel flanges. Weld flanges to rail ends, and anchor into the wall construction with expansion anchors.

4. Anchor rail ends to steel with steel oval or round flanges. Weld flanges to rail ends, and weld or bolt to the steel supporting members.

G. Grating: Weld grating to supporting members, unless otherwise shown or specified.

1. Secure removable panels with saddle clip anchor assemblies.

+ + END OF SECTION + +

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SECTION 05 50 30

ANCHOR BOLTS, EXPANSION ANCHORS AND CONCRETE INSERTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide anchor bolts, expansion and adhesive anchors and concrete inserts, etc. as shown and specified.

B. This Section includes all bolts, anchors and inserts required for the Work but not specified under other Sections.

C. The types of work using the bolts, anchors and inserts include, but are not limited to the following:

1. Partitions, etc.

2. Outdoor posts and/or railing mounting

D. Related Work Specified Elsewhere:

1. None.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown and specified.

1. ASTM A 307, Carbon Steel Externally and Internally Threaded Standard Fasteners.

2. ASTM A 320, Alloy-Steel Bolting Materials for Low-Temperature Service.

B. Expansion anchors and inserts shall be UL or FM approved.

1.3 SUBMITTALS

A. Samples: Submit for approval representative samples of bolts, anchors and inserts as may be requested by the Engineer. His review will be for type and

finish only. Compliance with all other requirements is exclusive responsibility of Contractor.

B. Shop Drawings: Submit for approval the following:

1. Setting drawings and templates for location and installation of anchorage devices.

2. Copies of manufacturer's specifications, load tables, dimension diagrams and installation instructions for the devices.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. When the size, length or load carrying capacity of an anchor bolt, expansion anchor, or concrete insert is not shown on the Drawings, provide the size, length and capacity required to carry the design load times a minimum safety factor of four.

B. Determine design loads as follows:

1. Use the design load recommended by the manufacturer and approved by the Engineer.

2.2 MATERIALS

A. Masonry Anchors:

1. Provide carbon steel anchors, as shown on Contract Drawings.

2. Product and Manufacturer: Provide anchors by one of the following:

a. Hilti, Incorporated.

b. Or approved equal.

B. Adhesive Anchors:

1. Provide 316 stainless steel or carbon steel HVA adhesive anchors as shown on Contract Drawings.

2. Product and Manufacturer:

a. Hilti, Incorporated

b. Or approved equal.

C. Expansion Anchors:

1. Provide 316 stainless steel or carbon steel expansion anchors as shown on Contract Drawings.

2. Product and Manufacturer:

a. Hilti, Incorporated

b. Or approved equal.

D. Powder actuated fasteners and other types of bolts and fasteners not specified herein shall not be used unless approved by Engineer.

E. Connection Bolts, Nuts and Washers: Materials shall be as specified in other Sections of the Specifications, or shown on the Drawings. Where materials are not specified or shown on the Drawings, they shall be of Type 304 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Drilling equipment used and installation of expansion anchors shall be in accordance with manufacturer's instructions.

B. Assure that embedded items are protected from damage and are not filled in with concrete.

C. Adhesive anchors shall be used as shown or approved by the Engineer.

D. Unless otherwise shown or approved by Engineer conform to following for expansion anchors:

1. Minimum embedment depth in concrete: Mfr. Recommendations.

2. Minimum anchor spacing on centers: Mfr. Recommendations.

3. Minimum distance to edge of concrete: Mfr. Recommendations.

4. Increase dimensions above to develop the full anchor load capacity.

3.2 CLEANING

A. After embedding concrete is placed, remove protection and clean bolts and inserts.

+ + END OF SECTION + +

SECTION 05 56 00

METAL CASTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide all castings as shown and specified.

B. Castings shall include, but not be limited to the following:

1. Catch basin, manhole, , etc., frames, and grates.

2. Water valve box extensions and covers.

C. Related Work Specified Elsewhere:

1. Section 33 05 16, Drainage Structures

1.2 SUBMITTALS

A. Shop Drawings: Submit for approval the following in accordance with Section 01 33 00, “Submittal Procedure”:

1. Shop Drawings for the fabrication and erection of all casting assemblies:

a. Include plane, elevations, and details of sections and connections. Show anchorage and accessory items.

b. Include setting drawings for location and installation of castings and anchorage devices.

2. Copies of manufacturer’s specifications, load tables, dimension diagrams, anchor details and installation instructions.

3. Provide lettering to be cast into the top of the casting such as “Water,” “Drain,” “Sewer,” etc.

1.3 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM A 48, Gray Iron Castings.

2. ASTM A 536, Ductile Iron Castings.

B. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete in ample time to not delay that Work.

B. Store materials to permit easy access for inspection and identification. Keep materials off the ground, using pallets, platforms or other supports.

PART 2 - PRODUCTS

2.1 DETAILS OF CONSTRUCTION

A. General:

1. Design all frames, covers and grates to prevent rocking and rattling under traffic.

2. All castings shall be free from pouring faults, cracks, blow holes, or other defects affecting their strength and value for the service intended.

3. Castings shall be manufactured using tough, close grained material without the admixture of cinder iron or metal of inferior quality. Angles shall be boldly filleted and corners kept sharp and perfect.

4. No plugging of defective castings will be permitted.

5. Castings shall be fabricated true to pattern so that component parts fit together. The dimensions of all castings shall have a tolerance of plus or minus 1/16 inch and an additional tolerance of plus or minus 1/16 inch per foot of dimension. The weight deviation tolerance is

5%. Notwithstanding the above tolerances, all manhole frames rings and covers of the same nominal size shall assemble interchangeably.

B. Catch Basin, Manhole, Drain Inlet, etc., Frames and Grates:

1. Material: Cast iron conforming to ASTM A 48 Class 30.

2. Size: As shown on the Drawings.

3. Construction: Heavy duty with machined bearing surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer's printed instructions and approved Shop Drawings.

B. Set castings accurately to required location, alignment and elevation, plumb, level, true and free of rock, measured from established lines and levels. Brace temporarily or anchor temporarily in formwork.

C. Protection from Dissimilar Materials: Painting, coat all surfaces of aluminum in contact with dissimilar materials such as concrete, masonry and steel or iron.

D. Castings shall be delivered to the project site unpainted and, after installation, all exposed surfaces shall receive two coats of asphaltic paint.

+ + END OF SECTION + +

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SECTION 05 70 05

ORNAMENTAL IRONWORK RESTORATION

PART 1 – GENERAL

1.1 DESCRPITION

A. This work shall consist of restoring ornamental ironwork as indicated on the architectural drawings.

B. Restoration includes, but is not limited to, the following:

1. Removal of coatings and corrosion from all existing ironwork to remain

2. Disassembly and removal of ornamental ironwork, if neccessary.

3. Field repair of existing ironwork to remain

4. Assembly and installation of restored components

5. Shop and field coating of all ironwork

C. Where lead-based paint is present, containment and disposal shall be in accordance with code requirements and shall supersede the site protection requirements in this specification.

1.2 RELATED WORK:

A. 09 91 13, Exterior Painting

B. 02 83 00, Hazardous Materials Removal

1.3 DEFINITIONS:

A. Poor Previous Replacement: Previous replacement or repair work that does not match the original iron work, including material, size, shape, profile, surface finish, decoration, etc., as represented in existing work, photographs, or original plans.

B. Replicate: Provide new components that match the original components in material, size, shape, profile, surface finish, decoration, etc., as represented in existing work, photographs, or original plans.

1.4 SPECIAL EXPERIENCE

A. Special Experience Requirements:

1. Contractor: All ornamental ironwork restoration shall be done by a Contractor with a minimum of five (5) years of experience working with ironwork restoration. Contractor shall demonstrate three (3) projects similar in scope and type to the required work in the New Jersey/New York metropolitan region involving facilities designated as Landmarks by local governments, or buildings listed on the National or State Register of Historic Places.

2. Mechanics: The Contractor shall maintain a steady work crew consisting of mechanics who are experienced with the materials and methods specified, and are familiar with the design requirements. Contractor shall maintain a full-time Foreperson who fluently speaks, reads, and writes English.

   Contractor shall confirm that all workers understand the job's requirements. Mechanics shall be fully supervised to ensure that the work is accomplished to meet or exceed the highest standards of the trades. The Contractor shall provide one crew of mechanics for the duration of the project. Substitutions and additions of work force shall be permitted with consent only and if there is no adverse effect on quality or performance of work

3. Fabricator: All ornamental ironwork fabrication and casting shall be done by a qualified Fabricator with experience replicating ornamental ironwork. Fabricator shall demonstrate three (3) projects similar in scope and type to the required work involving facilities designated as Landmarks by local governments, or buildings listed on the National or State Register of Historic Places.

1.5 QUALITY ASSURANCE:

A. Continuous Work: Work shall be performed daily, without interruption unless directed otherwise.

B. Skill: In acceptance or rejection of the work of this specification, no allowances shall be made for lack of skill on the part of the mechanics.

C. Personnel Substitutions: The Contractor shall provide one crew of mechanics for the duration of the project. Substitutions and additions of work force shall be permitted with consent, so long as there is no adverse effect on quality or performance of work.

D. Damage: The Contractor shall replace, at no additional cost to the Owner, all broken, lost, or damaged materials resulting from work.

E. Access: Regular access shall be given to the Contractor's scaffolding, swing stage, or work site so that he/she may inspect work being performed.

F. Protection: All adjacent surfaces shall be protected from weld splatter and paint drippings or other damage. The Contractor shall immediately remove misplaced coatings.

G. Repair Appearance Standard: Repaired surfaces shall have a uniform appearance as viewed from ten (10) feet away. The samples can be viewed at any angle from the ground or scaffold. If direct line of sight is not possible due to scaffold or obstructions, other means including, but not limited to distance viewing through the use of field glass or binoculars to simulate approximate same distances, will be utilized as determined.

1.6 COORDINATION:

A. Stucco Repair: Coordinate with the General Contractor the stucco repair work and other adjacent work with this work.

B. Preconstruction Conference: Prior to beginning the work, the Contractor shall convene a meeting with all relevant parties to review the requirements of the Program of Work, installation procedures, locations of required mock-up areas, and all job conditions and processes. Representatives of all subcontracting firms involved with this work shall participate in this meeting.

C. Other Trades: The Contractor shall coordinate the work of all other trades related to the successful completion of this work.

1.7 PROTECTION:

A. Surrounding areas shall be protected from contact with the surface preparation, cleaning operations, and abrasive media. Surrounding areas shall include, but shall not be limited to, adjacent surfaces and structures, private property including automobiles, vegetation, and all other surfaces that would be adversely affected if placed in contact with the cleaning materials or abrasive media. The Contractor shall make full restitution for damages caused at no additional cost to the Owner. Contractor vehicle parking and deliveries shall be coordinated accordingly, and the Contractor shall provide, erect, and maintain barricades, danger signals and warning signs as needed.

B. The Contractor shall not allow spent media or debris from the coating and corrosion removal process to enter storm sewer system, contaminate water supplies or to enter natural bodies of water. Spent media and debris shall be collected and disposed of as outlined in the approved Program of Work.

1.8 PRE-WORK SITE INSPECTION:

A. Before starting any work, the Contractor shall make a complete inspection of all surfaces and associated elements to confirm all repairs and any existing conditions of concern. The Contractor shall perform inspection in

the presence of the Architect, examine all adjoining work on which this work is in anyway dependent for proper installation and workmanship, and report any conditions which prevent the performance of this work. The Contractor shall not proceed with the work until all discrepancies are resolved.

B. The Contractor shall bring to the attention of the Architect any items not indicated in the contract documents that require repair work, such as displaced masonry or other substrates affecting the work of this specification, or serious deterioration of ironwork components exposed during coating removal or repairs.

1.9 SUBMITTALS:

A. Qualification Data: Qualification data and references shall be submitted for firms and persons specified above in “Special Experience Requirements” to demonstrate their capabilities and experience.

B. Product Literature: The Contractor shall submit copies of the manufacturer’s technical data for each product including their recommendations for installation and use and Safety Data Sheets (SDS). The Contractor shall include test reports and certificates that verify the products’ compliance with the specification’s requirements. One complete set of product literature and SDS shall be placed in a 3-ring, loose-leaf binder and shall be present on the job site always.

C. Program of Work: The Contractor shall prepare and submit a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of the work including protection of surrounding materials and project site. Provide drawings illustrating means and methods of protection. If materials and methods other than those specified herein are proposed for any phase of restoration work, include a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this project and worker's ability to use such materials and methods properly.

D. Shop Drawings: The Contractor shall prepare and submit shop drawings, including plans, elevations, sections and details of castings and other metal fabrications and their connections that are required. No fabrication shall proceed until the shop drawings for that part of the work have been approved.

E. Samples: The Contractor shall clearly label all samples to include the project name and contract number, the product name, manufacturer name, and any other information relevant to identification of and differentiation between samples including production codes, batch numbers, and color or formula numbers. The Contractor shall submit the following for approval prior to erecting mock-ups:

1. One (1) full-size sample for each cast or fabricated ironwork component.

2. Three (3) samples for each type of fastener.

3. One (1) sample for each type of coating system, including primer and finish coats, prepared on a wrought or cast-iron metal plate measuring no less than sixteen (16) square inches.

F. Mock-ups: Prior to executing work, the Contractor shall provide in-place mockups for approval. Panels shall be resubmitted until approved. Mock-ups shall be prepared using the same workmen, methods, and materials that will be employed for the remainder of the work. Upon approval, the mock-ups will remain the standard throughout the job. The approved mock-ups shall be retained, undisturbed and suitably marked, throughout construction. Mock-ups may be incorporated into the finished work when so approved. Mock-ups shall not be made until the methods and locations are approved. The Architect or his/her representative will be present during the creation of all mock-ups. The Contractor shall notify the Architect not less than seven (7) days in advance of mock-ups.

The Contractor shall provide protection for adjacent surfaces during the mock-up phase. Submit the following mock-ups for approval:

1. One (1) existing coating and corrosion removal, minimum of one (1) square foot for each type of material (cast and wrought iron), performed on site at a selected location.

2. One (1) field repair of existing ironwork for each type of repair, including welding repairs on cast and wrought iron, in select locations.

3. One (1) linear foot of fence field coating in selected locations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following sections of the New York State Department of Transportation (NYSDOT) standard specifications shall apply:

Galvanized Coatings and Repair Methods - 719-01

B. The following ASTM standards shall apply:

Standard Specification for Carbon Structural Steel	A36
Standard Specification for Gray Iron Castings	A48

C. The following other specifications shall apply:

Section II-C Specifications for Welding Rods, Electrodes, and Filler Metals – Materials	ASME/BPVC SEC II-C
Structural Welding Code – Steel – 23rd Edition 2nd Printing	AWS D1.1
Shield Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)	A-A-1923A
Shop, Field and Maintenance Painting of Steel	SSPC PA 1
Guide to Zinc-Rich Coating Systems	SSPC PS Guide 12.00
Commercial Blast Cleaning	SSPC SP6/NACE No. 3
Steel Structure Painting Manual	Volume II

D. Except as otherwise shown on the approved shop drawings, the Contractor shall use materials of size, thickness and type required to produce reasonable strength and durability on the work.

E. Wrought Iron:

1. The Contractor shall provide steel bar for repair and replacement of wrought iron pickets, rails, or other components that meets the requirements of ASTM A36. All steel bar shall be cut, milled, and fabricated, as required, to match the appearance of existing original wrought iron element including size, shape, profile, and surface finish. The original method of assembly and attachment shall be matched unless otherwise approved.

F. Fasteners:

1. Bolts, nuts, washers, screws, rivets, and other connection devices contacting the wrought iron shall be galvanized in accordance with the requirements of NYSDOT Standard Specifications, Section 719-01, Type II. Stainless steel or other metals that are incompatible with cast iron shall not be used. Incompatible metals will cause galvanic corrosion of iron elements to occur.

a. Masonry Anchors: Expansion shield type shall conform to Federal Specification A-A-1923A, Type 3.

G. Coatings:

1. Hardware shall be cleaned of all dirt, grime, oil, grease or other contamination using appropriate solvents that do not harm the galvanized coating. If the galvanized hardware comes with a dye, such dye must be removed prior to painting. The contractor shall notify the Architect of the product to be used for this purpose and demonstrate its effectiveness. To ensure that such product does not interact with the primer paint, all remnants of the product shall be washed off as recommended by the product's technical data sheet.

a. Primer for Blast Cleaned Components: The Contractor shall use an ethyl silicate zinc-rich (zinc content no less than 80% by weight in dried film) primer that is suitable for use on steel and ductile iron and meets or exceeds the requirements of Society for Protective Coatings (SSPC) PS 12.00.

b. Primer for Galvanized Components: The Contractor shall use a waterborne epoxy primer suitable for use on galvanized and non-ferrous surfaces to coat all exposed galvanized surfaces, including but not limited to galvanized fastener heads.

c. Second and Finish Coats: The Contractor shall use a waterborne acrylic epoxy suitable for use on ferrous metals.

d. Color and Sheen: Finish coat paint color and sheen will be selected by the Architect from the manufacturer's full range of colors. Primer coats shall each have a slight variation of color to distinguish them from the preceding coat.

e. Single Source: All coatings, primer and finish coats, applied in the shop or field shall be obtained from a single manufacturer.

H. Miscellaneous:

1. Filler Compounds: Filler compounds shall be epoxy resin binder with metallic (iron or steel) filler particles.

2. Lead Caulking: Lead caulking shall be antimonial lead.

3. Sealant: The sealant shall be architectural grade polyurethane sealant.

4. Welding Rods and Electrodes: The Contractor shall provide the appropriate type and alloy of filler metal and electrodes as recommended by the manufacturer of metal to be welded, and as required for color match, strength and compatibility in the fabricated items.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING:

A. The Contractor shall deliver materials to project site in manufacturer's original and unopened packaging, labeled with manufacturer's name and type of products.

B. The Contractor shall store ironwork above the ground on a clean dry surface with air circulation; do not store directly on the ground. Deliver, store, and handle materials to prevent cracks, dents, scratched coatings, or other physical damage. Protect materials from moisture, tampering, acts of vandalism, and possible injury to workers and the public in general.

3.2 FABRICATION:

A. General:

1. The Contractor shall be responsible for collecting all field measurements and removing samples required for preparation of shop drawings and accurate replication of ornamental ironwork components.

2. Fastenings shall be concealed or of the same or similar arrangement as in existing work.

3. The Contractor shall cut metal by sawing, shearing, or blanking. Flame cutting will not be permitted. The Contractor shall make cuts accurate, clean, sharp and free of burrs without deforming adjacent surfaces or metals.

4. The Contractor shall provide materials that have been selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces, which exhibit pitting, seam marks, roller marks, stains, discolorations or other imperfections on the finished units will not be acceptable.

5. The Contractor shall finish exposed surfaces to smooth, sharp, well-defined lines and arises.

6. All components shall be shop primed before shipment to the job site using specified primer paint according to the Steel Structures Painting Manual Vol. 2, SSPC PA-1, "Paint Application Specification No. 1, Shop, Field and Maintenance Painting." Remove loose rust, mill scale and existing paint by air abrasive cleaning as specified in Steel Structures Painting Manual Vol. 2, SSPC SP-6, “Commercial Blast Cleaning.”

3.3 COATING AND CORROSION REMOVAL:

A. The Contractor shall clean all ironwork surfaces free of coatings and corrosion and prepare for re-coating according to the requirements of the Society for Protective Coatings (SSPC):

B. SSPC-SP 6 - Joint Surface Preparation Standard, Commercial Blast Cleaning Surfaces shall be primed immediately following cleaning to prevent additional corrosion. All foreign materials such as dirt, dust, rust scale, sand, bird droppings, and all materials loosened by abrasive blasting operations shall be completely removed from the area of work before any painting operations are begun.

3.4 INSTALLATION:

A. Replace all damaged, missing, and poor previous replacement ornamental ironwork with new material that matches the existing and adjacent work in size, shape, profile, and surface finish. The Contractor shall install ironwork plumb, level, and true to existing adjacent work and firmly secure all work and secure components from tampering or theft.

3.5 CONNECTIONS:

A. The Contractor shall mill joints to a tight, hairline fit. Joints exposed to weather shall be formed to exclude water penetration. Surfaces shall be dressed smooth and free from mill marks or imperfections. Excessive use of epoxy and other filler materials will not be permitted.

1. Bolts and Screws: The Contractor shall make threaded connections tight with threads entirely concealed and use lock washers and nuts. Screw heads exposed to view shall be vandal resistant. The Contractor shall cut off projecting threaded ends of exposed bolts and screws flush with nuts or adjacent metal.

   a. Welding shall be in accordance with Standard Code for Welding in Building Construction, D1.1: Structural Welding of the American Welding Society (AWS) and shall be done with

electrodes and methods as recommended by the manufacturers of the metals being welded. Weld shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth to match finish of adjoining surfaces; undercut metal edges behind surfaces which will be exposed to view to prevent distortion of finished surface. Remove weld splatter and welding oxides from all welded surfaces.

2. Lead Setting: Fence posts or other wrought ironwork shall be set in hot pourable lead caulking. Surfaces embedded in lead shall not be coated; remove coating as required. The Contractor shall re-use existing setting holes in stonework. Molten lead shall not be poured into stone setting holes if stone is wet; stone may crack or spall due to heat. The Contractor shall shore and support fencing until lead has cooled.

3.6 COATING:

A. All ironwork surfaces, including surfaces that will be concealed in final constructed condition, shall be coated using the specified coating system applied according to the requirements of SSPC-PA 1 - Shop, Field and Maintenance Painting, Steel Structure Painting Manual, vol. 2.

B. All work shall be done in a workmanlike manner and by skilled mechanics. All paint shall be evenly spread, smoothly flowed on, and shall be free from defects. No coat shall be applied until the previous coat has reached its “dry to handle” (for the finish coat) or “dry to recoat” (for the primer) time as established by the paint manufacturer in the product data sheet. Finish surfaces shall be uniform.

C. Coatings shall be brush or spray applied; rollers shall not be used.

D. The Contractor shall confirm surface temperature of metal surfaces prior to painting or installation of filler compounds and not paint or use filler compounds if surface temperature falls below or rises above that recommended by the coating manufacturer.

E. Each primer coat applied shall produce a dry film thickness of 2.0 to 2.5 mils. Each finish coat shall produce a minimum dry film thickness of 2.0 to 3.5 mils.

F. Marred or otherwise damaged coatings shall be touched-up with the specified coating system (primer and finish coats) as required.

1. Primer Coats: Two (2) coats shall be applied to provide a minimum 5-mil dry film thickness.

2. Finish Coats: The Contractor shall provide 4 - 9 mil dry film thickness by applying one or more coats as necessary to achieve specified film thickness.

3.7 COMPLETION / SITE CLEAN-UP:

A. Upon completion of work, the Contractor shall clean all surfaces of any debris, paint drips, construction materials, etc. protect the new work against damage from subsequent restoration work. Any defective or failed work shall be repaired or replaced at the Contractor's expense using approved procedures.

+ + END OF SECTION + +

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals

B. Section 01 74 00, Construction Waste Management

C. Section 09 91 01, Exterior Painting

1.2 REFERENCES

A. Standards: Comply with the following unless otherwise specified or indicated on the Drawings:

1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions for each indicated use.

2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.

3. Plywood Installation: APA Design/Construction Guide, Residential & Commercial by the American Plywood Association (APA).

4. Grading Rules:

a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).

b. Southern Pine: Southern Pine Inspection Bureau (SPIB).

c. Redwood: Redwood Inspection Service (RIS).

d. Spruce-Pine-Fir: National Lumber Grades Authority (NLGA).

5. User Specification for Treated Wood, American Wood Protection Association Standard (AWPA) U1-02.

6. Framing Installation: American Forest and Paper Association (AFPA).

7. ICC Evaluation Service, Inc.; ESR-1721.

8. LEED Certification: Forest Stewardship Council (FSC) Principles and Criteria

1.3 SUBMITTALS

A. Quality Control Submittals:

1. Certificates: Certification for the following wood treatments:

a. Pressure Treatment: Certification by treating plant stating chemicals and process used, net amount of chemical preservative retained, and conformance with specified standards.

b. Waterbourne Preservatives: Certified written statement that moisture content of treated materials was reduced to a maximum of 19 percent prior to shipment to Project site.

c. Fire-Retardant Treatment: Certification by treating plant stating treated material complies with specified standards and treatment will not bleed through specified finishes.

1.4 QUALITY ASSURANCE

A. Mill and Producers Mark: Each piece of lumber and plywood shall be gradestamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface, or ends of pieces with finished surfaces.

1. Pressure Preservative Treated Material: Accredited agency quality mark on each piece of wood indicating treatment.

2. Fire-Retardant Treated Material: Accredited testing agency mark on each piece of wood indicating compliance with the fire hazard classification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials dry during delivery. Store materials 6 inches minimum height above ground surface. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation between stacks.

B. Cover stored materials until ready for use for protection from moisture. Place and anchor cover in a manner that will provide good ventilation under the covering.

1.6 PROJECT CONDITIONS

A. Correlate location of supporting members to allow proper attachment of other Work.

PART 2 - PRODUCTS

2.1 LUMBER

A. General: Furnish FSC certified wood products only, with all pieces stamped with the FSC Label. Furnish seasoned dimension lumber dressed to nominal sizes indicated with 19 percent maximum moisture content at time of dressing, marked “S-DRY”. Comply with dry size requirements of PS 20.

1. Dress: Surfaced 4 sides (S4S) unless otherwise indicated.

B. Framing Lumber: Species: Douglas Fir or Hem-Fir (WWPA or WCLIB), Southern Pine (SPIB), Redwood (RIS), or Spruce-Pine-Fir (NLGA) unless otherwise indicated.

1. Light Framing; 2 inches through 4 inches thick, less than 6 inches wide:

   a. Stud grade lumber for stud framing and Standard grade lumber for other light framing.

2. Structural Framing; 2 inches through 4 inches thick, 6 inches and wider:

   a. Select Structural grade.

3. Exposed Framing; 2 inches through 4 inches thick: Furnish the following species and grade where framing will not be concealed by other Work:

   a. Douglas Fir, Select Structural grade (WWPA or WCLIB).

C. Board Lumber; less than 2 inches thick:

1. Exposed Board Lumber, for Paint Finish: Southern Pine No. 1 (SPIB), Douglas Fir 2 Common (WWPA) or Select Merchantable

(WCLIB), Redwood Construction Common (RIS), or Spruce-Pine-Fir No. 1 / No. 2 (NLGA).

2. Exposed Board Lumber, for Transparent Finish: Redwood Clear (RIS).

3. Concealed Board Lumber: Southern Pine No. 3 (SPIB), any species No. 4 (WWPA) or any species Standard (WCLIB), Redwood Merchantable (RIS), or Spruce-Pine-Fir No. 1 / No. 2 (NLGA).

D. Miscellaneous Lumber: Standard grade, No. 3 grade, or better grade of the following species unless otherwise indicated:

1. Nailers and Blocking: Douglas Fir, Hem-Fir, Idaho White Pine, Southern Pine, or Spruce-Pine-Fir.

2. Furring: Douglas Fir, Southern Pine, or Spruce-Pine-Fir.

3. Plaster Grounds:

a. Interior Use: Douglas Fir, Southern Pine, or Spruce-Pine-Fir.

b. Exterior Use: White Oak, Douglas Fir or approved equal.

2.2 PLYWOOD (where applicable and indicated on drawings)

A. Sheathing and Subflooring: APA RATED SHEATHING, EXPOSURE 1. Furnish APA PS 1 veneered panels, with span ratings for the required thicknesses as listed below unless otherwise indicated.

THICKNESS	SPAN RATING
3/8 inch	24/0
1/2 inch	32/16
5/8 inch	40/20
3/4 inch	48/24

B. Underlayment: APA UNDERLAYMENT, EXPOSURE 1.

1. For use under resilient tile flooring and resilient sheet flooring: Sanded face.

2. For use under carpet and “liquid” flooring: Touch-sanded.

2.3 PARTICLEBOARD

A. Underlayment: ANSI A 208.1, Type 1, Density Range M (40 lb/cu ft minimum average).

2.4 HARDBOARD

A. Hardboard: PS 58, Class “Tempered”, S1S, plain board.

2.5 MISCELLANEOUS MATERIALS

A. Underlayment Patching Compound: Hardsetting, quicksetting type with latex or polyvinyl acetate binder.

B. Asphalt Felt: Asphalt-saturated felt, No. 15, without perforations, complying with ASTM D 226.

C. Rosin Paper: Commercial, rosin-sized building paper, 0.010 inch thick.

2.6 PRESERVATIVE TREATMENT

A. Treat lumber and plywood where indicated and as specified. Comply with applicable AWPA U1 Standards and quality control and inspection requirements.

1. Fasteners and anchoring devices to be used with wood treated with waterbourne preservatives shall be hot-dipped galvanized or stainless steel if the wood will be exposed to moisture.

B. Complete fabrication of items to be treated to the greatest extent possible prior to treatment. Where items must be cut after treatment, coat cut surfaces with heavy brush coat of the same chemical used for treatment or other solution recommended by AWPA Standards for the treatment.

C. Inspect wood after treating and drying. Discard warped or twisted items.

D. Wood Treatment: Compatible with galvanized metal connector plates, unless other compatible protective finish for connector plates is approved by the Director for use with approved treatment.

1. Preservative Treatment: Category UC3A for Exterior Construction above Ground; coated and exposed to rapid water runoff.

2. Nailers, blocking, furring, stripping, and similar concealed members in contact with exterior masonry and concrete (including interior wythe of exterior walls), and all sills for framing.

3. Wood items indicated or scheduled on the Drawings to be preservative treated.

E. Wood Treatment: Compatible with galvanized metal connector plates, unless other compatible protective finish for connector plates is approved by the Director for use with approved treatment.

1. Preservative Treatment: Category UC4A for Ground Contact or Freshwater; Non-critical components.

2.7 FIRE-RETARDANT TREATMENT

A. Furnish “FR-S” lumber where indicated, complying with AWPA U1 Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E 84 or NFPA Test 255.

1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.

2. Provide UL label or identifying mark on each piece of fire-retardant lumber.

3. Redry treated items to a maximum moisture content of 19 percent after treatment.

2.8 FRAMING HARDWARE (where applicable)

A. Fasteners and Anchoring Devices: Select and furnish items of type, size, style, grade, and class as required for secure installation of the Work. Items shall be Hot Dip galvanized or stainless steel for exterior use. Items exposed to treated wood shall be Hot-Dip galvanized conforming to ASTM Standard A653; Class G-185 or AISI 304 or AISI 316 stainless steel. Unless shown or specified otherwise, comply with the following:

1. Nails, Screws, Lag Screws/Lag Bolts, Bolts/Nuts/Washers:

a. Hot-Dip galvanized, ASTM Standard A653; Class G-185.

b. Stainless steel AISI 304 or AISI 316.

c. Zinc or cadmium plated.

d. Silicon bronze.

2. Expansion Anchors: Hot-Dip galvanized steel wedge anchors, ASTM Standard A653; Class G-185.

3. Toggle Bolts: Cadmium or zinc plated tumble - wing type.

4. Self Threading Masonry Screws: Zinc Plated; “Tapcon” by Elco Industries, Inc., 1111 Samuelson Rd., PO Box 7009, Rockford, IL 61125-7009, (815) 397-5151.

5. Bar or Strap Anchors: ASTM A575 carbon steel bars.

6. Wall Plugs: Corrugated type, galvanized steel, 24 USS gage min, not less than 2 inches wide x 2-1/2 inches deep.

7. Cross Bridging: Nailable type, galvanized steel, 16 USS gage min, by 3/4 inch wide.

8. Metal Hangers and Framing Anchors: Size and type for intended use, galvanized finish, manufacturer’s recommended fasteners. Items exposed to treated wood shall be Hot-Dip galvanized conforming to ASTM Standard A653; Class G-185 and epoxy coated in the field.

9. Buck Anchors: Corrugated type, galvanized steel not lighter than 12 USS gage min, 4 inches wide (except where partitions are less than 4 inches thick) by 8 inches long, punched for two 5/16 inch carriage bolts at buck end.

10. Sleeper Anchors: Approved type, galvanized steel not lighter than 20 USS gage min, not less than 1-1/4 inches wide, designed to anchor into concrete not less than 1-1/2 inches and permit height adjustment of sleeper.

11. Stainless Steel Anchors: AISI 304 or AISI 316; Applications include permanent wood foundations and corrosive environments such as saltwater spray and preservative treated wood.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine substrate and supporting structure on which rough carpentry is to be installed for defects that will adversely affect the execution and quality of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION - GENERAL

A. Do not use units of material with defects which impair the quality of the Work and units which are too small to fabricate the Work with minimum joints or with optimum joint arrangement.

B. Install Work accurately to required lines and levels with members plumb and true, accurately cut and fitted and securely fastened. Closely fit rough carpentry to other associated construction.

C. Securely attach carpentry Work to substrates by anchoring and fastening as indicated or, if not indicated, as required by the referenced standards. Select fasteners of size that will not penetrate through members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required. Set nail heads in exposed Work which is to be painted or stained and fill resulting holes.

D. Treated Wood: Apply heavy brush coat of treatment material to field cut surfaces.

3.3 WOOD FRAMING (where applicable)

A. Install framing members of nominal sizes indicated or of units built-up to dimensions indicated, on spacings shown. Unless otherwise indicated, comply with the recommendations of the AFPA “Manual for Wood Frame Construction”. Construct required openings for installation of related work. Do not splice structural members between supports.

B. Anchor and nail members as indicated. If not indicated, comply with the “Recommended Nailing Schedule - Table 1” of the “Manual for Wood Frame Construction” and other applicable recommendations of the AFPA.

C. Install miscellaneous blocking and framing indicated and as required for attachment and support of facing materials, fixtures, specialty items, and trim.

3.4 WOOD NAILERS, BLOCKING, AND GROUNDS

A. Install required items where indicated and where required for support, attachment or screeding of other Work. Form to shapes indicated or required. Coordinate locations and cut and shim as required to provide items at true and level planes to receive Work to be attached. Install closure strips for nailers at all edges.

3.5 PLYWOOD SHEATHING, SUBFLOORING, AND UNDERLAYMENT (where applicable)

A. Comply with printed installation requirements of the APA Design/ Construction Guide, Residential & Commercial for plywood application required, unless otherwise indicated.

B. Plywood Underlayment: Install underlayment just prior to installation of finish flooring. Stagger end joints between panels in relation to each other and stagger all joints in relation to substrate jointing. Allow 1/32 inch space between panel ends and edges for expansion. Fasten in accordance with APA recommendations. Prior to installation of finish flooring, patch damaged areas wider than 1/16 inch. Set nails 1/16 inch, but do not fill. Sand rough areas smooth and uneven joints flush.

3.6 PARTICLEBOARD UNDERLAYMENT (where applicable)

A. Install underlayment in accordance with National Particleboard Association recommendations for the type of subfloor condition. Fasten to subflooring in accordance with APA recommendations. Patch and sand gouges, gaps, and chipped edges. Sand uneven joints flush.
   1. Nail underlayment to subflooring.

3.7 WOOD FURRING

A. Install members plumb and level with closure strips at all edges. Shim with wood as required to achieve tolerance specified.

   1. Fastening: Attach to substrates as indicated; if not indicated, attach material as specified for nailers and blocking.

   2. Tolerance: Shim and level wood furring to a tolerance of 1/8 inch in 10 feet.

   3. Firestop furred spaces on walls at each floor level, with wood blocking or other approved non-combustible materials. Fit members accurately to close furred spaces.

   4. Furring to Receive Plywood Paneling: Unless otherwise indicated, 1 x 3 inch furring at 2 feet oc, horizontally and vertically.

   5. Furring to Receive Gypsum Drywall: Unless otherwise indicated, 1 x 2 inch furring at 16 inches oc, vertically.

   6. Furring to Receive Plaster Lath: Unless otherwise indicated, 1 x 2 inch furring at 16 inches oc, vertically.

7. Suspended Furring: Size and spacing indicated, including hangers and attachment devices.

3.8 FLOOR SLEEPERS (where applicable)

A. Unless otherwise indicated, install 3 x 3 inch strips, 12 inches oc and across abutting walls and restricting features. Anchor to slab with sleeper anchors 16 inches oc. Shim level to required height with redwood wedges 8 inches oc. Fill space between sleepers and floor slab solid with 1 part Portland cement and 2-1/2 parts sand mortar.

+ + END OF SECTION + +

SECTION 06 20 13

EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fascia: profiles as indicated on dwgs

2. Soffit: as indicated on drawings for exterior roof bracket repair

B. Related Requirements:

1. Section 01 33 00, Submittals

2. Section 01 74 00, Construction Waste Management

3. Section 01 81 13, Construction IAQ Management

4. Section 09 91 13, Exterior Painting

5. Section 06 10 00, Rough Carpentry, for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.

1.3 ACTION SUBMITTALS

A. Product Data and Shop Drawings: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Fascia Bd.

2. Exterior Wood Brackets and Moldings .

B. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.7 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.

1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.8 WARRANTY

A. Manufacturer's Warranty for CB products: Manufacturer agrees to repair or replace trim that fails due to defects in manufacturing within specified warranty period. Failures include, but are not limited to, deterioration, delamination, and excessive swelling from moisture.

1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate or prefinished items, provide matching prefinished aluminum fasteners where face.

1. For applications not otherwise indicated, provide stainless-steel hot-dip galvanized-steel or aluminum fasteners.

B. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and with applicable requirements in Section 07920 "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Sonolac.

b. Bostik, Inc.; Chem-Calk 600.

c. May National Associates, Inc.; Bondaflex 600 Bondaflex Sil-A 700.

d. Pecora Corporation; AC-20+.

e. Schnee-Morehead, Inc., an ITW company; SM 8200.

f. Tremco Incorporated; Tremflex 834.

2.2 FABRICATION

A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

2. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.

1. Use scarf joints for end-to-end joints.

2. Stagger end joints in adjacent and related members.

B. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

C. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

+ + END OF SECTION + +

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SECTION 06 20 23

FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all finish carpentry Work where applicable and as indicated on the Drawings and as specified herein.

B. Related Work Specified Elsewhere:

1. Section 01 33 00, Submittals

2. Section 01 74 00, Construction Waste Management

3. Section 09 91 13 and Section 09 91 23, Painting

1.2 SUSTAINABILITY REQUIREMENTS

A**.** Sustainability requirements included in the Section are as follows:

1. Restrictions on the use of urea-formaldehyde containing materials.

B. The Contractor shall implement practices and procedures to meet the Project's sustainable requirements. The Contractor shall ensure that the requirements related to these goals, as defined in Specification Section 01 35 60, Sustainability Requirements, and as specified in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be proposed by the Contractor or their sub-contractors if such changes compromise the stated Sustainable Design Performance Criteria.

1.3 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1. Architectural Woodwork Institute (AWI)
Architectural Woodwork Quality Standards

2. American Society for Testing and Materials (ASTM)
E84 Standard Test Method for Surface Burning Characteristics of Building Materials

3. American National Standards Institute (ANSI)
ANSI A208.1

4. Underwriter's Laboratories, Inc. (UL)

1.4 SUBMITTALS

A. Product Data

1. Submit manufacturer's or supplier's product data for each product and process specified as work of this Section and incorporated into items of finish carpentry.

B. Quality Certification

1. Submit woodwork Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with AWI quality grades and other requirements indicated herein.

C. Wood Treatment Data

1. Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finish of treated material.

D. Fire-Retardant Treatment

1. Provide certification by treating plant that treated materials comply with requirements.

E. Shop Drawings

1. Submit Shop Drawings showing location of each fabricated item, dimensioned plans and elevations, large scale details and profiles, attachment devices and other components.

2. Identify woodwork item using same identification system shown on Architectural Drawings.

3. Coordinate details and cut-outs to accommodate accessories specified under other Sections.

F. Samples

1. Wood Trim: 12" length of each type and finish (e.g., base, casings, stools, aprons, chair rail, exercise barre).

2. Plywood Paneling: 12" x 12" for each type and finish.

G. Low Emitting Materials Compliance Submittals

1. Provide documentation for each adhesive and glue to be used on site, indicating that the adhesives comply with low V.O.C. requirements as stated in Specification Section 01 35 60.

H. Sustainability Submittals

1. Submit manufacturer's documentation that composite wood products, including plywood, that are used are manufactured without the use of any added urea-formaldehyde. This requirement includes binders, and laminating adhesives used in the field or shop. Submit manufacturer's documentation of the resin(s).

1.5 QUALITY ASSURANCE

A. AWI Quality Standard

Comply with applicable requirements of the AWI "Architectural Woodwork Quality Standards", except where indicated otherwise.

B. Fabrication and Installation Qualifications

Firm which can demonstrate a minimum of 5 years of successful experience in fabricating and installing woodwork items similar in type and quality to those required for this project.

C. Submit name of firm to Architect for approval.

D. Regulatory Agencies

Fire-retardant treated wood shall be certified by one of the following:

1. National Recognized Testing Agency

2. NYC Board of Standards and Appeals (BSA)

3. NYC Materials and Equipment Acceptance (MEA)

4. OTCR

E. All plywood, composite wood products and laminating adhesives used shall contain no added urea-formaldehyde.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver woodwork until operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If woodwork must be stored, store only in areas meeting requirements and conditions specified for installation areas.

1.7 PROJECT CONDITIONS

A. Conditioning

1. Woodwork Installer shall advise the Authority's Representative of temperature and humidity requirements, in writing for woodwork installation and storage areas. Do not install woodwork until required temperature and relative humidity have been stabilized.

B. Maintain temperature and humidity conditions in installation area as required to maintain moisture content of installed woodwork within 1. percent of optimum moisture content as follows:

1. Optimum moisture content of wood: 5-10%

2. Relative humidity required to be maintained in installation and storage areas: 25-55%

PART 2 - PRODUCT

2.1 MATERIAL

A. General (where applicable and indicated on drawings)

1. All interior wood finish shall be made up of thoroughly seasoned, kiln dried woods of the kinds specified.

2. All material shall be clear on all exposed faces and edges, free from checks, cracks or other blemishes that would mar the appearance of the finished wood.

3. In assembling interior woodwork, arrange so that variations in grain pattern are kept to a minimum.

4. All material shall be product of one mill.

5. All plywood and laminating adhesives used shall contain no added urea- formaldehyde.

B. Species and Grades (Lumber) (where applicable unless otherwise indicated on drawings)

1. Plain Sawn Appalachian Red Oak, AWI Grade A1 (for transparent finish): interior wood finish throughout, except as otherwise specified or shown on Drawings.

2. Red or White Birch, AWI Grade B2, (for opaque finish):
Option: Maple, Yellow Poplar, or Basswood: AWI Grade B2.

3. White Birch, AWI Grade A1 (for transparent finish):

C. Species, Grades, Types (Plywood)

1. Veneer: Oak and White Birch, as specified herein, AWI Grade A1.

2. Grain Appearance: Running Match.

3. Core: Particleboard or fiberboard, medium density M-1 grade, fire-retardant.

2.2 FABRICATION, GENERAL

A. Wood Moisture Content

1. Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity in installation areas. (See Art. 1.7).

B. Fabricate woodwork to dimensions, profiles, and details indicated.

C. Complete fabrication, assembly, finishing, and other work before shipment to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary, provide ample allowance for scribing, trimming, and fitting.

D. Pre-Cut Openings

1. Provide woodwork with pre-cut openings, where possible, for hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutouts.

E. Measurements

1. Before fabrication of woodwork to be fitted to other construction, obtain field measurements and verify dimensions and shop drawings detail as required for accurate fit.

2. Where field measurements before fabrication would delay the project, fabricate without field measurements and provide ample borders and edges to allow for scribing and trimming of woodwork.

2.3 FIRE-RETARDANT MATERIALS (where applicable)

A. Where fire-retardant treated lumber, plywood, and panel products are required by Building Code or indicated on the drawings, provide materials which are pressure impregnated with fire-retardant chemicals and comply with the following requirements:

1. Fire-Retardant Chemicals: Use chemicals which do not bleed through or otherwise adversely affect adhesives or finishes. Do not

use colorants to distinguish treated lumber and panels from untreated lumber and panels.

B. Fire-Performance Characteristics

Provide materials which are identical to those tested in accordance with ASTM methods and time periods indicated, are listed for fire performance characteristics by Underwriter's Laboratories, Inc., or other testing agency acceptable to authorities having jurisdiction.

1. Marking: Identify treated lumber with separable paper classification marking of inspecting and testing agency.

2. Surface Burning Characteristics: Not exceeding values indicated below, tested in accordance with ASTM E84 for 30 minutes which no evidence of significant combustion.

a. Flame Spread: 25.

b. Smoke Developed: 50.

C. Kiln-dry woodwork after treatment to levels required for non-fire-retardant woodwork materials. Maintain moisture content required by kiln drying, before and after treatment. Do not use treated lumber which does not comply with requirements of referenced woodworking standard.

D. Where fire-retardant particleboard and fiberboard are used, provide panels with fire-retardant chemicals to achieve surface-burning characteristics of 20 for flame spread and 25 for smoke developed when tested in accordance with ASTM E84.

Comply with ANSI A208.1 for Grade M-1 panels. Minimum density 40 lbs./cu. ft.

Linear expansion: Maximum average 0.35%.

2.4 LUMBER THICKNESS

A. Finish thicknesses of members, and tolerances permitted:

Comply with AWI Section 3, 4.2.1.

2.5 GLUING

A. Gluing for wood member thickness and for wood member width

Comply with AWI- Section 3, 4.2a.

B. All glues shall comply with V.O.C. requirements specified in Section G01600.

2.7 FINISHING (SHOP APPLIED)

A. Finishing shall be as specified in Section 09 00 00, Painting

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Examine all grounds, stripping and blocking, to secure paneling and other items provided under this Section.

B. Do not install until all defects are corrected.

3.2 INSTALLATION

A. Install woodwork plumb and level without distortion.

B. Shim as necessary with concealed shims.

C. Accurately scribe and closely fit all face plates, filler strips and trim strips to irregularities of adjacent surfaces.

D. Do all Work in strict accordance with the details for the various portions of the Work.

E. For adjoining pieces of hardboard, carefully select to match the color and grain as closely as possible.

F. Interior finish

High-speed machine work, free from planning machine marks, sandpapered smooth, ready to receive paint or varnish.

G. Carefully fit woodwork and secure with finishing nails; countersink nails.

H. Do not allow kerfing on faces of trim or moldings.

I. Properly house stiles and rails into framework and properly nail and glue all parts together.

J. Miter, with miters doweled or clamped, all trim joints except window trim.

K. For joining of window trim, see Details.

L. Round base and all other moldings on walls at all salient angles; where columns occur in partitions, follow contour.

M. Carefully cut and fit wood trim at convectors.

N. Install all trim, when applied to a surface less than 13 feet in length, in one length: no piecing will be accepted. Provide bevel joints, where joints are required; no butt joints will be accepted.

O. In addition to machine sanding, sand all interior woodwork by hand with 00 sandpaper to give trim a smooth surface for finishing.

3.3 APPLYING HARDWARE

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

1. Where finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A153/A153M.

B. Apply all miscellaneous hardware not specified to be installed under Section 08710, Section 06410 and other Sections.

+ + END OF SECTION + +

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SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE.

A. Section 01 33 00, Submittals.

B. Section 01 74 00, Construction Waste Management.

E. Section 06 20 13, Exterior Finish Carpentry.

1.2 REFERENCES

A. Comply with the applicable provisions of the "Architectural Woodwork Standards" (First Edition-2009) (AWS) except as otherwise specified herein. References to "Premium", "Custom", and "Economy" Grades herein, shall be as defined in that Standard.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturers' catalog sheets, specifications, and installation instructions for plastic laminates and hardware items.

C. Samples:

1. Wood Paneling: 24-inch square piece, with trim boards, with required finish.

PART 2 - PRODUCTS

2.1 COUNTERTOPS (where applicable and indicated on drawings)

A. Comply with AWS Sections 10 and 11 except as otherwise specified herein.

B. Cabinets:

1. For Laminate Finish (Portions of Under Bar Cabinets): Custom Grade, with plastic laminate cover on exposed cabinetwork and on

inside face of hinged doors. Melamine for cabinet interiors (color TBD).

C. Plastic Laminate: NEMA Standards Publication LD3 for the following types; color, texture, and finish as indicated, or if not indicated, as selected by the Director.

1. Horizontal Surfaces: General Purpose Type; GP 50 Grade; 0.050 inch nominal thickness.

2. Post-Formed Surfaces: Post forming Type; PF 42 Grade; 0.042 inch nominal thickness.

3. Vertical Surfaces: General Purpose Type; GP 28 Grade; 0.028-inch nominal thickness.

4. Chemical Resistant Surfaces: Specific Purpose Type; SP 62 Grade; 0.062 inch nominal thickness.

5. Concealed Back Faces: Backer Type; BK 20 Grade; 0.020-inch nominal thickness.

2.2 HARDWARE (where applicable and indicated on drawings)

A. Provide hardware as required for architectural woodwork, including cabinet hardware and miscellaneous items. Provide dull chrome finish (US26D), or nearest match available, except as otherwise indicated.

1. Adjustable Shelf Pilaster Standards and Supports: Steel with bright nickel or zinc finish; Knape & Vogt 255 x 256, or Grant 120 x 21.

2. Adjustable Shelf Slotted Standards and Brackets: Steel; satin anachrome or zinc finish, Knape & Vogt 80 x 180 and 179 adjustable brackets, or Garcy 649 x 689 and N768 adjustable brackets.

3. Hinges: Steel for 3/4 inch flush doors; Stanley 1586.

4. Drawer Slides: Full extension, 50 lb capacity; Premium Quality Soft Close Slides.

5. Cabinet Door/Drawer Pulls, Surface: Stanley S824-433, 3-3/4” spoon pull, satin nickel finish.

6. Magnetic Cabinet Door Catches: Stanley SP45, or H.B. Ives 325.

7. Cabinet Door Lock: Corbin Cabinet Lock 0370B, or National Cabinet Lock M2-3702, hand as required.

2.4 WOOD FINISH

A. Provide wood filler, stain, and two coat polyurethane (semi-gloss) finish on all hardwood woodwork (paneling, cabinets, misc. trim, soffit, etc.) Stain color to match Architect's sample.

B. All woodwork finish to match.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the Work of this Section in strict accordance with the manufacturer's printed instructions and approved shop drawings (if any).

B. Fit joints neatly and accurately with adjoining surfaces in same plane. Maintain field joint tolerances equal to those specified in AWS Standards.

C. Fastening:

1. Use concealed fasteners for work to receive transparent finish.

2. Fasten assembled items together securely.

3. Fasten items securely to supporting surfaces.

4. Set exposed nails for putty stopping.

5. Plug stop screws in exposed-to-view surfaces.

6. Perform gluing operations in such a manner that the glued surfaces will be in close contact throughout, firmly cemented together and with joints as nearly invisible as possible.

+ + END OF SECTION + +

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SECTION 07 11 00

SHEET MEMBRANE WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work under this Section:

Provide membrane waterproofing for wet areas with multiple drains with ceramic tile or quarry tile flooring, and other areas shown, as indicated on the Drawings and as specified herein.

1.2 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

B. American Society for Testing and Materials (ASTM)

C. Federal Specifications (FS)

1.3 SUBMITTALS

A. Submittals Package

Submit the Shop Drawings, product data, and samples specified below at the same time, as a package.

B. Shop Drawings

Show locations and extent of waterproofing. Include details for substrate joints and cracks, penetrations, inside and outside corners, and termination conditions.

C. Product Data

1. Manufacturer's written instructions for evaluating, preparing, and treating substrate. Technical data and tested physical and performance properties of waterproofing. Catalog sheets, specifications, and installation instructions for each material specified.

2. Manufacturer's Warranty Sample: Submit a sample copy of the membrane manufacturer's five (5) year materials warranty.

D. Samples

1. Rubberized Asphalt Sheet Membrane: Two 1-foot square pieces.

E. Quality Control Submittals

1. Applicator's Certification:

a. Submit a letter certifying that the applicator has been actively installing waterproofing systems for the past five (5) years.

b. Submit the names and addresses of five (5) previous waterproofing projects. Include the type and size of each project, the waterproofing manufacturer's name, and the name and telephone number of a contact person at the project location.

c. Submit a letter certifying that the supervisor or foreman and the workers applying the waterproofing materials have at least three (3) years' experience in the application of waterproofing materials.

F. Contract Closeout Submittals:

1. Manufacturer's Warranty: Upon acceptance of the completed Work of this Section, furnish the membrane manufacturer's written five (5) year materials warranty.

2. Contractor's written five (5) years guarantee covering materials and workmanship.

1.4 QUALITY ASSURANCE

A. Membrane Manufacturer's Qualifications

1. The manufacturer must have been actively marketing a self adhering rubberized asphalt sheet membrane waterproofing system in the United States for a minimum of three (3) years.

2. The manufacturer's rubberized asphalt sheet membrane must have previously been installed on a minimum of 10 waterproofing projects of comparable scope and complexity to the Work of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery

Deliver all materials to the site in the manufacturer's labeled, unbroken containers. Membrane rolls must be packaged in rigid containers to prevent membrane distortion.

B. Storage

1. Do not double stack pallets of membrane.

2. Store all materials on wooden platforms in a well-ventilated place.

3. Store drainage mat and protection board flat.

4. Cover all materials on top and sides with tarpaulins allowing for adequate ventilation. Keep materials dry at all times.

5. Store all materials away from high heat, flames, and sparks.

C. Handling

1 Handle all materials in a manner to prevent damage. Mark and remove all damaged material from the site.

2. Do not smoke or use open flames near primer, mastics, or liquid membrane.

1.6 PROJECT CONDITIONS

A. Do not execute the Work of this Section without notifying the Owner’s Representative at least five (5) days before commencing.

B. Do not execute the Work of this Section unless the substrate is smooth, dry, and free of all dirt, dust and debris, and properly sloped to drains. Do not apply the waterproofing system in areas where dust is being generated from adjacent work areas. If necessary, erect temporary dust barrier or screens to keep the area being waterproofed clean and free of dust and dirt. Confirm that all floor areas slope to drain. Note that application of the membrane waterproofing to the substrate shall constitute the Contractor’s, manufacturer’s and applicator’s acceptance of such substrates to receive the waterproofing materials, including acceptance of the condition and slope of the substrates. If later it is determined that the areas do not properly pitch to the drains, the membrane and substrate will have to be removed and redone.

C. Unless approved otherwise by the Owner, do not execute the Work of this Section when the air or deck temperature is below 40°F.

1.7 WARRANTY AND GUARANTEE

A. Warranty

The Contractor shall provide, from the membrane Manufacturer, a written 5-year warranty for the materials used in the membrane application, providing for replacement of defective material.

B. Guarantee

The Contractor shall furnish a written five (5) year guarantee, providing that the membrane materials and workmanship will be free from leaks and defects; and that if leaks and defects do occur, the membrane system and all other work damaged by the failure, including Work which must be removed for access to the waterproofing materials, will be repaired or replaced at the Contractor's expense.

PART 2 - PRODUCT

2.1 MANUFACTURERS

A. Grace Construction Products, Cambridge, MA. (Bituthene, Hydroduct)

B. Polyguard Products, Inc., Ennis, TX. (Polyguard 650)

C. Karnak Chemical Corp., Clark, NJ. (Elasto-Ply)

D. W.R. Meadows Mel-Rol Waterproofing system

E. Approved equal.

2.2 MATERIALS

A. Sheet Membrane waterproofing

Rubberized asphalt with cross laminated polyethylene film permanently bonded to the outer surface.

B. Physical Properties

1. Pliability (180 degrees bend over one-inch mandrel at -35°F): Unaffected ASTM D146.

2. Tensile Strength: 250 psi minimum ASTM D412 (Die C) modified.

3. Elongation (Rubberized Asphalt): 300 percent minimum ASTM D412 (Die C) modified.

4. Cycling Over Crack at -15°F (-26 degrees C): No effect 100 cycles.

5. Puncture Resistance: 40 pounds minimum ASTM E154.

6. Permeance: 0.1 maximum ASTM E96 method B.

7. Water Absorption: 0.25 percent maximum ASTM D1228.

8. Total Membrane Thickness: 60 mils minimum.

C. Protection Drainage Mat

Provide protection board or drainage mat recommended by the membrane manufacturer.

1. Hydroduct 220 for vertical surfaces. Non woven, polypropylene

   a. Thickness: .44 in. (11 mm)

   b. Compression strength: 15,000 lbs.

2. Hydroduct 660 for horizontal surfaces. Non woven, polypropylene

   a. Thickness: .44 in (11 mm) nominal

D. Primer

Provide the membrane manufacturer's standard primer. Primer shall comply with all N.Y. State V.O.C. Compliance regulation.

E. Mastic and Sealant

Provide the membrane manufacturer's standard mastic and sealant compounds.

2.3 PRE-INSTALLATION CONFERENCE

A. Prior to the start of the waterproofing and concrete construction schedule, the Contractor shall conduct a meeting to review the proposed waterproofing design and to discuss the required methods and procedures to achieve the required quality and waterproofing integrity. The meeting shall include, at a minimum, Contractor, the membrane installer, membrane manufacturer, the Owner's Construction Manager and CID Inspector. The Contractor shall send a conference agenda to all attendees prior to the scheduled date of the conference.

PART 3 - EXECUTION

3.1 EXECUTION PROCEDURES

A. The preparation and application procedures in Art. 3.02 and Art. 3.03 are general; follow the membrane manufacturer's recommendations as required to obtain the five (5) year warranty and the five (5) year guarantee.

3.2 INSPECTION AND PREPARATION

A. Concrete substrate shall be cured a minimum of 14 days, and as recommended by the membrane manufacturer.

B. Substrate Surface

Clean, free of surface contaminants, smooth, free of voids, spalls, loose aggregate, sharp protrusions, and free of all defects that could damage the membrane. Note that application of the membrane shall constitute the manufacturer’s and applicator’s acceptance of the substrate as suitable to receive the system.

C. All piping, floor drains, and other penetration items shall be installed before membrane is applied.

3.3 MEMBRANE APPLICATION

A. Apply primer to the substrate at the rate recommended by the membrane manufacturer; apply primer only to areas which can be covered that same day.

B. After primer is tack free, apply membrane, lapping edge seams a minimum of 3", and end seams a minimum of 4"; turn membrane up adjoining walls. Stagger lap ends.

C. Apply 8" wide strip of membrane over construction joints, cold joints, control joints, and expansion joints.

D. Apply double plies of sheet membrane around drains, pipes, and other penetrations; extend 6" horizontally in all directions.

E. Follow membrane manufacturer’s guidelines for installation at corners and direction changes.

F. Seal all membrane edges and terminations thoroughly.

G. Extend membrane under door saddle locations.

H. Turn up membrane at least 2" above finished floor level at walls and up around all pipes penetrating floors, to form flashings. As recommended by the membrane manufacturer provide a canted fillet of liquid membrane at intersection of horizontal and vertical surfaces.

3.4 TESTING

A. Before the completed membrane system is covered by protective covering or by other Work, test for leaks by flooding area with 1" depth of water; allow water to stand for 24 hours. If leaks occur, provide repairs and repeat testing procedure for as many times required until no leaks occur. Notify the Owner's Representative 48 hours prior to test. For each flood test performed, the Contractor shall notify the Owner's field representative when the minimum 1" of water above high point has been reached to mark the start of test period for verification and notification to the Owner's Construction Inspection Division to allow for inspection.

3.5 PROTECTION

A. Provide protection for membrane as recommended by the manufacturer, before and during placement of mortar and other materials over membrane. Protection shall not be applied until flood testing has been completed.

+ + END OF SECTION + +

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SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bituminous damp proofing on concrete surfaces.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00, Cast-In-Place Concrete.

B. Section 03 11 30, Concrete Formwork – Site/Civil

C. Section 03 20 00, Concrete Reinforcement.

D. Section 04 20 00, Unit Masonry.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. C578-15 - Rigid, Cellular Polystyrene Thermal insulation.

2. D226/D226M-09 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

3. D449/D449M-03(2014)el - Asphalt Used in Dampproofing and Waterproofing.

4. D1227-13 - Emulsified Asphalt Used as a Protective Coating for Roofing.

5. D6506-01(2009) - Asphalt Based Protection Board for Below-Grade Waterproofing.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 00, SUMITTALS.

B. Manufacturer's Literature and Data:

1. Description of each product.

2. Application instructions.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight and conditioned facility.

B. Protect products from damage during handling and construction operations.

1.7 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Control moisture migration through concrete or masonry exterior walls where no hydrostatic head occurs or is anticipated.

2.2 PRODUCTS - GENERAL

A. Provide each product from one manufacturer and from one production run.

B. Hot Applied Bituminous Dampproofing:

1. Asphalt: ASTM D449/D449M, Type I.

C. Cold Applied Bituminous Dampproofing:

1. Asphalt: ASTM D1227, Type III (spray grade).

2.3 ACCESSORIES

A. Asphalt Saturated Felt: ASTM D226/D226M, Type I, 7 kg (15 pound).

B. Protection Course: ASTM D6506, 3 mm (1/8 inch) thick, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners. Smooth-surfaced roll roofing complying with ASTM D6380/D6380M, Class S, Type III. Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 13 mm (1/2 inch) thick.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.

D. Remove free water; surfaces may remain damp.

3.2 INSTALLATION - GENERAL

A. Install products according to manufacturer's instructions and approved submittal drawings.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer’s Representative consideration.

3.3 DAMPPROOFING INSTALLATION

A. Applications:

1. Apply to surfaces where indicated on drawings.

B. Apply damp proofing at 1 L/sq. m (2-1/2 gal. per 100 sq. ft.), minimum, each coat.

1. Allow 24 hours drying time between coats.

C. Adhere protection course to conceal foundation damp proofing before backfilling.

3.4 PROTECTION

A. Protect damp proofing and protection course from construction operations.

B. Repair damage.

+ + END OF SECTION + +

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SECTION 07 14 17

BOND COAT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cementitious flexible waterproof coating

2. Surge Tank Interior

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show locations and extent of cementitious waterproofing.

2. Include details for substrate joints and cracks, penetrations, tie-ins with adjoining waterproofing, and other termination conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

B. Meets or exceeds the following:

1. ASTM E96 (Vapor Transmission)

2. ASTM C321 (Bond Strength)

3. ASTM C672 (Feeze-Thaw)

4. ASTM d4541.02 (Pull Off Test)

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS FLEXIBLE BONDCOAT WATERPROOFING

A. Mortar & Polymer based Waterproofing:

B. Manufacturer: BASECRETE TECHNOLOGIES LLC (Sarasota Fla.- Ph. 941 312 5142)

1. No Substitutions

2.2 AUXILIARY MATERIALS

A. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.

B. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; and as recommended by manufacturer for substrate and joint conditions.

1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from substrate.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

F. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions.

G. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions.

3.2 WATERPROOFING APPLICATION

A. Apply waterproofing according to manufacturer's written instructions.

B. Unreinforced Waterproofing Applications.

1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, in thicknesses as indicated on drawings.

3.3 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

+ + END OF SECTION +

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SECTION 07 14 17.1

SWIMMING POOL WATERPROOFING & FINISH COAT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cementitious flexible waterproof coating – Base coat

2. Cementitious flexible waterproof coating – Finish coat.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show locations and extent of cementitious waterproofing.

2. Include details for substrate joints and cracks, penetrations, tie-ins with adjoining waterproofing, and other termination conditions.

3. Mockup & samples:

C. Samples for Verification: Representative of finish, color, and texture variations expected approximately 12 by 12 inches by actual thickness.

D. Mockups: Build mockups to demonstrate aesthetic effects, texture, color and finish and to set quality standards for installation.

1. Build mockup of typical floor and wall condition to include concrete gutter, 4’-0” wide, to show first layer, second layer, tile accent, and finish coat.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

B. Meets or exceeds the following:

1. ASTM E96 (Vapor Transmission)

2. ASTM C321 (Bond Strength)

3. ASTM C672 (Freeze-Thaw)

4. ASTM d4541.02 (Pull Off Test)

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS FLEXIBLE WATERPROOFING

A. Mortar & Polymer based Waterproofing:

B. Manufacturer: BASECRETE TECHNOLOGIES LLC (Sarasota Fla.- Ph. 941 312 5142)

1. No Substitutions

C. Color: White.

D. Texture and Non-Slip Finish: As approved by Pool Consultant after review of Samples and Mockup.

E. Non-Slip Finish.

2.2 AUXILIARY MATERIALS

A. Reinforcing Mesh: Manufacturer's 4.5 ounce standard fiberglass mesh made of multi-strand interwoven glass fiber coated with resin polymers to enhance resistance to attack by alkalinity of mixtures containing Portland cement.

B. Joint Sealant: One part silicone sealant, compatible with waterproofing, and as recommended by manufacturer for substrate and joint conditions. Refer to Section 079200 “SWIMMING POOL JOINT SEALANTS”, for additional information.

1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overlap affecting other construction.

C. Close off drains and other penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from substrate.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

F. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions.

G. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions.

H. Once the site is clean and clear of any loose debris, cracks, etc., pressure wash for final preparation. Protect adjacent areas to prevent material from going beyond designated site.

3.2 WATERPROOFING APPLICATION

A. Apply waterproofing according to manufacturer's written instructions.

B. Begin with a SSD (Saturated Surface Dry) substrate that is clearly damp below the immediate surface, has no standing water and has a surface that is showing no signs of a “film” of water on the surface. Ideally the concrete will be clearly damp (typically much darker than dry concrete) but the surface will have no water present and will be showing “signs” of drying.

C. Unreinforced Waterproofing Applications.

1. Apply first coat of waterproofing in thickness indicated on the drawings with a trowel to correct inconsistencies in substrate required to obtain a smooth, plumb, and true surface providing a seamless membrane free of entrapped gases and pinholes.

2. Coordinate with tile installation. Provide a straight, flush condition between Basecrete and tile work. Refer to details on drawings. Tile components are installed and grouted after first coat and must be protected prior to subsequent layers being applied.

3. Apply second coat using any of the methods permitted by the manufacturer allowing for thickness of final coat. Allow to cure a minimum of 18 hours between coats.

4. Apply final coat over dry Basecrete using a 3/4” nap roller, then damp sponged to provide a smooth, uniform, slip-resistant finish.

D. Reinforced Waterproofing Applications.

1. Provide mesh reinforcement at cold joints, to round inside corners, within pool gutter, and as advised by the manufacturer.

2. Dampen all exposed concrete surfaces to achieve a SSD condition.

3. Apply a base coat of Basecrete to extend a minimum of 6” along the vertical portion of the wall and 6” along the horizontal portion of the floor. Apply a base coat of Basecrete to gutter surface. Allow it to cure for a minimum of 18 hours.

4. Install a Basecrete mesh over a fresh coat of Basecrete. Apply an additional layer of Basecrete over the mesh, fully embedding and covering the mesh itself. Allow it to cure for a minimum of 18 hours.

E. Detailing at Floor & Wall Penetrations and Intersections.

1. Special attention should be given to all floor and wall penetrations, vertical and horizontal wall intersections, and gutter area to create a monolithic waterproofing membrane system.

2. Expose the perimeter of the floor and wall through penetrations (i.e., water jets, drains, lights, valves, etc.) to a minimum of 1/4” below the surface.

3. Dampen all exposed concrete surfaces to achieve a saturated surface dry condition (SSD). The surfaces shall be damp, not wet.

4. Fill the exposed volume with Basecrete to a flush finish with the surrounding concrete. Allow it to cure for a minimum of 18 hours.

3.3 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing/finished coat from damage and wear during remainder of construction period or until pool is filled.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 07 16 13

CEMENTITIOUS WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Cement Base Waterproof Coatings for Masonry Above Grade

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 040123, Masonry Cleaning.

1.3 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and application instructions for each material specified.

B. Samples:

1. Cementitious Coating: One pound of dry powder mix.

2. Acrylic Additive: One quart.

C. Quality Control Submittals:

1. Test Reports: If requested by the Director, furnish certified test data issued by an independent testing laboratory, demonstrating that the products submitted comply with the required physical properties.

2. Installers Qualifications Data:

a. Submit the names and addresses of 5 previous cementitious waterproofing projects. Include the type and size of each project.

b. Submit a letter certifying that the supervisor or foreman and the workers applying the cementitious waterproofing materials have at least 2 years' experience in the application of cementitious waterproofing materials.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer's Qualifications: The manufacturer shall have qualified technical representatives with the technical expertise to advise the Contractor of application procedures required for coating materials under the particular job conditions.

2. Applicator's Qualifications: The person supervising the Work of this Section and the workers applying the cementitious waterproofing shall have had 2 years of experience in the application of cementitious waterproofing coatings and in addition shall have worked on 5 cementitious waterproof coating projects of comparable scope and complexity to the work of this project.

B. Field Examples:

1. On actual surfaces designated by the Director's Representative, apply a sample application of the cementitious waterproof coating. Apply coating on at least 100 sq ft of surfaces.

2. Sample application accepted by the Director's Representative will be used as the standard of comparison for the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:

1. Comply with the manufacturer's printed instructions for material storage requirements.

1.6 PROJECT CONDITIONS

A. Do not execute the Work of this Section until required restoration of substrate has been completed.

B. Environmental Requirements:

1. Do not apply materials to surfaces that contain free water or frost.

2. Do not apply materials when temperature is below 40 degrees F or will fall below 40 degrees within 24 hours.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cementitious Waterproof Coating: Factory blended and packaged dry powder mix; “Thoroseal” by Thoro/BASF Building System, “Sonoblock” by Sonneborn/BASF Building System, or other material complying with Federal Specification TT-P-0035 and having the following physical properties:

1. Compressive Strength (ASTM C 109): 4000 psi at 7 days, 6000 psi at 28 days.

2. Tensile Strength (ASTM C 190): 250 psi at 7 days, 425 psi at 28 days.

3. Flexural Strength (ASTM C 348): 350 psi at 7 days, 1000 psi at 28 days.

4. Absorption (ASTM C 67): 3.6 percent.

5. Freeze/Thaw Resistance (ASTM C 666, Method B): No cracking or delaminating after 200 cycles.

6. Water Vapor Transmission (ASTM E 96, Procedure A): 11.420 grams/meter2/24 hours.

7. Resistance to Wind-Driven Rain (FS TT-P-0035): No moisture penetration after 8 hours at 98 MPH wind pressure.

8. Accelerated Weathering (FS TT-P-0035): No checking, cracking, or loss of adhesion after 5000 hours of weatherometer exposure.

9. Static Test (FS TT-P-0035): No failure after 30 minutes 30 lbs. per sq. ft.

B. Cementitious Waterproof Plaster Coating: Factory blended and packaged dry powder mix; “Thoroseal Plaster Mix” by Thoro/BASF Building System, “Blockade Finisher” by Merlex Stucco, or other material complying with Federal Specification TT-P-0035 and having the following physical properties:

1. Compressive Strength (ASTM C 109): 4000 psi at 28 days.

2. Tensile Strength (ASTM C 190): 310 psi at 28 days.

3. Flexural Strength (ASTM C 348): 900 psi at 28 days.

4. Absorption (ASTM C 67): 3.38 percent.

5. Freeze/Thaw Resistance (ASTM C 666, Method B): No cracking or delamination after 300 cycles.

6. Accelerated Weathering (FS TT-P-0035): No checking, cracking, or loss of adhesion after 5000 hours of weatherometer exposure.

7. Salt Spray Resistance; 300 hour exposure: No deterioration or loss of adhesion.

C. Color: As selected by the Architect from manufacturer's standard colors.

D. Acrylic Additive: "Acryl 60" by Thoro/BASF Building System, "Acrylic Additive" by Sonneborn/BASF Building System, or a comparable product recommended by the cementitious coating manufacturer.

E. Cleaning Agents: Products recommended by the cementitious coating manufacturer for the particular conditions.

PART 3 EXECUTION

3.1 PREPARATION

A. Protection: Protect adjacent surfaces not required to be coated.

B. Surface Preparation:

1. Remove all debris, dirt, dust, and other substances that are detrimental to the application of the cementitious waterproofing.

2. Remove existing paints and coatings. Use cleaning agents and methods recommended by the cementitious coating manufacturer.

3. Remove laitance and efflorescence with a 10 percent solution of hydrochloric (muriatic) acid, followed by a thorough wash with clean water.

3.2 APPLICATION

A. Plan the Work with enough workers and scaffolding so breaks in the cementitious coating application are at natural stopping points recommended by the coating manufacturer and approved by the Director's Representative.

B. Mixing: Follow the cementitious coating manufacturer's recommendations unless otherwise specified.

1. Use clean containers for mixing.

2. Power mix materials with mechanical mixing equipment.

3. Mix only the amount of material that can be applied within "open time". Do not re-work set or hardened material; remove such material from the site.

4. Liquid solution shall consist of 3 parts of clean water and 1 part acrylic additive, unless otherwise recommended by the cementitious coating manufacturer for the particular conditions.

5. Proportion and mix liquid solution and powder in accordance with the cementitious coating manufacturer's recommendations for the application indicated.

C. Immediately before application, dampen dry surfaces with clean water.

D. Apply cementitious coating in compliance with the coating manufacturer's recommendations unless otherwise specified.

E. Cementitious Waterproof Coating:

1. Brush on and evenly distribute a base coat of the mix at the minimum rate of 2 lbs per sq yd. Cure base coat for 24 hours or longer if required by environmental conditions. Apply a finish coat of the mix at the minimum rate of 1 lb per sq yd.

2. For extreme surface conditions and a smooth plaster coat finish - Brush apply a base coat of the mix at the minimum rate of 2 lbs per sq yd. Trowel apply a second coat at the minimum rate of 12 lbs per sq yd or sufficient material to bring the surface true and level. After material stiffens,

sponge float to an even uniform surface to obtain desired texture.

F. Cementitious Waterproof Plaster Coating:

1. Trowel, brush, or spray apply a base coat of the mix at the rate of 2 lbs per sq yd. Float or brush out first coat of spray application to fill holes, pores and imperfections before applying a finish coat. Cure for 5 to 7 days before applying finish coat.

a. Trowel and Float Finish: Trowel apply second coat firmly, pressing the material into all voids. Sponge float the surface uniformly to a soft sand finish, free of lap marks. Apply mix at approximate rate of 4 to 6 lbs per sq yd on concrete, and 6 to 9 lbs per sq yd on masonry and coarse concrete surfaces.

b. Sprayed-on Finish: Spray on an evenly distributed coat of the plaster mix moving the spray nozzle with steady, even strokes. After material has set, double back over the surface with one or more light spray applications to achieve a uniform texture free of air and water bubbles. Apply mix at approximate rate of 5 to 7 lbs per sq yd on concrete and 6 to 9 lbs per sq yd on masonry and coarse concrete surfaces.

G. Apply minimum total coating thickness of 1/8 inch, or coating thickness(es) indicated on the Drawings.

H. Curing: If rapid drying occurs, spray the finished surface with a water mist as required to keep the surface damp. Water mist for the period of time recommended by the cementitious coating manufacturer.

3.3 CLEANING

A. Clean adjacent surfaces that have been soiled or defaced by the execution of this Work.

B. Remove protective covers.

+ + END OF SECTION + +

SECTION 07 21 00

INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals as required to provide insulation as shown and specified.

2. The extent of each type of insulation Work is shown on the Contract Drawings or specified herein.

3. The types of insulation required include the following:

a. Fiberglass batt insulation at ceiling joists.

b. Polystyrene insulation.

B. Related Work Specified Elsewhere:

1. Section 042010, Unit Masonry Construction.

2. Section 061000, Rough Carpentry.

1.2 QUALITY ASSURANCE

A. Design Criteria: Thermal Conductivity: The thicknesses shown are for the thermal conductivity, k-value at 75 degrees F., specified for each material. Provide adjusted thicknesses as directed for the use of material having a different thermal conductivity.

B. Requirements of Regulatory Agencies: Comply with fire-resistance and flammability ratings as shown and specified; and comply with applicable requirements of the New York State Uniform Fire Prevention and Building Code.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ASTM C518, Thermal Conductivity of Materials by Means of Heat Flow Meter.

2. ASTM D2842, Water Absorption of Rigid Cellular Plastics.

3. ASTM E84, Surface Burning Characteristics of Building Materials.

4. ASTM E119, Fire Tests of Building Construction and Materials.

5. FS HH-I-521F, Mineral Fiber, Insulation Blanket.

6. FS HH-I-558B, Thermal Insulation.

7. FS HH-I-574B, Insulation, Thermal (Perlite).

8. ASTM E2178 Standard Test Method for Air Permeance of Building Materials - leakage rates less than 0.001 L/s/m2 at a test pressure of 75 Pa.

9. ASTM E283 Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under specified Pressure differences across the specimen. Results were <0.02 L/s/m2.

10. 10.ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies - no leakage.

11. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference - no leakage.

12. 2009 International Building Code (IBC) Section 2603

13. ICC-ES ESR-1659

14. THERMAX™ products are covered under Underwriters Laboratories Inc. (UL) File R5622.

D. Reference standards for rigid insulation:

1. THERMAX™ Sheathing meets ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board, Type I, Class 2. Applicable standards include:

   a. C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.

   b. C209 – Standard Test Methods for Cellulosic Fiber Insulating Board,

c. C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus,

d. D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics,

e. D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging,

f. E96 – Standard Test Method for Water Vapor Transmission of Materials,

g. D1623 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

1.3 SUBMITTALS

A. Manufacturer's Data: Submit for approval copies of manufacturer's specifications and installation instructions for each type of insulation required. Include data substantiating that the materials comply with specified requirements.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver all materials in unopened, undamaged original packaging bearing the manufacturer's labels.

B. Storage of Material:

1. Protect insulation materials from becoming wet or soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

2. Handle all materials with proper care to prevent damage from any source.

3. Insulation must be kept dry at all times. If stored outside, raise insulation aboveground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed and they should not be used as outside storage covers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fiberglass Insulation:

1. Fiberglass insulation shall be installed within ceiling as shown and indicated on dwgs.

2. Insulation shall conform to Federal Specification HH-I-521F, Type II, Class A.

3. Insulation shall have a minimum R value as indicated on dwgs and shall include a vapor barrier at ceiling side only.

4. Insulation shall be secured in place with galvanized T-50 staples as recommended by the insulation manufacturer. Vapor barrier shall be towards the interior of the building. Insulation shall be stored in a dry place and shall be protected from the weather at all times.

5. Manufacturer:

   a. Johns Manville

   b. Or equal

B. Wall Batt Insulation

1. The insulation system shall have a minimum thickness of 2 inches and an “R” value as indicated on dwgs.

   a. Product and Manufacturer: Batt Insulation shall be manufactured by:

      1) Owens Corning

      2) Or approved equal.

C. Polyiso Rigid Insulation

1. 2” rigid insulation or as otherwise indicated on drawings.

2. R value of R-10 as indicated on drawings for equipment room.

3. Glass-fiber-infused polyisocyanurate foam core laminated between 1.0 mil smooth, reflective aluminum facers on both sides.

4. Product and Manufacturer:

a. Dow Chemical, THERMAX sheathing

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor shall examine the substrate and conditions under which the insulation Work is to be performed, and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the insulation Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.

3.3 INSPECTION AND ACCEPTANCE

A. Insulation which has become wet, damaged, or deteriorated, as determined by the Engineer, shall be promptly removed from the job.

+ + END OF SECTION + +

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SECTION 072613

VAPOR RETARDER UNDER SLABS ON GRADE

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-In-Place Concrete: Section 033000.

B. Earthwork: Section 310000.

1.2 REFERENCES

A. Standard Referenced in this Section are:

1. ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

2. ASTM D 1709 Standard Test Methods of Impact Resistance of Plastic Film by the Free-Falling Dart Method.

3. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

4. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.

5. ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

6. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.

1.3 QUALITY ASSURANCE

1.4 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each material specified.

1. Samples:

a. Vapor Retarder Material: 12 inches square.

b. Pressure-Sensitive Tape: 36-inch-long piece minimum.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor Retarder: Extruded single-ply or multi-ply type; polyethylene or polyolefin.

1. Water-Vapor Permeance (ASTM E 96 or ASTM E 154): 0.04 perms or less.

2. Class Rating (ASTM E 1745): A.

3. Tensile Strength (ASTM E 154 or ASTM D 882): 45 lbf./in. or higher.

4. Puncture resistance (ASTM D 1709): 2200 g or higher.

5. Thickness: 10 mils minimum.

6. Acceptable Products:

a. “Moistop Ultra 10” by Fortifiber Building Systems Group.

b. “Vapor Block 10” by Raven Industries, Inc.

c. “Stego Wrap 10-Mil Vapor Barrier” by Stego Industries, LLC.

d. “Perminator 10 Mil Underslab Vapor-Mat” by W. R. Meadows, Inc.

B. Pressure-Sensitive Tape/Adhesive: Vapor retarder manufacturer’s standard or recommended materials.

C. Pipe Boots: Vapor retarder manufacturer’s standard pipe boots, or construct pipe boots from vapor retarder material, pressure-sensitive tape and/or adhesive, in accordance with vapor retarder manufacturer’s instructions

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Rake, trim, and tamp surfaces over which vapor retarder is to be installed to true planes and as required to make a surface that will not puncture the vapor retarder material.

3.2 INSTALLATION

A. Install vapor retarder in accordance with manufacturer's printed instructions and ASTM E 1643. Lap seams and joints a minimum of 6 inches and seal with adhesive or pressure-sensitive tape.

B. Lap vapor retarder over footings and seal to foundation walls.

C. Seal penetrations, including pipes, with pipe boots.

3.3 PROTECTION

A. Protect vapor retarder as required so that it will be in sound condition, free from punctures and tears, at the time the concrete is placed.

3.4 REPAIR

A. Repair tears and punctures with a piece of vapor retarder material, overlapping the tear or puncture a minimum of six inches on all sides, and completely seal edges with pressure-sensitive tape or adhesive.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 07 28 00

WATER RESISTIVE BARRIER AND AIR BARRIER

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals.

B. Section 01 74 00, Construction Waste Management.

C. Section 06 10 00, Rough Carpentry

D. Section 06 20 13, Exterior Finish Carpentry

1.2 DEFINITIONS

A. Section includes vapor-permeable, fluid-applied air and water barriers.

B. Weather Barrier: A combination of materials and accessories that do the following:

1. Prevent the accumulation of water as a water-resistive barrier.

2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.

3. Provide sufficient water vapor transmission to enable drying as a vapor permeable membrane.

1.3 REFERENCES

A. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly in accordance **with IBC Section 1403.2.**

1. Primary Layer: Water-resistive barrier (fluid-applied) installed closest to building interior with all flashings and terminations integrated to this layer.

B. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of building envelope in accordance with **ASHRAE 90.1 Section 5.4.3.1**.

C. Vapor-Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms or greater, when tested in accordance with

the desiccant method using **Procedure A of ASTM E 96** in accordance with definition in International Building Code. Vapor-permeable material permits passage of moisture vapor through vapor diffusion.

D. Conformance to test parameters:

1. ASTM E2357 Section A2.2.1.2 Specimen 2 for penetrated assemblies.

a. ASTM E 331 Test Parameters.

b. AAMA 501.1 Test.

c. ASTM E 330 Test

d. AAMA 501.5 Test Parameters:

1.4 SUBMITTALS

A. Product Data:

1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

2. Catalog sheets, specifications, and installation instructions for each material specified.

B. Sustainable Design Submittals (where applicable)

1. Test Reports: Envelope testing and verification of the following:

a. Water-Spray Test.

b. Air Infiltration Test.

c. Water Penetration Test.

2. Product Data: Including the following information:

a. Provide Health Product Declarations (HPDs).

b. Provide Environmental Product Declarations (EPD’s).

c. SDS (formerly MSDS), third-party certifications, or product technical data confirming systems that meet or exceed emissions guidelines for volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), as follows:

1) Commercial weather barrier complies with California Department of Public Health (CDPH) Standard.

2) Adhesives and sealants wet-applied on-site that meet/exceed VOC content requirements for wet applied products comply with SCAQMD Rule 1168.

3) Flashing systems comply with SCAQMD Rule 1168 on VOC limits.

C. Preconstruction Laboratory Mockup Testing Submittals: (where applicable as approved by Architect)

1. Owner/Architect's representative in a third-party testing program: Develop specifically for Project.

2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.

3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

D. Shop Drawings:

1. Show details of weather barrier at terminations, openings, and penetrations.

2. Show details of weather barrier applications.

1.5 INSTALLATION

A. Manufacturer's Instructions: For installation of each product specified.

B. Qualification Data: For Installer and laboratory mockup testing agency and field testing agency.

C. Sample Warranty: For manufacturer's warranty.

D. Reports: Field test and inspection reports.

E. Installer's weather barrier manufacturer training certificate.

F. Shop Drawings:

1. Show details of weather barrier at terminations, openings, and penetrations.

2. Show details of weather barrier applications.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.

B. Laboratory Mockup Testing Agency Qualifications: Qualified in accordance with ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025].

C. Mockups: (where applicable as approved by Architect) Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as indicated on dwgs, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

    a. If Architect determines that mockups do not comply with requirements, reconstruct mockups and apply weather barrier until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preconstruction Laboratory Mockups: (where applicable as approved by Architect)

1. Preconstruction Testing Service: Owner/Architect's representative will engage a qualified testing agency to perform testing on preconstruction laboratory mockups.

2. Manufacturer's Field Service: Register Project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project Registration and Observation process.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

C. Store in a dry environment between 50 and 80 deg F.

1.8 WARRANTY

A. Manufacturer's Product Warranty: Manufacturer agrees to repair or replace weather barrier product that fails in materials within specified warranty period.

1. Warranty Period: 10 years from date of product purchase.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

1. DuPont Safety & Construction: E. I. du Pont de Nemours and Company, Rochester, NY www.dupont.com

2. W.R. Meadows Sealtight Air Shield LMP., water-based air/liquid moisture barrier.

3. WR Meadows, Inc. PO Box 338 Hampshire, Ill. www.wrmeadows.com

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.

B. High-Performance Installations:

1. For installation with one of the following building envelope performance or structural characteristics:

a. Exceeding 65 mph equivalent structural load.

b. Exceeding 15 mph equivalent wind-driven rain water infiltration.

c. Buildings with 60 feet or more total height above grade plane, as defined by the IBC.

d. Construction with gypsum or cement-based exterior sheathing.

e. Non-wood based primary structure such as steel, light-gauge steel, masonry, or concrete.

C. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied WB+™ or comparable product by one of the following:

W.R. Meadows Sealtight Air Shield LMP., water-based air/liquid moisture barrier.

1. Solids Content, %: 58

2. Color: Gray

3. (Black – special order only)

4. Flexibility @ -26° C (-15° F), PASS

5. (ASTM C 836):

6. Elongation (ASTM D 412), %: 1300

7. Water Vapor Permeance 12

8. (ASTM E 96, Procedure B) Perms:

9. Service Temperature: Not to exceed 175° F

10. (80° C)

11. Nail Sealability (ASTM D 1970): Pass

12. Storage Temperature 40 – 90° F (4 – 32° C)

13. Air/Substrate Temperature (At Time of Application): >20° F (-6.7° C)

14. Air leakage Test Method ASTM E 2178 ASTM E 2357

15. Pressure 75 Pa

16. (1.57 lb./ft.2) 75 Pa

17. (1.57 lb./ft.2)

18. ABAA Requirements 0.004 cfm/ft.2 (0.02 L/S/M2) 0.04 cfm/ft.2

19. (0.2 L/S/M2)

20. AIR-SHIELD LMP Results <0.004 cfm/ft.2 (0.02 L/S/M2) <0.04 cfm/ft.2

21. (0.2 L/S/M2)

D. Fluid-Applied Membrane: ASTM E 2357 passed, Air Barrier Association of America (ABAA) evaluated air barrier assembly, and assembly water resistance in accordance with ASTM E 331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E 84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

2.3 WEATHER BARRIER FLASHING

A. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; FlexWrap™ NF or comparable product by one of the following:

1. WR Meadows

B. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners. ASTM E 331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.

C. Water Penetration: No leakage at 15 psf (720 Pa) in accordance with ASTM E 331.

D. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (-4 deg C) as Class A (without primer use).

E. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

F. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure of 176 deg F (80 deg C) for seven days.

G. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® StraightFlash™ Tyvek® StraightFlash™ VF] or comparable product by one of the following:

1. WR Meadows

H. Water Penetration: No leakage at 15 psf (720 Pa) in accordance with ASTM E 331.

I. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (-4 deg C) as Class A without primer use.

J. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

K. Primer for Flashings: Synthetic rubber-based product. Spray applied. Strengthen the adhesive bond at low temperature applications between weather products, such as self-adhered Flashing Products, Commercial Building Wraps, and common building sheathing materials.

L. Basis of Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; DuPont™ Adhesive Primer or comparable product by one of the following.

1. WR Meadows

M. Peel Adhesion Test: Passes ASTM D 3330, Test Method F, for the following:

1. Peel Angles: 0, 25, 72, and 180 degrees.

2. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.

N. Chemical Compatibility per AAMA 713: Pass.

O. Flame Spread Index per ASTM E 84: 5.

P. Smoke Development Index per ASTM E 84: 0.

2.4 FLUID APPLIED FLASHING AND SEALANT (where applicable)

A. Fluid Applied Flashing: Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material.

1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied Flashing and Joint Compound+ or comparable product by one of the following:

a. WR Meadows

2. VOC Content: ASTM C 1250, less than 2 percent by weight and less than 30 g/L.

3. Water Vapor Transmission: ASTM E 96, Method B, greater than 20 perms at 25 mils (0.64 mm) thick.

4. Minimum Tensile Strength: ASTM D 412, 165 psi (1140 kPa).

5. Minimum Elongation at Break: ASTM D 412, 360 percent.

B. Fluid Applied Sealant: ASTM C 920

1. Extension-Recovery/Adhesion per ASTM C 736: 100 percent recovery.

2. Accelerated Weathering/Low Temperature Flexibility per ASTM C 793: Pass.

3. VOC Percentage by Weight per ASTM C 1250: Less than 2 percent.

4. VOC per ASTM C 1250: Less than 30 g/L.

2.5 DRAINAGE LAYER

A. Drainage Layer: Weather barrier membrane with drainage.

1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied WB+™ and CommercialWrap® D or comparable product by one of the following:

a. WR Meadows

2. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

2. Verify that substrates have cured and aged for minimum time recommended in writing by weather barrier manufacturer.

3. Verify that substrates are visibly dry and frost-free.

   a. Fluid-applied weather barrier may be applied to damp surfaces.

   b. Surfaces are considered damp if there is no visible water on the surface, and no transfer of water to the skin when touched.

   c. Apply accessory products only to clean and dry surfaces.

4. Verify that substrates are free of efflorescence and mold.

5. Verify that masonry joints are flush and filled with mortar.

6. Verify that top-of-wall system has been capped or covered to prevent water getting behind the facade and into wall cavity.

7. Verify continuous path for moisture drainage.

   a. Verify that continuous path for drainage is not blocked or disrupted, which results in excess moisture buildup in wall cavity.

8. Verify that surfaces to receive weather barrier are above grade.

B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.

   1. Verify that rough sill framing for doors and windows slopes downward towards the exterior and is level across width of opening.

C. Verify air and surface temperatures are above 25 deg F (4 deg C) with a maximum surface temperature of 140 deg F (60 deg C). Do not install once ambient temperature exceeds 95 deg F (35 deg C), unless surface is shaded.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

D. Remove excess mortar from masonry ties, shelf angles, and other obstructions. (where applicable)

E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

F. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

G. When spraying is method of application, taper ends of the joint treatment to assist maintaining a wall system free of pinholes and voids.

H. Treat all non-moving transition joints to beams, columns, and dissimilar materials by applying a 2-inch- (50-mm-) wide by 60-mil- (1.5-mm-) thick coat of fluid-applied flashing across the joint.

I. Apply 25-mil- (0.6-mm-) thick coat of fluid-applied flashing, extending a minimum 2 inches (51 mm) on each surface, and treat the following conditions:

1. Joints up to 1/4 inch (6 mm).

2. Joints 1/4- to 1/2-inch (6- to 13-mm); reinforce with fiberglass-mesh tape.

3. Joints and transitions up to 1 inch (25 mm); treat using strip flashing.

J. Bridge [isolation joints] [expansion joints] [and] discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

K. When spraying is method of application, taper ends of fluid applied corner treatment to wall substrate.

L. Treat inside and outside corners by applying a 25-mil- (0.6-mm-) thick coat of fluid applied weather barrier a minimum 2 inches (50 mm) on each adjoining

surface. Apply fillet bead of fluid-applied sealant to inside corners to ensure continuity. Alternatively, treat corners using strip flashing. Press strip flashing into inside corners; ensure that it is fully adhered to substrate.

M. Seal penetrations using fluid-applied flashing or sealant. Extend fillet bead 1/2 inch (13 mm) onto both surfaces.

N. Treat embedded masonry anchors by applying a coat of fluid-applied weather barrier or fluid-applied flashing around base of the anchor.

3.3 ACCESSORIES INSTALLATION (where applicable and indicated on drawings)

A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

2. Install transition strip on roofing membrane or base flashing, for a minimum 3 inches (75 mm) coverage over each substrate.

3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow to dry.

4. Use recommended primer when applying self-adhered flashing products on concrete, masonry, and fiber faced exterior gypsum board substrates. Priming is generally not required for adhering self-adhered flashing products to wood. However, adverse weather conditions or colder temperatures may require a primer to promote adhesion. Priming is not required when applying fluid-applied products, except on cut edges of exterior gypsum sheathing.

5. Apply pressure along entire surface of strip flashing for good bond using a J-roller or firm hand pressure. Remove all wrinkles and bubbles by smoothing surface and repositioning as necessary.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. When applying self-adhered flashing products over a cured fluid-applied membrane, first apply a wet bed of fluid-applied product.

D. Seal fasteners of mechanically attached supports or furring strips in high-performance building envelope designs.

1. Apply double-sided butyl tape to back of support bracket at fastener location.

2. Embed support bracket into an additional wet bed of fluid applied product.

3. Adhere butyl-based flashing patch to wall at fastener location.

4. Use alternate method as approved by the manufacturer.

E. At end of each working day, seal top edge of strips and transition strips to substrate with manufacturer approved product.

F. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Flashing Sill Area for Windows and Doors: (where applicable and as indicated on dwgs)

1. Use 6-inch- (150-mm-) wide conformable flashing for 2- by 4-inch (50- by 100-mm) framing and 9-inch- (220-mm-) wide conformable flashing for 2- by 6-inch (50- by 150-mm) framing. When rigid back dams are required or desired, one option to use is a 3/4-inch (19 mm) corner guard (back dam), cut to length of sill, and nailed into place on interior edge of sill prior to installation of 9-inch- (220-mm-) wide conformable flashing. Afterward, install 9-inch- (220-mm-) wide conformable flashing over sill and corner guard back dam.

2. Install without stretching conformable flashing when installing along sills or jambs. Conformable flashing is intended to be stretched when covering corners or curved sections.

H. Apply fluid-applied flashing products from head of opening down. Use a corner trowel to smooth corners.

I. Repairs:

1. Coat small damaged areas with layer of fluid-applied product.

2. Reinforce large damaged areas with fiberglass mesh or replace damaged substrate before reapplying fluid-applied product.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips, and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

4. Fluid applied products may be overcoated once a touch-free skin has formed. Exterior insulation and cladding may be installed once the membrane has cured sufficiently to resist damage during installation.

B. Apply air barrier material in accordance with air-barrier manufacturer's written instructions and recommendations. (where applicable)

1. Roller Application:

a. Nap rolling: Use a roller cover with a 1/2- to 3/4-inch (13- to 19-mm) nap.

2. Spray Application:

a. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

b. Use spray guard.

c. Back Rolling: Use a roller cover with a 1-1/2- to 3/4-inch (13- to 19-mm) nap. Apply fluid-applied product in a single coat at 25 mils (0.64 mm) thick. Control thickness by applying appropriate volume over a marked area and spot checking with a wet-mil gauge.

C. Integrate fluid-applied product with through-wall flashing and window and door flashing by overlapping flashing with fluid-applied product a minimum 2 inches (50 mm).

D. Inspect surfaces to ensure that fluid-applied products are continuous and free of any voids or pinholes.

E. Do not cover air barrier until it has been tested and inspected by the testing agency.

F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

1. Continuity of air-barrier system has been achieved throughout the building envelope without gaps, holes, or pinholes.

2. Air-barrier dry film thickness.

3. Continuous structural support of air-barrier system provided.

4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

5. Site conditions for application temperature, and dryness of substrates are maintained.

6. Maximum exposure time of materials to UV deterioration not exceeded.

7. Surfaces primed, where applicable.

8. Laps in strips and transition strips comply with minimum requirements, are shingled in correct direction (or mastic applied on exposed edges), and are without fishmouths.

9. Termination mastic applied on cut edges.

10. Strips and transition strips firmly adhered to substrate.

11. Compatible materials used.

12. Transitions at changes in direction and structural support at gaps provided.

13. Connections between assemblies (air-barrier and sealants) comply with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.

14. Each penetration sealed.

C. Field Quality Control Testing: (where applicable as approved by Owner/Architect's representative) Perform the following tests:

1. Air Infiltration Whole Building: ASTM E 779 at not more than [0.40 cfm/sf (2.00 L/s per sq. m)] [0.25 cfm/sf (1.25 L/s per sq. m)] [0.15 cfm/sf (0.75 L/s per sq. m)] at 1.57 lb/sq. ft. (75 Pa).

2. Water Penetration: ASTM E 1105 at a minimum [uniform] [and] [cyclic] static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article in Part 2, but not less than [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)] [10.4 lbf/sq. ft. (500 Pa)] [12.5 lbf/sq. ft. (600 Pa)]. No water penetration shall occur as defined in ASTM E 1105.

a. Perform a minimum of two tests in areas as directed by Architect. (where applicable)

b. Perform tests in each test area as directed by Architect. Perform a minimum three tests, prior 70 percent completion.

3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D 4541 for each [600 sq. ft. (56 sq. m)] of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.

2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.

2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide flashing and sheet metal work as shown and specified. The work also includes:

   a. Providing openings in flashing to accommodate the work under this and other sections and building into the flashing all items such as sleeves, anchor bolts, inserts and all other items to be embedded in flashing for which placement is not specifically provided under other sections.

   b. Providing openings in flashing to accommodate the work under other contracts and assisting other contractors in building into the flashing all items such as sleeves, anchor bolts, inserts and all other items required to be embedded in flashing under other contracts.

2. The extent of the flashing and sheet metal Work shall be as shown on the Drawings, and/or required.

3. The types of flashing required include the following:

   a. Flashing and counter flashing at penetrations in roofing and ends of roofing.

   b. Miscellaneous flashings at openings in masonry walls.

   c. Miscellaneous flashings at sill locations and brick repair work where applicable

B. Coordination: Review installation procedures under other Sections and coordinate the installation of items that must be installed with the flashing and sheet metal Work.

C. Related Work Specified Elsewhere:

1. Section 04 20 00, Unit Masonry Brickwork

1.2 QUALITY ASSURANCE

A. Installer Qualifications:

1. The installer shall be skilled and experienced in the type of flashing and sheet metal Work required, and equipped to perform workmanship in accordance with recognized standards. Submit name and qualifications to Engineer.

B. Design Criteria:

1. Except as otherwise shown or specified, comply with the recommendations and instructions of the manufacturer of the flashing and sheet metal being installed.

2. Flashing and sheet metal shall be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM A 304, Stainless Steel Sheet.

2. ASTM B 29, Pig Lead.

3. ASTM B 32, Solder Metal.

4. FS O-F-506C, Flux, Soldering, Paste and Liquid.

5. FS SS-C-153, Cement, Bituminous, Plastic.

1.3 SUBMITTALS

A. Samples: Submit for approval 12-inch square samples of specified material to be exposed as flashing. Samples will be reviewed by Engineer for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

B. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's specifications, installation instructions and general recommendations for flashing and sheet metal required. Include manufacturer's data substantiating that the materials comply with the requirements.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver flashing and sheet metal materials to job or fabrication shop in manufacturer's original, unopened containers and rolls with labels intact and legible.

B. Storage of Materials:

1. Store materials in an area protected from construction traffic.

2. Store materials in same package in which they were shipped.

C. Handling of Materials: Protect flashing from dents, scratches, warps or bends.

1.5 JOB CONDITIONS

A. Scheduling:

1. Do not proceed with the flashing Work until curb and substrate construction, cant strips, blocking, and other construction to receive the Work is completed.

2. Schedule the installation of flashing and sheet metal to coincide with the installation of waterproofing drains, piping, blocking, nailers, framing at openings, curbs, and other adjoining and substrate work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Flashing and Sheet Metal:

1. Stainless Steel Coping, Counter Flashing and Sheet Metal:

2. Provide sheet metal of Type 304 fully annealed and pickled, dead soft temper, No. 2B or 2D finish. Provide 226A gage thickness except where heavier gage is specified.

3. Lead Flashing and Sheet Metal: Provide sheet complying with the FS QQ-L-201, Grade B, and formed from common desilverized pig lead complying with ASTM B 29; weighing 4.0 pounds per square foot.

B. Miscellaneous Materials:

1. Burning Rod for Lead: Same composition as lead sheet.

2. Solder for Stainless Steel: ASTM B 32, 60 percent tin and 40 percent lead, used with acid-chlorine flux.

3. Nails, Screws and Rivets: Stainless steel, or as recommended by manufacturer of flashing sheet.

4. Cleats: Same metal and gage as sheet being anchored, 2 inches wide, punched for 2 anchors.

5. Sealants: Refer to Section 07920, Sealants and Caulking's.

6. Reglets: Provide springlock type reglets with windlock clips as follows:

a. Provide stainless steel, Type 304, 0.02-inches thick, for masonry, concrete and surface installation with top flange 4-inches wide to penetrate the first width of brick.

b. Produce and Manufacturer: Provide one of the following:

1) Type SM, MA and CO as manufactured by Fry Reglet Corporation.

2) Concrete, Masonry and Surface Types as manufactured by Keystone Flashing Company.

3) Or equal.

2.2 FABRICATION

A. Conform to quality, procedures and methods recommended by the Sheet Metal and Air Conditioning Contractors National Association, Incorporated, unless otherwise shown or specified.

B. Fabricated Metal Flashing: Shop fabricate sheet metal items to comply with profiles and sizes shown, and to comply with manufacturer's recommended details. Except as otherwise shown or specified, provide soldered flat-lock seams, and fold back metal to form a hem on the concealed side of exposed edges. Comply with metal producers' recommendations for tinning, soldering and cleaning flux from metal.

C. Metal flashings, copings, counter flashings, etc. shall be formed of sheet metal as indicated on the Drawings (or as otherwise approved by the Architect).

D. Make surfaces free of waves and buckles with lines, arises and angles sharp and true; curves shall be smooth.

E. Materials furnished hereunder to be built into work by others shall be in condition for final installation. Do all cutting, fitting, drilling or other operation in sheet metal required to accommodate work of other trades. Provide any items essential to complete the installation, though not specifically shown or specified, of the same kind, quality, and type as similar items utilized elsewhere in the building.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor, his installer, and a representative of the roofing materials manufacturer shall examine the substrate and the conditions under which the flashing and sheet metal work is to be performed, and notify Engineer in writing of unsatisfactory conditions. Do not proceed with flashing and sheet metal work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 PREPARATION

A. Before installing flashing and sheet metal, verify shapes, and dimensions to be covered.

B. Prepare substrates as recommended by the sheet metal manufacturer.

3.3 INSTALLATION

A. General:

1. Separate dissimilar metals from each other by painting each metal surface in the area of contact with a heavy application of bituminous coating, or by other permanent separation as recommended by the manufacturers of the dissimilar metals. Comply with the following:

a. Separate stainless steel from dissimilar metals, including regular steel and iron, and from cementitious materials by a course of roofing felt wherever possible. Where felt application is not possible, coat the stainless steel or other material with a

15-mil bituminous coating. Where felt is applied under sheets which will be soldered or welded, cover felt with a course of building paper before installing stainless steel. Comply with manufacturer's recommendations for other forms of protection of the stainless steel against corrosion.

2. Provide thermal expansion for running sheet metal, flashing, and other items exposed for more than 15 feet-0 inches continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams as shown or, if not shown, at the following maximum spacings for each general flashing use:

   a. Flashing and Sheet Metal: At 10 feet-0 inches intervals, and 2 feet-0 inches each side of corners and intersections.

3. Fabricate and install the work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks, considering the temper and reflectivity of the metal. Provide uniform, neat flat-locked seams with minimum exposure of solder, welds and sealant. Fold back the sheet metal to form a hem on the concealed side of exposed edges.

4. Conceal fasteners and expansion provisions wherever possible in exposed work, and locate so as to minimize the possibility of leakage. Cover and seal work as required for a watertight installation.

   a. Provide cleat-type anchorages for metal flashings and sheet metal wherever practical, arrange to relieve stresses from building movement, and thermal expansion and contraction.

   b. Join parts under concealed rivets or sheet metal screws where necessary for strength or stiffness. Place sheets together before drilling.

   c. In general, space nails, rivets, or screws not more than eight inches apart. If nailing into concrete or masonry, use "Dryvins" and drilled holes.

5. On vertical surfaces lap 2-piece flashings members a minimum of 3 inches.

6. On sloping surfaces, for slopes of not less than 6 inches in 12 inches, lap unsealed flashings a minimum of 6 inches. For slopes less than 6 inches in 12 inches use soldered flat locked seams.

7. For embedment of metal flashing flanges in built-up roofing or composition flashing or stripping, extend flanges for a minimum of 4-inches embedment, and bed in roofing cement or other setting compound which is compatible with flashing, adjoining work and substrate.

8. Splice and Expansion Units: Use splice plates of same metal and gage as the base material.

B. Installation of Stainless-Steel Flashing and Trim:

1. Tin the edges of plain stainless steel to be soldered, for a width of 1-1/2 inches, using solder for stainless steel and acid flux. Remove every trace of acid flux residue from the metal promptly after tinning or soldering.

2. Provide welded joints. Provide upturned, 1/2-inch wide hooked flanges, and weld between adjoining sheets; lay seam flat.

C. Installation of Lead Flashing and Sheet Metal:

1. Where prefabricated units of lead flashing are to be set in felts, the underside may be coated with flashing cement.

2. Cut and shape lead sheets in place with minimum of 1-inch lapped joints, and form bends and folds to provide corners and intersections as shown. Shave or wire-brush joint areas immediately before sealing joint. Burn joints in lead sheets to provide true welded construction, exercising care to avoid reduction of sheet thickness.

3. Use for flashing roof drains, pans and vents.

D. Support and anchor each unit or work in the manner shown; but in no case in a manner which would be inadequate for thermal expansion stresses and the normal loading of water, ice, wind and similar loadings.

E. On bituminous membranes provide not less than 4-inches of mechanically fastened cover over built-up base flashings.

1. Overlap built-up base flashing with counter flashing a minimum of 4 inches and fold lower edge back on itself for 1/2 inch.

3.4 ADJUSTMENT AND CLEANING

A. Protect flashing and sheet metal until Final Acceptance of the Work.

B. Do not permit workmen, or others, to step directly on flashing sheets in place, or to place or move equipment over flashing and sheet metal surfaces. Protect surfaces during installation of permanent covering work and adjoining work.

C. Neutralize excess flux as work progresses with 5 percent to 10 percent washing soda solution and rinse thoroughly.

D. Clean exposed surfaces of every substance which is visible or might cause corrosion or prevent uniform oxidation of the metal surfaces. Exercise extreme care to remove fluxes and ferrous metal particles, including welding splatter and grinding dust.

+ + END OF SECTION + +

SECTION 07 71 00

MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gutters and Downspouts:

1. Gutter profiles.
2. Square/rectangular downspouts, elbows, and offsets.
3. End caps.
4. Miters.
5. Hangers for downspouts.
6. Conductor heads.

B. Related Sections:

Section 055000, Metal Fabrications.

Section 076000, Flashing and Sheet Metal

Section 076000, Flashing and Sheet Metal.

Section 079200, Joint Sealants

Section 099113, Exterior Painting.

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A527 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.

3. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.

4. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Shop Drawings: Include materials, details of construction and attachment to adjacent work.

C. Verification Samples: For each product to be provided, two samples, minimum size 6 inches (150 mm) square representing actual product including thickness, color and finish.

1. Anchors: Two, each type required.

2. Cap Flashings: Full section, 6" long.

3. Downspout: Full section, 12" long.

D. Guarantee

E. Certificates of qualifications as specified under Article titled “Quality Assurance”.

F. Product Certificates

1. Certify that materials of this Section, such as copper/fabric flashing, sealants, termination bar, and fasteners, are compatible with all components of the air barrier system and other Project materials that contact them.

1.4 DESIGN REQUIREMENTS

A. Conform to applicable code for size and method of rain water discharge.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section shall be supplied by a single manufacturer with a minimum of ten years' experience.

B. Installer Qualifications: Minimum 2 years experience installing similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Store products in clean, dry, sheltered area off the ground until ready for use.

C. Protect products from exposure to direct sunlight and rain. Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

1.8 WARRANTY

A. Manufacturers Product Warranty: Provide manufacturer's standard limited warranty that products are free from manufacturing defects and will not break down or deteriorate under normal conditions.

1. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Chris Industries, which is located at: 290 Larkin Ave.; Wheeling, IL 60090; Toll Free Tel: 800-356-7922 ; Tel: 847-729-9292; Fax: 847-729-0340; Email: request info (); Web: www.chrisind.com

B. Substitutions: approved equal

2.2 MATERIALS

A. Materials: The products listed in this specification are made using materials listed below as applicable and as specified.

1. Galvanized Flat Sheet, Paint grip: G90 galvanized steel. LFQ (lock forming quality). ASTM A527.

2. Stainless Steel Flat Sheet: Alloy 304, Finish 2B, ASTM A240

2.3 SCUPPER, NOZZLE AND DOWNSPOUTS

A. Scupper

1 Manufacturer: OMG 5 inch scupper thru wall retrodrain

a. RAC Back□ow Compression Seal - activated at drain flange level to protect the roofing system and building contents from water backup damage.

b. 125-in. metal clamping ring assembly provides a compression type termination for the vertical and horizontal roof flashings. Stainless steel studs and lock nuts secure the clamping ring assembly to the drain flange.

c. .060-in. thick drain strainer secured to the drain body with four stainless steel wing nuts

d. 9-in. stem

B. BRONZE DOWNSPOUT NOZZLE

1. Manufacturer: ZURN

a. Model ZARB199-8-PVC

1. Downspout Material:

2.4 ACCESSORIES

A. Connectors: Furnish required connector pieces for components.

B. Anchors and Supports: Profiled to suit downspouts.

C. Anchoring Devices: In accordance with SMACNA requirements

D. Downspout Supports:

E. Fasteners: As per manufacturer’s recommendations

F. Solder: ASTM B32; Alloy Grade Sn50 type.

2.5 FASTENERS

A. Nails "Stronghold" type large flat head roofing nail.

1. For Copper: Hardened copper.

2. For Stainless Steel: Stainless steel.

B. Screws, Bolts, and other Fastening Accessories

1. For Copper: Copper or brass.

2. For Stainless Steel: Stainless steel type 316.

C. Anchors

Provide one of the following types:

1. Hammer driven anchors, consisting of a stainless steel drive pin and a corrosion resistant metal expansion shield inserted thru a stainless steel disc with an EPDM sealing washer.

D. Self-tapping, corrosion resistant, concrete and masonry screw inserted thru a stainless steel disc with an EPDM sealing washer.

2.6 MISCELLANEOUS MATERIALS

A. Solder

1. Composition of block tin/pig lead of proportion recommended by the metal manufacturer, stamped either 50/50 or 60/40 "Warranted".

B. Flux

1. Paste or acid type as recommended by the metal manufacturer.

C. Bituminous Coating: FS TT-C494.

D. Type 3 Sealant (For concealed sealant joints of thru-wall cap receivers and other areas which require concealed sealant).

1. One part butyl rubber sealant; Pecora BC-158, PTI 707, or Woodmont chem-Calk 300.

E. Flashing Sealants and Adhesives (where applicable)

1. Provide products recommended in writing by the flashing manufacturer, and compatible with all adjacent materials, including components of the air barrier system. Materials containing asbestos are prohibited. Mastics and other asphaltic materials shall not be used where sealant is specified or required.

2.. Where low modulus silicone sealant is indicated provide ASTM C 920, single-component, neutral-curing silicone; Class 100/50, Grade NS, Use NT, Use O.

2.7 FABRICATION

A. Form gutters, rakes, downspouts and elbows as indicated on drawings

B. Fabricate with required connection pieces.

C. Form sections to shape indicated on Drawings, square, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance.

D. Hem exposed edges of metal.

E. Downspouts

1. Materials: Plain copper or lead coated copper.

2. Components (where applicable)

a. Hung Gutter: 20 oz.

b. Downspouts: 16 oz.

c. Conductor Heads: 16 oz.

d. Outlet Tube, offsets and elbows: 16 oz.

e. Continuous cleats: 20 oz.

f. Downspout Support Hanger: 1"x1/16" brass or copper.

g. Wire Strainers: 18 gage copper wire, 1/2" mesh.

3. Fabrication

a. Fabricate gutters, downspouts and fittings to shapes and profiles indicated on Drawings; if details are not indicated,

follow applicable requirements of the Architectural Sheet Metal Manual of SMACNA.

b. Form downspouts in 10'-0" long sections (where applicable).

2.7 INSTALLATION

A. Installing Thru Wall Scupper

1 Where protected membrane roofing is provided, scuppers shall be equipped with grilles with opening size not greater than the size of stone ballast used on the roof.

2. Lock and solder, or rivet and solder all construction joints of the scupper (where applicable).

B. Installation of Downspouts:

1 Join the downspout sections with end joints that telescope at least $1\frac{1}{2}$"

2 Install necessary offsets and elbows.

3 Install a minimum of 2 hangers at each downspout section. Form hangers to keep downspouts 1" away from wall.

4 Fasten downspouts to hangers with sheet metal screws.

5 Secure hangers to masonry and concrete walls with machine bolts in lead shields and to wood walls with screws.

6 Discharge Elbows: Fasten leader shoes to downspouts with a minimum of 3 sheet metal screws.

7 Connection to Underground Drains: Fit the downspout neatly into the drain pipe or boot. Caulk the joint with lead wool and seal with sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's recommendations, approved submittals, and in proper relationship with adjacent construction.

3.4 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer’s recommendations.

B. Protect installed products until completion of project.

+ + END OF SECTION + +

SECTION 07 72 30

ROOF HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated roof hatches for access to room below.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. ACUDOR, www.accessdoorsandpanels.com, 1-800-609-2917 RHG-SEC Model GSEC 3838 (30 x 30) security roof hatch

B. Type S Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.

C. Personnel II roof hatch by Babcock-Davis,

73rd Avenue N, Brooklyn Park, MN 55428 Toll Free Hotline: 888.412.3726 www.Babcock-Davis.comPersonnel roof hatch

2.2 ROOF HATCH

A. Furnish and install where indicated on plans metal roof hatch, size width: 30" (762mm) x length: 30" (762mm). or as indicated on drawings. Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.

B. Performance characteristics:

1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span and a 140 psf (684 kg/m^2) wind uplift for galvanized steel

2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.

3. Operation of the cover shall not be affected by temperature.

4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

C. Cover: Shall be 10 gauge aluminum with a 3” (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. Cover insulation: Shall be fiberglass of 1” thickness, fully covered and protected by a metal liner 18 gauge (1mm) aluminum.

E. Inside liner: 22 gauge galvanized steel

F. Curb: Shall be 12” in height and of: 10 gauge with 1” thick fiberboard roof insulation at curb exterior. 3.375” wide bottom flange with flange with pre drilled mounting holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, including stamped tabs, 6” on center, to be bent inward to hold single ply roofing membrane securely in place.

G. Curb insulation: Shall be rigid, high-density fiberboard of 1” thickness on outside of curb.

H. Lifting mechanisms: Manufacturer shall provide gas spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe. Inside pull handle for closing cover

I. Hardware

1. Heavy 11 gauge galvanized steel pintle hinges with 3/8” pin shall be provided

2. Cover shall be equipped with a spring latch with interior and exterior turn handles

3. Roof hatch shall be equipped withexterior padlock hasps.

4. The latch strike shall be a stamped component bolted to the curb assembly.

5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1” diameter red vinyl grip handle to permit easy release for closing.

6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.

7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

8. Door Latch: self latching, zinc plated outside T handle with stainless steel inside lock and lever assembly. Heavy duty detention lock with paracentric key. Inside and outside padlock provisions.

9. Finish: Unit prepared with iron phosphate wash, followed by rust inhibiting primer, and then baked polyester enamel paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

1. Test units for proper function and adjust until proper operation is achieved.

2. Repair finishes damaged during installation.

3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

+ + END OF SECTION + +

SECTION 07 76 00

ROOF PEDESTAL PAVER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Contract, including:

a. General and Supplementary Conditions

b. Division 1 Specifications apply to this section.

B. Section Includes:

1. Rooftop Pavers

2. Adjustable Pedestal Supports

C. Related Sections:

1. Section 042000 – Concrete Masonry Units

2. Section 071113 – Bituminous Damproofing

1.2 REFERENCES

A. Standards for Pedestal Paver Systems:

1. ASTM C 67 – Freeze Thaw

2. ASTM C 140 – Compressive Strength

3. ASTM C 140 – Water Absorption

4. ASTM C 293 – Flexural Strength

1.3 ADMINISTRATIVE REQUIREMENTS

A. Convene for installation meeting at least one week before starting work of this section.

1.4 SUBMITTALS

A. Shop Drawings: Submit scaled shop drawings including plan of installation

area, layout of all paver and pedestal areas, starting point and elevations, and construction details at critical terminations of pedestal paver system with adjacent construction. Include manufacturer's literature completely describing all components of the pedestal paver systems and giving detailed installation recommendations and instructions.

B. Product data for pedestal paver system, including all components with descriptive published data indicating characteristics and limitations.

C. Samples:

1. Architectural Pavers: Submit samples for type, color and texture required.

2. Pedestals: Submit samples of each pedestal component.

D. Delivery, storage and handling requirements and recommendations

E. Certifications: Written submittal by manufacturer indicating that installer is certified as qualified to perform work of this Section.

F. Closeout Submittals:

1. Warranty: Submit manufacturer warranty and ensure Owner's name is registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Manufacturer shall provide the following:

1. Rooftop Pavers

2. Pedestal Support System

B. There shall be no deviation from this specification or the drawings. Installer assumes liability for any deviations from specifications and/or drawings.

C. Installer Qualifications: Certified as pre-approved and qualified by manufacturer to install work of this section.

D. Preconstruction Testing: Conduct to verify following:

1. Membrane Roofing Manufacturer: Conduct inspection by certified manufacturer's technical representative to verify that the in-place membrane roofing system meets the manufacturer's specifications, is waterproof, and is approved for installation of the pedestal paver system. Verify membrane protection layer and other requirements to maintain roofing

manufacturer's warranty provisions. A copy of the inspection report shall be submitted to the pedestal paver manufacturer prior to installation of the pedestal paver system.

2. Membrane Integrity Test: The roof area or portions thereof shall be leak tested by means of electronic testing or flood testing for a period of 48 hours to check the integrity of the membrane installation. Membrane integrity test shall be conducted by roof membrane contractor and attested in writing to pedestal paver manufacturer by the roofing contractor prior to the pedestal paver system being installed.

1.6 DELIVERY, HANDLING, STORAGE, PROTECTION

A. Deliver materials to project site in the original packaging with the manufacture's labels intact and legible.

B. Inspect all materials to ensure they are undamaged and in good condition.

C. Store materials in a clean, dry and protected location.

D. Ensure waterproofing membrane is not damaged while delivering, storing or handling material.

E. Take measures to locate and spread loads in manner to not exceed load capacity of roof deck.

F. Store paver and pedestal components and materials over plywood panels or protective sheeting. Do not allow products, grit, debris, and pedestrian traffic on unprotected roofing.

G. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture membrane protection layer or membranes. Keep roof surfaces free of soil, grit, or debris at all times.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, precipitation) within limits recommended by manufacturer for optimum results. Do not install products in any unsafe condition, inclement weather or under environmental conditions outside manufacturer's recommended limits.

B. Deck supports specified are to be used with pedestrian traffic only. All four sides of deck system must restrain and contain the decking panels with perimeter blocking or walls. Decking panels must not be allowed to move laterally.

C. All membrane waterproofing and protection board surfaces to receive pedestals must be frost/ice free, and free of dirt, oil, debris or any rough foreign matter, which may impair the waterproofing / roofing manufacturers guarantee or protection requirements.

D. Installation or anticipated installation of additional heavy roof top feature such as, planters, benches, water features, hot tubs, industrial equipment etc. must be supported directly by additional pedestals that are in addition to the main deck paver pedestal system. Failure to adequately support the additional weight of any such features or items may cause significant damage to the deck, underlying structure, or waterproofing.

E. All decks shall be designed to not exceed the design capacity of the pedestal.

F. The substrate immediately below the pedestal supports shall provide positive and adequate drainage in accordance with good building practice and applicable building codes.

G. Do not install Sky Deck Pedestal Paver System over any insulation less than 60psi or with low-density polystyrene (bead board insulation).

1.8 WARRANTY

A. Manufacturer's Warranty: Paver and pedestal system manufacturer shall warrant the materials to remain free from defects for a period of five (3) years.

B. Contractor's Warranty: The contractor shall warrant the work to remain free from defects of labor and materials used in conjunction with their work in accordance with the general conditions for this project for a maximum period of two (2) years.

C. Warranty

a. SkyTerrace Pavers: Limited 3 year warranty

b. SkyJack Pedestal System: Limited 3 year warranty

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: SkyDeck USA Pedestal Paver System and Components. 1197 Hoyt St. SE Grand Rapids, MI 49507.
Tel: 616-308-6309

Email ceagan@skydeckusa.com Web: www.skydeckusa.com

B. Stepstone, Inc DryDeck or Lightweight Roof Paver

C. Or approved Submittal

D. Requests for substitutions will be considered in accordance with provisions of Section 013300.

2.2 MATERIALS

A. SkyJack Adjustable Height and Slope Compensating Pedestals

1. Typical Height Range: 0-24 inches.

2. SkyHigh Pedestal Bracing System: For pedestal applications over 24 inches in height.

3. Weight Bearing Design Capacity: 1000lbs/pedestal

4. Spacer Tabs: 3/16 inch

5. Slope Stabilization Head: Compensates for slope up to 7%

B. SkyTerrace Concrete Pavers

1. Type: Architectural Concrete Pavers

2. Color: To be selected from manufacturer's standard colors

3. Size: 12" x 12" or as otherwise indicated on drawings. Typical height of concrete paver 2" – 2 ½".

4. Meet the required technical specifications:

a. Compressive Strength: 8,500 psi

b. Minimum Flexural Strength: Not less than 800 psi

c. Density: 150 lbs per cubic foot

d. Water absorption: Not to exceed 5%

e. Freeze Thaw: Not to exceed 1% loss of dry weight

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared and related work penetrating the plane of the roof is completed. Carefully inspect installed work of other trades and verify that such work is complete to the point where work of this section may properly commence. Notify the Architect in writing of the conditions detrimental to the proper and timely completion of work.

B. Verify that substrates, membranes, and protection boards are ready for installation of pedestal and paver system.

C. Verify that the roof deck will sustain the weight of the pedestal paver system.

D. Verify deck dimensions elevations and pedestal heights before commencing work.

3.2 PREPARATION

A. Clean and prepare deck free of all debris in accordance with manufacturer's instructions.

B. Install membrane protection layer under all pedestals if specified by roofing membrane manufacture.

C. Establish accurate lines, levels, and pattern.

3.3 INSTALLATION

A. Determine starting point and layout the paver and pedestal grid layout determining where full and cut pavers will be installed.

B. Mark perpendicular guidelines on substrate surface to ensure square layout.

C. Install initial pavers along guidelines forming a "T" pattern.

D. Install Pavers tightly butted into pedestals. Form even joint width determined by pedestal spacer tabs.

E. Checks shall be made constantly for correct elevation and spacing of the installed pavers using laser level, automatic leveler, or mason's line.

F. Slight irregularities in paver thickness and/or deck heights can be compensated for by using one or more regulation shims.

G. Any section of paver, pedestal or protection course which is not restrained by an abutting wall or parapet must be "boxed in" by some

field installed restraint.

3.4 ROUTINE MAINTENANCE AND CARE

A. Remove and replace pavers, which are loose, chipped, broken, stained or otherwise damaged. Make sure edge restraints stay intact and are structurally sound.

B. Remove mortar stains and all other types of soiling from exposed paver surfaces, wash and scrub clean.

C. Efflorescence is a naturally occurring white residue or stain that is on the surface of new concrete. The residue will dissipate naturally with time.

D. Provide final protection and maintain conditions in a manner acceptable to installation, which ensures paver work being without damage or deterioration at time of substantial completion.

E. Joints and drains should be kept clean to protect from water back up.

+ + END OF SECTION + +

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SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Firestopping shall be applied at all penetrations through walls in existing and proposed walls, floors or ceilings whether or not it is shown on the Drawings.

1.2 SUMMARY

A. Requirements for in-horizontal assemblies at floor and roof penetrations, and at penetrations in fire-rated walls.

1.3 REFERENCES

A. UL 263 Fire Tests of Building Construction and Materials.

B. UL 1479 Fire Tests of Through-Penetration Firestops.

C. UL 2079 Standard for Safety Tests for Fire Resistance of Building Joint Systems.

D. ASTM E 119 Methods of Fire Tests of Building Construction and Materials.

E. ASTM E 814 Method of Fire Tests of Through Penetration Fire Stops

1.4 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including any General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

B. Devices and materials shall meet the hourly fire resistance ratings required by the Project as determined by UL 263, UL 1479, ASTM E 119 or ASTM E 814 and be listed and detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide or the Omega Point Laboratories Listings Directory.

1. Exception: Where no listed designs exist that meet the requirements of a specific project condition, submit details and manufacturer's written recommendations for a design meeting the requirements.

Include evidence of engineering judgment and extrapolation from listed designs.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: The persons installing the firestopping and their supervisor shall be personally experienced in firestop work and shall have been requlary employed by a company installing firestopping for a minimum of three (3) years.

B. Pre-Installation Conference: Before firestop work is scheduled to commence a conference will be scheduled by Owner's Representatives.

C. Container/Package Labels: Include manufacturer's name and identifying product number, date of manufacturer, lot number, shelf life (if applicable), qualified testing and inspecting agency classification marking, curing time, and mixing instructions for multi-component materials.

D. Company Field Advisor: Secure the services of a Company Field Advisor for the following:

1. Render advice regarding suitability of firestopping materials and methods.

2. Assist in completing firestop schedule.

3. Attend pre-installation conference.

1.6 SUBMITTALS

A. Product Data

1. Catalog sheets, specifications, and installation instructions for each product specified except miscellaneous materials.

B. Installer Certificates: from Installer indicating that firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Grout and sealant systems shall meet or exceed requirements as specified in Part 1 of this Section and shall be acceptable to the Authority.

B. Firestopping systems shall meet the requirements of ASTM E-814, which include, but are not limited to, the following:

1. Prevent flame pass-through.

2. Restrict temperature to not exceed 325 degrees F over ambient on side of assembly opposite flames.

3. Provide a positive smoke seal.

4. Withstand hose stream test.

C. Firestopping materials shall be asbestos-free, emit no toxic or combustible fumes and be capable of maintaining an effective barrier against flame, smoke, gas, and water in compliance with requirements of this Section.

D. Firestopping materials/systems shall be flexible to allow for normal movement of building structure and penetrating items(s) without affecting the adhesion or integrity of the system.

E. Firestopping materials shall not require hazardous waste disposal of used containers/packages.

F. On insulated pipe, the fire-rating classification must not require the removal of the insulation.

2.2 ACCEPTABLE MANUFACTURERS:

A. Hilti Construction Chemicals, Inc., Tulsa, OK.

B. The Carborundum Company, Niagara Falls, NY.

C. 3M Fire Protection Products, St. Paul, MN.

D. Bio Fireshield, Inc., Concord, MA

E. Tremco Sealant Division, Tremco LTD, Toronto, Ontario, Canada.

F. Specified Technologies, Inc., Somerville, NJ

G. G. W. R. Grace & Co., Macungie, PA

H. RectorSeal Corp., Houston, TX B.

PART 3 - EXECUTION

3.1 GENERAL

A. Examine and confirm the compatibility of surfaces to receive firestopping materials. Verify that surfaces are sound, clean and dry and are ready to receive the firestopping.

B. Verify that penetration elements are properly located and securely fixed, with the proper space between the penetration element and surfaces of the opening.

3.2 PREPARATION

A. Clean out openings immediately before installation of through-penetration firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove foreign materials from surfaces of openings, and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form release agents from concrete.

B. Clean out openings, and juncture, control, and expansion joints immediately before installation of firestopping. Comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove foreign materials from surfaces of openings and joint substrates, and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form release agents from concrete.

3.3 INSTALLATION OF THROUGH PENETRATION FIRESTOPS

A. Use through-penetration firestop devices, forming materials, and fill, void or cavity materials to form through-penetration firestops to prevent the passage of flame and limit temperature rise of the unexposed surface as detailed in the UL Fire Resistance Directory, Inchcape Directory of Listed Products, Factory Mutual Approval Guide, or the Omega Point Laboratories Listings Directory.

1. Where applicable design is not detailed in the directories, use forming materials and fill, void or cavity material to form through-penetration firestop in accordance with approved printed details and installation instructions from the company producing the forming materials and fill, void or cavity material.

2. If the construction type(s) of the building cannot be determined, provide firestopping with fire resistance ratings as specified in the Building Code of New York State, Tables 720.1(1), 720.1(2), 720.1(3), and 302.3.2.

B. Provide through-penetration firestop systems with F ratings that shall equal or exceed the fire resistance of the penetrated building construction.

C. Provide through-penetration firestop systems with T ratings, in addition to F ratings, at floors where the following conditions exist:

1. Where firestop systems protect penetrations located outside the wall cavities.

2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.

3. Through-penetration firestop systems protecting floor penetrations require a T-rating of at least one (1) hour, but not less than the required floor fire-resistance rating.

D. Firestop through-penetrations of floors, walls, partitions, ceilings, and roofs.

E. Firestop through penetrations associated with the new work.

F. Firestop through-penetrations of partitions identified on the Construction Work Drawings as smoke partitions and fire rated assemblies.

3.4 CLEANING

A. Clean off excess fill materials and sealants adjacent to penetrations by methods and cleaning materials recommended by manufacturers of firestopping products and of products in which penetrations occur.

B. Remove masking tape as soon as practical so as not to disturb the firestopping's bond with substrate.

C. Protect firestopping during and after curing period from contact with contaminating substances, or damage resulting from adjacent work.

D. Cut out and remove damaged or deteriorated firestopping immediately and install new materials as specified in firestop schedule.

3.5 FIELD QUALITY CONTROL

A. Inspect all installations to ensure that all work meets the requirements specified.

+ + END OF SECTION + +

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install caulking and sealants.

2. Extent of each type of caulking and sealant is shown or indicated and includes the following:

a. Interior and exterior joints in equipment and construction systems not filled by another material, and that are not required to be open for operation.

b. Exposed-to-view joints of all fire-rated sealants.

c. Joints specified to be re-caulked.

B. Coordination:

1. Review installation procedures under other Sections and coordinate installation of items to be installed with or before caulking and sealants.

2. Notify other trades in advance of installation of caulking and sealants to provide other trades with sufficient time for installing their work that must be installed before caulking and sealants.

3. Coordinate final selection of caulking and sealants so that materials are compatible with all caulking and sealant substrates specified.

1.2 REFERENCES

A. American Society of Testing Material (ASTM) Publications:

B. ASTM C510, Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.

1. ASTM C661, Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

2. ASTM C793, Test Method for Effects of Accelerated Weathering on Elastomeric Joint Sealants.

3. ASTM C794, Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

4. ASTM C920, Specification for Elastomeric Joint Sealants.

5. ASTM C1021, Practice for Laboratories Engaged in Testing Building Sealants.

6. ASTM C1087, Test method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

7. ASTM C1193, Guide for Use of Joint Sealants.

8. ASTM C1247, Practice for Durability of Sealants Exposed to Continuous Immersion in Liquids.

C. Federal Specifications (FS)

1. FS TT-S-00227, Sealing Compound: Elastomeric Type, Multi-component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).

2. FS TT-S-00230 Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).

D. South Coast Air Quality Management District's (SCAQMD).

1. SCAQMD Rule 1168.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer:

a. Engage a single installer, approved by product manufacturer, regularly engaged in caulking and sealant installation and with successful experience in applying types of products required, and who employs only tradesmen with specific skill and successful experience in the type of Work required.

2. Testing Laboratory:

a. Furnish services of independent testing laboratory qualified

according to ASTM C1021, for conducting testing required.

B. Component Supply and Compatibility:

1. Obtain materials only from manufacturers who will, if required:

a. Furnish at the Site services of a qualified technical representative to advise installer of proper procedures and precautions for using materials.

b. Test caulking and sealants for compatibility with substrates for conformance with FS-TT-S-00227, and recommend remedial procedures as required.

1. Before purchasing each sealant, investigate its compatibility with joint surfaces, joint fillers, and other materials in joint system. Provide products that are fully compatible with actual installation condition, verified by manufacturer's published data or certification, and as shown on approved Shop Drawings and other approved submittals.

2. Product Testing: Provide test results of laboratory pre-construction compatibility and adhesion testing, as specified in Article 3.1 of this Section, by qualified testing laboratory, based on testing of current sealant formulations within a 36-month period preceding the Notice to Proceed for the Work.

3. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920 and, where applicable, to other standard test methods.

4. Test other joint sealants for compliance using specified post-construction field adhesion test.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

a. Schedule of caulking and sealants installation, indication each specific surface where caulking or sealants are to be provided and the material proposed for each application.

2. Product Data:

a. Copies of manufacturer's data sheets including color charts, specifications, recommendations, and installation instructions for each type of sealant, caulking compound, and associated

miscellaneous material required. Include manufacturer's published data, indicating that each product complies with the Contract Documents and is intended for the applications shown or indicated.

b. Product test reports and UL Listed design data sheets

B. Informational Submittals: Submit the following:

1. Certificates:

a. Certify that materials are suitable for intended use and materials meet or exceed requirements of the Contract Documents.

b. Certification from manufacturer that products furnished are appropriate for surfaces and conditions to which they will be applied.

c. Certify that applicator is approved by manufacturer.

2. Field Quality Control Submittals:

a. Results of tests on job mock-ups.

b. Pre-construction and post-construction field test reports.

c. Compatibility and adhesion test reports.

d. Contractor's Field Test Report Logs:

1) Indicate time present at the Site.

2) Include observations and results of field tests, and document compliance with manufacturer's installation instructions and supplemental instructions provided to installers.

3. Pre-installation conference record.

4. Qualifications: Submit qualifications for:

a. Installer.

b. Testing laboratory

C. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data:

a. Recommended inspection intervals.

b. Instructions for repairing and replacing failed sealant joints.

2. Warranty: Submit written warranties as specified in this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with the following:

1. Delivery of Products:

a. Deliver products in caulking and sealant manufacturer's original unopened, undamaged containers, indicating compliance with approved Shop Drawings and approved Sample color selections.

b. Include the following information on label:

1) Name of material and Supplier.

2) Formula or Specification Section number, lot number, color and date of manufacture.

3) Mixing instructions, shelf life, and curing time, when applicable.

2. Storage of Products:

a. Do not store or expose materials to temperature above 90 degrees F or store in direct sunlight.

b. Do not use materials that are outdated as indicated by shelf life.

c. Store sealant tape in manner that will not deform tape.

d. In cool or cold weather, store containers for sixteen hours before using in temperature of approximately 75 degrees F.

e. When high temperatures prevail, store mixed sealants in a cool place.

3. Handling:

a. Do not open containers or mix components until necessary preparatory Work and priming are complete.

1.6 JOB CONDITIONS

A. Conform to applicable OSHA and the New York State Building Codes.

B. Environmental Conditions:

1. Do not install caulking and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.

2. Proceed with the Work when forecasted weather conditions are favorable for proper cure and development of high-early bond strength.

3. Where joint width is affected by ambient temperature variations, install elastomeric sealants when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.

4. When high temperatures prevail, avoid mixing sealants in direct sunlight.

5. Supplemental heat sources required to maintain both ambient and surface temperatures within the range recommended by manufacturer for material applications are not available at the Site.

6. Provide supplemental heat and energy sources, power, equipment, and operating, maintenance, and temperature monitoring personnel.

7. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas of caulking, sealants, and painting Work, and areas where Owner's personnel or construction personnel may work. Properly locate and vent such heat sources to outdoors so that caulking and sealants and other Work are unaffected by exhaust.

1.7 WARRANTY

A. Provide written warranty, signed by manufacturer and Contractor, agreeing to repair or replace sealants that fail to perform as air-tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified in approved Shop Drawings and other submittals, as an inherent quality of material for exposure indicated.

1. Provide manufacturer warranty for period of one year from date of Substantial Completion of caulking and sealants Work.

2. Provide installer warranty for period of two years from date of Substantial Completion of caulking and sealants Work.

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. Provide elastomeric joint sealants for interior and exterior joint applications that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. VOC Performance Criteria:

1. VOC content of sealants used shall comply with current VOC content limits of SCAQMD Rule 1168. Sealants used as fillers shall comply with or exceed requirements of BAAQMD Regulation 8, Rule 51.

a. Sealants: 250 g/L.

b. Sealant Primers for Nonporous Substrates: 250 g/L.

c. Sealant Primers for Porous Substrates: 775 g/L.

C. Provide colors selected by Engineer from caulking and sealant manufacturer's standard and custom color charts. "Or equal" manufacturers shall provide same generic products and colors as available from manufacturers specified.

2.2 MATERIALS

A. Exterior and Interior Vertical Joints; Non-submerged:

1. Two-component Polyurethane Sealant:

a. Products and Manufacturers: Provide one of the following:

1) Sikaflex- 2c NS by Sika Corporation.

2) Dymeric 240 FC by Tremco Sealant/Waterproofing Division of RPM International, Inc.

3) Or equal.

b. Polyurethane based, two-component elastomeric sealant complying with:

1) FS TT-S-00227E: Type II (non-sag) Class A and ASTM C920, Type M, Grade NS, Class 25.

2) Adhesion-in-Peel, FS TT-S-00227E and ASTM C794: (Minimum five pounds per linear inch with no adhesion failure): 10 pounds.

3) Hardness (Standard Conditions), ASTM C661: 25 to 35 (Shore A).

4) Stain and color change, FS TT-S-00227E and ASTM C510: No discoloration or stain.

5) Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weatherometer.

6) Rheological Vertical Displacement at 120 degrees F, FS TT-S-00227E: No sag.

7) VOC Content: 100 g/L, maximum.

B. Exterior and Interior Horizontal Joints; Non-submerged:

1. Two-component Polyurethane Sealant:

a. Products and Manufacturers: Provide one of the following:

1) Sikaflex- 2c SL by Sika Corporation.

2) THC/900 by Tremco Sealant/Waterproofing Division of RPM International, Inc.

3) Or equal.

b. Polyurethane based, two-component elastomeric, self-leveling sealant complying with the following:

1) FS TT-S-00227E, Type I (self-leveling) Class A. and ASTM C920, Type M, Grade P, Class 25

2) Water Immersion Bond, FS TT-S-00227E: Elongation of 50 percent with no adhesive failure.

3) Hardness (Standard Conditions), ASTM C661: 35 to 45.

4) Stain and Color Change, FS TT-S-00227E and ASTM C510: No discoloration or stain.

5) Accelerated Aging, ASTM C793: No change in sealant characteristics after 250 hours in weather meter.

6) VOC Content: 165 g/L, maximum.

C. Miscellaneous Materials:

1. Joint Cleaner: As recommended by caulking and sealant manufacturer.

2. Joint Primer and Sealer: As recommended for compatibility with caulking and sealant by caulking and sealant manufacturer.

3. Bond Breaker Type: Polyethylene tape or other plastic tape as recommended for compatibility with caulking and sealant by caulking and sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of caulking and sealant. Provide self-adhesive tape where applicable.

4. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended for compatibility with caulking and sealant by caulking and sealant manufacturer. Provide size and shape of rod that will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide highly-compressible backer to minimize possibility of sealant extrusion when joint is compressed.

5. Low-temperature Catalyst: As recommended by caulking and sealant manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and conditions under which caulking, and sealant Work will be performed, and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work and performance of sealants. Do not proceed with caulking and sealant Work until unsatisfactory conditions are corrected.

B. Laboratory Pre-construction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers for testing indicated below samples of materials that will contact or affect joint sealants.

1. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

2. Submit at least eight pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For products that fail tests, obtain joint-sealant manufacturer's written instructions for corrective measures including using specially formulated primers.

5. Immersion Testing: ASTM C1247 for potable water and wastewater.

6. Testing will not be required if joint sealant manufacturers submit joint preparation data based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted and mock-up field testing is acceptable.

3.2 PREPARATION

A. Protection: Do not allow caulking and sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces including rough textured materials. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or caulking and sealant materials.

B. Joint Surface Preparation:

1. Clean joint surfaces immediately before installing sealant compound. Remove dirt, weakly adhering coatings, moisture and other substances that would interfere with bonds of sealant compound as recommended in sealant manufacturer's written instructions as shown on approved Shop Drawings.

2. If necessary, clean porous materials by grinding, sandblasting, or mechanical abrading. Blow out joints with oil-free compressed air or by vacuuming joints prior to applying primer or sealant.

3. Roughen joint surfaces on vitreous coated and similar non-porous materials, when sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or steel wool to produce a dull sheen.

C. Mixing:

1. Comply with sealant manufacturer's written instructions for mixing multi-component sealants.

2. Thoroughly mix components before use.

3. Add entire contents of activator can to base container. Do not mix partial units.

4. Mix contents for minimum of five minutes or as recommended by sealant manufacturer, until color and consistency are uniform.

3.3 INSTALLATION

A. Install caulking and sealants after adjacent areas have been cleaned and before joint has been cleaned and primed, to ensure caulking and sealant joints will not be soiled. Replace caulking and sealant joints soiled after installation.

B. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or indicated in the Contract Documents, and except where manufacturer's technical representative directs otherwise, only as acceptable to Engineer.

C. Prime or seal joint surfaces as shown on approved Shop Drawings and approved other submittals. Do not allow primer or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to applying sealants.

D. Apply masking tape before installing primer, in continuous strips in alignment with joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.

E. Do not install sealants without backer rods and bond breaker tape.

F. Roll back-up rod stock into joint to avoid lengthwise stretching. Do not twist, braid, puncture, or prime backer rods.

G. Employ only proven installation techniques that will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

H. Install sealants to depths recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of bead.

1. For horizontal joints in sidewalks, pavements, and similar locations sealed with elastomeric sealants and subject to traffic and other

abrasion and indentation exposures, fill joints to depth equal to 75 percent of joint width, but not more than 5/8-inch deep or less than 3/8-inch deep.

2. For vertical joints subjected to normal movement and sealed with elastomeric sealants and not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2-inch deep or less than 1/4-inch deep.

I. Remove excess and spillage of compounds promptly as the Work progresses.

J. Cure caulking and sealant compounds in compliance with manufacturer's instructions and recommendations, to obtain high-early bond strength, internal cohesive strength, and surface durability.

3.4 EXISTING JOINTS

A. Mechanically remove existing sealant and backer rod.

B. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface.

C. Conduct laboratory pre-construction compatibility and adhesion testing on joint surfaces in accordance with Paragraph 3.1.B of this Section.

D. Allow joint surfaces to dry before installing new sealants.

3.5 FIELD QUALITY CONTROL

A. Post-construction Field Adhesion Testing: Before installing elastomeric sealants, field-test joint sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:

a. Perform ten tests for the first 1,000 feet of joint length for each type of elastomeric sealant and joint substrate.

b. Perform one test for each 1,000 feet of joint length thereafter, and minimum of one test per each floor per elevation.

c. Test Method: Test joint sealants according to Method A, Field-applied Sealant Joint Hand Pull Tab, and Method D, Water Immersion in Appendix X1 of ASTM C1193. For joints with dissimilar substrates, verify adhesion to each substrate separately by extending cut along one side and verifying adhesion to opposite side. Repeat procedure for opposite side.

d. Inspect joints for complete fill, absence of voids, and joint configuration complying with specified requirements. Record results in a log of field adhesion tests.

e. Inspect tested joints and report on whether:

1) Sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

2) Sealants filled the joint cavities and are free of voids.

3) Sealant dimensions and configurations comply with specified requirements.

f. Record test results in a log of field adhesion tests. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

g. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

h. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other requirements will be satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

i. Do not proceed with installation of elastomeric sealants over joint surfaces that have been painted, lacquered, waterproofed, or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with FS TT-S-00227, has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

B. Water Leak Testing: Field test for water leaks as follows:

1. Flood the joint exposure with water directed from a 3/4-inch diameter garden hose, without nozzle, held perpendicular to wall face, two feet from joint and connected to water system with 30 psi minimum normal water pressure. Move stream of water along joint at an approximate rate of 20 feet per minute.

2. Test approximately five percent of total joint system, in locations that are typical of every joint condition, and that can be inspected easily for leakage on opposite face. Conduct test in presence of Engineer, who will determine actual percentage of joints to be tested and actual period of exposure to water from hose, based on extent of observed leakage or lack of observed leakage.

3. Where nature of observed leaks indicates potential of inadequate joint bond strength, Engineer may direct that additional testing be performed at a time when joints are fully cured, and before Substantial Completion.

3.6 ADJUSTING AND CLEANING

A. Where leaks and lack of adhesion are evident, replace sealant.

B. Clean adjacent surfaces of sealant and soiling resulting from the Work. Use solvent or cleaning agent recommended by sealant manufacturer. Leave all finish Work in neat, clean condition.

C. Protect sealants during construction so that they will be without deterioration, soiling, or damage at time of readiness for final payment of the Contract.

3.7 PROTECTION

A. During and after curing period, protect joint sealants from contact with contaminating substances and from damage resulting from construction operations or other causes, so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

+ + END OF SECTION + +

SECTION 07 92 00.1

SWIMMING POOL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Immersible joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.

2. Joint-sealant manufacturer and product name.

3. Joint-sealant formulation.

4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction laboratory test reports.

C. Preconstruction field-adhesion-test reports.

D. Field-adhesion-test reports.

E. Sample warranties.

1.4 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: One (1) year from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS – WET AREA

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

1. Laticrete (Latasil)

2. Mapei (Mapesil T)

3. Tremco

4. Sika

2.3 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) or as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturer: As recommended by Sealant manufacturer.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer**.**

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.

2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform one test for each 50 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.

1. Joint Locations:

a. Joints in swimming pool decks.

b. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone-wet area , S, P, 25, T, NT, I.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

+ + END OF SECTION + +

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide hollow metal doors and frames as indicated on Drawings and specified herein.

1.2 RELATED SECTIONS

A. The following Sections contain requirements that relate to this Section:

1. Section 08 71 00, Door Hardware

2. Section 08 90 00, Louvers and Vents.

1.3 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1. Underwriters' Laboratories, Inc. (UL)

2. American Society for Testing and Materials (ASTM)

3. National Fire Protection Association (NFPA)

4. Steel Door Institute (SDI)

5. Hollow Metal Manufacturers Association (HMMA)

1.4 SUBMITTALS

A. Product Data

Manufacturer's catalog sheets, specifications, and installation instructions.

B. Shop Drawings:

1. Show details of each frame type, elevation and construction for each door type, conditions at openings, location for each door type, location and installation requirements for finish hardware (including

cutouts and reinforcements), details of connections, and anchorage and accessory items.

2. Include a schedule of doors and frames using the same reference numbers for details and openings as those on the Contract Drawings.

3. For sound rated assemblies, provide drawings indicating interface of sound rated doors and frames with adjacent construction. Include details of each frame type, cam hinge (when used), sound seals, door bottom, threshold, and door. Indicate location and installation requirements of door and frame hardware and reinforcements. Indicate glazing materials and details for glazed assemblies.

C. Samples

1. Frames: Corner sample of each type, 18" x 18" with mortises and reinforcements, shop primed.

2. Doors: Corner sample of each type showing construction, 18" x 18", with mortises and reinforcements, shop primed.

3. Security Louver panel, as per Section 08 91 19.

D. Quality Control Submittals

1. Include approval data and acceptance by a New York City Building Department approved testing agency for all fire-rated assemblies.

2. Provide certification glazing meets safety impact requirements of CPSC 16 CFR 1201.

3. Provide certification for oversized assemblies as described in Quality Assurance.

E. Warranties

1. Provide manufacturer/installer warranty.

1.5 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI A250.8 and as herein specified.

B. Fire Rated Assemblies

Wherever fire resistance classification is shown or scheduled for hollow metal doors and frames, provide fire rated units that have been tested as fire door assemblies and comply with National Fire Protection Association

(NFPA) Standard No. 80, are tested in accordance with NFPA 252 or UL 10B/UL 10C and UL 1784 as required by the NYC Building Code and comply with these Specifications. Identify each door and frame with metal UL, or Warnock Hersey labels indicating applicable fire class of the unit. Rivet or weld labels on the hinge edge of door and jamb rabbet of frame.

1. Oversize Assemblies: Whenever fire rated assemblies are larger than size limitations established by NFPA, provide manufacturer's certification that they have been constructed with materials and methods equivalent to requirements for labeled construction.

2. See Door Schedule in the Drawings for Label Requirements (Class) for respective openings.

C. Regulatory Requirements

1. Notwithstanding the requirements for fire-rated assemblies noted above, all fire-rated doors and frames shall be approved for use in New York City.

2. Provide evidence of acceptance by an approved testing agency. Provide permanent labels on doors and frames as required by the New York City Building Code. Labels shall be applied at the factory or where fabrication and assembly are performed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store doors and frames on raised platforms in vertical position with blocking between units to allow air circulation.

B. During delivery, storage and handling, protect doors and frames from water damage.

C. Provide delivery, storage and handling in such manner to prevent damage to products.

1.7 FIELD EXAMINATION

A. At the Site, before door installation, the Owner reserves the right to select at random one or more doors for examination by cutting a portion of such size to reveal the construction of the particular door.

1. If the examination finds that the doors examined do not comply with requirements of the Specifications, all doors shall be removed from the Site and new doors shall be provided. Costs of examination and replacement of rejected doors shall be borne by Contractor.

2. If the examination finds that the doors do comply with the requirements of the Specifications, the cost of the examination and the cost of the replacement of the examined doors will be borne by the Owner.

1.8 GAUGE STANDARDS

A. Gages specified are based on U.S Standard Gauge for hot rolled and cold rolled steel sheets.

B. The allowable tolerances for steel sheet thicknesses shall be in accordance with HMMA Standards.

1.9 WARRANTY

A. Submit warranty signed by manufacturer and installer, agreeing to replace assemblies which fail in materials, performance or workmanship within the specified warranty period.

1. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acme & Dorf Door Corp., Clifton NJ 07011

B. Ceco Door Products Div., Milan, TN 38358

C. Curries Company, Mason City, IA 50401

D. Long Island Fireproof Door, Port Washington, NY 11050

E. Michbi Doors Inc. Brentwood, NY 11717

F. Or Approved Equal.

2.2 MATERIALS

A. Cold-Rolled Steel Sheets

Commercial Quality carbon steel complying with ASTM A1008 and ASTM A568.

B. Metallic-Coated Steel Sheet

Commercial Quality Steel complying with ASTM A653, Type B with minimum G60 (Z180) or A60 metallic coating.

C. Galvannealed Steel Sheets

Carbon steel sheets of commercial quality complying with ASTM A653 Doors and frames shall have A60 zinc-iron coating, mill phosphatized, complying with ASTM A653.

D. Anchors and Supports

Fabricate of gages indicated on and of not less than 16 gage sheet steel, unless otherwise indicated, on the drawings

1. Galvanized Units: Galvanized anchors and supports used with galvanized frames, complying with ASTM A153, Class B.

E. Anchorage Devices, Bolts, and other Fasteners

Manufacturer's standard units unless otherwise indicated on the Drawings.

1. Galvanized Units: Galvanized items used with galvanized frames complying with ASTM A153, Class C or D as applicable.

2.3 FABRICATION

A. Fabricate hollow metal work accurately and assemble neatly to ensure work smooth and free from dents, tool marks, visible waves, warp, buckles and conspicuous joints.

B. Align lines straight and true with arises and angles as sharp as practicable. Miter corners in true alignment and join similar abutting profiles accurately.

C. Assemble all joints to form imperceptible intersections when finished.

D. Form each member, such as jamb and head, from a single piece of metal, unless otherwise shown or approved.

E. Fasten all members together to provide rigid construction in assembled work. Weld all connections except those for removable members such as glazing beads.

F. Weld, dress smooth and flush joints on exposed faces.

G. Clearances

Fabricate doors for their respective frames within the following clearances:

1. Jambs and Head: 3/32" to 1/8".

2. Meeting Edges of Pairs: 1/8" to 3/16".

3. Bottom (no threshold or carpet): 3/8", maximum.

4. Bottom (at threshold or carpet): 1/4", maximum.

H. Work showing defects or blemishes will be rejected and rejected work shall be replaced with satisfactory work.

2.4 DOORS

A. General

1. Provide steel doors of types and styles indicated on drawings or schedules. Comply with ANSI/SDI A250.8 requirements unless more restrictive requirements are specified herein.

2. Design and Thickness: Flush design doors, seamless vertical edges, hollow construction, 1 3/4" thick unless specifically noted otherwise.

3. Sound Deadening (ASTM E90): Minimum Sound Transmission Class (STC) of 30.

4. Door Edges: Bevel lock stile edge of single acting hinged doors 1/8" in 2". Double acting doors shall have rounded edges, approximately 2¼" radius. Meeting stiles of pairs of single acting doors shall be "V" beveled or rounded as detailed on the Drawings or required.

5. Glazing Stops and Beads: Fixed steel stops, formed integral with door unless otherwise approved by the Owner, on the outside of exterior doors and on the secure side of interior doors. Removable steel beads, of tubular steel of gage indicated on the Drawings or solid bar stock, on the other side of doors secured with machine screws. Form corners with butted hairline joints. Coordinate width of rabbet between fixed stop and removable bead and depth of rabbet with type of glass and glazing required.

6. Glazing:

a. Non-rated doors - 1/4” thick minimum laminated glass meeting safety impact requirements of CPSC 16 CFR 1201.

b. Fire-rated doors **–** Fire Protection rated glazing meeting safety impact requirements of CPSC 16 CFR 1201.

c. Fire-protection-rated glazing in excess of 100 square inches shall be permitted in fire door assemblies when tested as components of the door assemblies and not as glass lights per Section BC 715.4.4 the 2014 NYC Building code.

Size and location of vision panels shall be as indicated on the drawings.

B. Interior Doors

1. Fabricate interior doors with 2 outer stretcher-leveled, steel sheets of 12 gage unless indicated otherwise on the Drawings. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces and stile edges, except around glass and louver panels. On mortise face of door, vertical joints shall be welded, filled and ground smooth.

2. Provide surface sheet reinforcement for surface sheet, edge, hardware, stops and other provisions, of size and gage as detailed on Drawings.

3. Provide 14 GA top and bottom channels and closures as detailed on the Drawings.

4. For all toilet room, locker room, mechanical room, food service area doors and other doors indicated on the door schedule, all outer sheets of the door shall be galvannealed and welds shall be coated with zinc rich primer.

C. Louvered Panels for Doors

1. Provide steel louvers for doors where indicated on Drawings and as specified herein. Refer to Section 08 90 00.

2.5 FRAMES

A. General

1. Provide steel frames for doors, and other openings where shown, of size and profile as indicated on Drawings.

2. Construction: Full-welded unit construction, with corners mitered and continuously welded full depth and width of frame, unless otherwise indicated. Knock-down type frames will not be accepted.

a. Fixed Stops: Integral 5/8" stop unless otherwise indicated. Construct jambs and heads from one piece of metal each; rabbeted and flanged as required for the various types of openings, and neatly mitered or interlocked and welded together. Provide channel, angle and bent plate reinforcing as indicated on approved Shop Drawings or otherwise required. Provide reinforcing in the heads of frames where shown or required.

3. Frame Material

   a. Interior Frames: 12 gage Galvannealed steel sheet unless indicated otherwise on Drawings.

4. Provide frames for masonry openings with adjustable Underwriter's type masonry anchors to suit conditions of installation, using not less than three (3) at each jamb, in addition to floor anchors.

5. Provide frames with calking stops, filler pieces and trim where indicated on Drawings or required; integrally formed as part of the frame wherever possible. Applied calking stops, filler pieces, and other members as indicated, shall be neatly attached by spot welding. All welds at galvannealed frames shall be painted with zinc-rich primer.

6. Equip sound-proof frames with adjustable door stops and continuous rubber seals. Fill frames solidly with sound-deadening material.

7. At butts, cut back jamb the thickness of one leaf of butt.

8. Drill and tap reinforcement to template.

9. Spot weld 20 gage plaster guard to frame at latch cutouts, if applicable. Paint all welded areas with zinc-rich primer.

10. Provide reinforcement for hardware as indicated on Drawings and as required for proper hardware installation. Refer to Section 08 71 00 - Door Hardware.

11. Provide frames for other openings as indicated on the Drawings.

12. Provide cutouts and reinforcing for security devices as required.

2.6 SHOP PAINTING

A. All doors shall be delivered to the site with a full shop coat. Doors not fully shop coated shall not be accepted.

B. Chemically wash, rinse, and dry exposed and concealed surfaces of fabricated units.

C. Apply one coat of rust-inhibiting primer (Carboline “Carbozinc 11 HS” or approved equal) to all exposed surfaces of ungalvannealed doors and frames. Use the same paint to touch up all welded areas of galvannealed doors and frames. Apply primer per the manufacturer’s recommendations

D. Units shall pass the following tests:

1. Salt Spray Test complying with ASTM B117 for 120 continuous hours.

2. Water fog Test Complying with ASTM D1735 or ASTM D4585 for 240 continuous hours

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions

Examine substrate and conditions, under which the frames are to be installed, for defects which will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3. 2 INSTALLATION

A. Install hollow metal doors, frames, and accessories in accordance with the Drawing Details, approved Shop Drawings, and the manufacturer's printed instructions, except as otherwise indicated.

B. Frame Installations

Place frames accurately in position; plumb, align, and brace securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreader bars, leaving surfaces smooth and undamaged.

1. At in-place concrete and in-place masonry construction, place frames and secure in place with anchorage devices. Set anchorage devices opposite each anchor location, in accordance with details on approved Shop Drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.

   a. Anchor frames as detailed on the Drawings.

2. Place fire rated frames in accordance with NFPA Standard No. 80.

3. Provide necessary field splices in frames as detailed on approved Shop Drawings, welded and finished to match factory fabrication.

4. Extend jambs to structural floor slab and securely anchor in place.

C. Door Installation

1. Install doors accurately in their respective frames within the clearance specified in Part 2.

2. Place fire rated doors with clearances as specified in NFPA standard No. 80.

D. Drill and tap doors and frames to receive surface applied hardware.

3.3 ADJUSTING

A. Prime Coat Touch-up

Immediately after installation, sand smooth and clean rusted and damaged areas of shop prime coat and apply touch-up of original primer.

B. Final Adjustments

Check and adjust operating finish hardware items prior to final inspection. Leave work in complete and proper operating condition.

3.4 CLEANING

A. Clean doors, frames, and accessories, leaving free of dirt and other foreign material after completion of installation.

+ + END OF SECTION + +

SECTION 08 14 00

WOOD DOORS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals

B. Section 01 74 00, Construction Waste Management

E. Section 08 71 00, Door Hardware

F. Section 08 80 00, Glass, Plastic, Glazing

F. Section 09 91 13, Exterior Painting

G. Section 09 91 23, Interior Painting

1.2 REFERENCES

A. Standards: Unless otherwise specified, comply with the applicable requirements of the "Architectural Woodwork Standards" (First Edition-2009) (AWS).

1.3 SUBMITTALS

A. Shop Drawings: Show details, elevation, and construction for each door type, location and installation requirements for Finish Hardware (including cutouts and reinforcements), and accessory items.

1. Include a schedule of doors using the same reference numbers for details and openings as those on the Contract Drawings.

B. Product Data: Catalog sheets, specifications, and installation instructions for each type door specified.

C. Samples:

1. 12 x 12-inch corner sample of each door type, with panel (if any).

a. Factory Finished Doors: Include shop finish on samples.

D. Quality Control Submittals:

1. Affidavit required under Quality Assurance Article.

1.4 QUALITY ASSURANCE

A. Certifications: Affidavit by door manufacturer certifying that each door meets the specified requirements and standards.

B. Fire Rated Doors: Carry metal label, fastened on hinge edge with drive screws, indicating fire class/rating certified by an independent testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Factory Finished Doors: Deliver doors in factory applied plastic bags or heavy paper protective cartons. Mark packaging with sufficient identification to insure proper door location.

B. Comply with manufacturer's storage instructions.

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Do not store doors within the building or install doors until after completion of cast-in-place concrete, masonry, plastering, gypsum board and tile Work, and until after the building has dried out.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber: Comply with applicable AWS species requirements for door type and grade.

1. Exposed Surfaces: As indicated on the Drawings or quarter sawn oak veneers. Furnish matching exposed surface material on both faces and both edges of each door unless otherwise indicated.

2. Fire Rated Doors: Exposed faces to match non-fire rated doors in same building area.

B. Wood Veneers: Comply with applicable AWS species requirements for door type and grade.

C. Wood Doors, with aluminum exterior cladding:

1. Manufacturer: Marvin

2.2 FABRICATION

A. Interior Flush Wood Doors (Non Fire Rated) 2 or 3 ply face panel construction each side over a solid glued wood block (stave) core edge bonded to stiles and rails, complying with AWS SLC 5 or SLC 7; or 2 or 3 ply face panel construction each side over a solid wood particleboard core edge bonded to stiles and rails, complying with WAS PC5 or PC 7.

1. Exposed Surfaces For Transparent Finish: AWS Premium Grade

a. Face Veneer Cut, and Species as chosen by District.

b. Face Veneer Matching

1) Label door and panel assembly match relationships to insure proper field assembly.

B. Interior Flush Wood Doors (3/4, 1, and 1-1/2 Hour Fire Rated): 2 or 3 ply face panel construction each side over fire rated solid mineral core, with hinge stile construction having equivalent stile edge split resistance and screw withdrawal resistance of one inch thick wood, and complying with applicable AWS FD for the indicated fire rating.

1. Exposed Surfaces for Paint Finish: Medium density overlay face over standard thickness hardwood face veneers, or AWS Custom Grade rotary cut birch face veneers. Close grain hardwood for exposed edges and other solid wood components.

C. Stile and Rail Doors: Veneered construction using solid lumber edge glued core, with 1/8-inch-thick face veneers and matching wood species exposed edges and other solid wood components.

1. Panels: Raised

2. Panels: Flat

3. Doors for Transparent Finish: AWS Premium Grade

D. Light Openings: Fully trimmed openings. Comply with the applicable provisions of the referenced standards for core treatment and stop application.

1. Light Openings For Fire Rated Doors: Factory cut and trim openings to comply with applicable codes.

E. Exterior Wood doors with Aluminum Cladding

1. Description: Factory assembled Ultimate Commercial Door, as manufactured by Marvin, Ripley, Tennessee.

2. Frame Description

a. Finger-Jointed, edge-glued core

b. Kiln dried to moisture content no greater than twelve (12) percent at the time of fabrication

c. Water repellent, preservative treated in accordance with WDMA I.S.4.

d. Frame width: 4 9/16” (116mm)

e. Frame thickness: 1 1/16” (27mm)

f. Exterior extruded aluminum clad 0.050” (1.3mm) thick

3. Panel Description

a. 1 ¾” Doors: Stiles contain laminated veneer lumber (LVL) core with non-finger-jointed Pine, White Oak, Cherry, Mahogany, Mixed Grain Douglas Fir. Solid wood top, bottom and intermediate rails.

b. Kiln dried to moisture content no greater than twelve (12) percent at time of fabrication.

c. Water repellant, preservative treated in accordance with WDMA I.S.4.

d. 2 ¼” Doors: Stiles and top rail contain laminated veneer lumber (LVL) core with non finger-jointed Pine, White Oak, Cherry, Mahogany, Mixed Grain Douglas Fir. Solid wood bottom and intermediate rails.

e. Composite panel thickness: 1 ¾” (44mm); 2 ¼” (57mm)

f. Exterior extruded aluminum clad 0.055” (1.4mm) thick

g. Top rail width: 1 ¾” panel: 6” (152mm) or 2 ¼” panel: 8 1/8” (206mm)

h. Stile width: 6” (152mm)

i. Bottom rail height: 11 3/8” (289mm)

j. Panel corners glued and fastened with 5/8” x 4” (16mm x 102mm) fluted hardwood dowels. Removable interior vinyl glazing stops with non finger-jointed wood covers. 1 ¾” panel: no visible fastener holes; 2 ¼” panel: visible nail fastener on glazing stop.

k. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

4. Simulated Divided Lites (SDL) (as indicated on dwgs door elevations)

a. 5/8” (16mm), 7/8” (22mm), 1 15/16” (49mm), 2 13/32” (61mm) – with or w/out internal spacer bar.

b. Exterior muntins: Extruded aluminum 0.055” (1.4mm) thick. Color matched panel aluminum cladding color.

c. Interior muntins: Wood and finish interior of door

d. Pattern: Rectangular. Custom lite layout

e. Interior muntins: Wood and finish interior of door

f. Standard interior sticking: Ogee

F. Round Top Exterior Round Top Window

1. Polygon frame exterior aluminum clad with 0.055” (1.3mm) thick extruded aluminum

a. Polygon frame thickness: Full Frame- 1-3/32” (28mm); Contemporary- 1-3/16” (30mm)

b. Round Top frame exterior aluminum clad with 0.075” (1.9mm) thick extruded aluminum

c. Round Top frame thickness: 11/16” (17mm)

d. Frame depth: Clad Direct Glaze - 4 9/16” (116mm); Clad Narrow Frame (Contemporary) Direct Glaze - 2 3/16” (56mm)

2. Finish

a. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

2.3 FACTORY PRIMING

A. Factory Priming for Doors to Receive Paint Finish: Shop apply prime coat on all exposed surfaces and edges of wood doors scheduled or indicated to receive paint finish.

2.4 FACTORY FINISHING, PREFITTING, AND PREPARATION FOR HARDWARE

A. Factory Finishing: Prefinish wood doors at the factory or finishing shop as follows:

1. Comply with AWS factory finishing recommendations including final sanding requirements.

2. Finishing System: Comply with the requirements of the following AWS Finish System:

a. Transparent Finish: System No. 5 - Conversion Varnish, Premium Grade.

1) Sheen: Dull satin; 15 to 20 degrees.

2) Stain Color: To match architectural woodwork.

3) If Open Grain Wood: Filled finish.

b. Opaque Finish: System No. 3 - Standard Lacquer, Custom Grade finish requirements for wood grain characteristics of exposed wood species.

1) Sheen: Medium gloss rubbed effect; 35 to 45 degrees.

B. Factory Prefitting and Premachining for Hardware: Prefit doors scheduled or indicated to receive factory finishing. Premachine these doors for hardware.

1. Comply with AWS clearance requirements for prefitting. Machine doors for hardware requiring cutting of doors. Comply with finish hardware schedule, door frame shop drawings, and hardware templates to insure proper fit and alignment of doors and hardware.

2. Verify hardware in existing frames in field to verify dimensions and proper alignment prior to proceeding with factory machining of doors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition doors to average prevailing humidity in installation area prior to hanging.

B. Prepare doors to receive scheduled mortise hardware. Coordinate doors with the finish hardware schedule and with the door frame shop drawings for proper location of mortise hardware. Machine doors for hardware.

C. Touch-up cut surfaces of factory primed doors with primer compatible with primer specified for factory priming.

3.2 INSTALLATION

A. Install the Work of this Section in accordance with manufacturer's printed installation instructions, except as shown or specified otherwise.

B. Fit doors to prepared frames for proper fit. Allow 3/32 to 1/8 inch clearance at head and both jambs. Trim doors when necessary by planning. Slightly chamfer edge of lock stiles. Bevel lock stile as follows:

1. Non Fire Rated Doors: 1/8 inch in 2 inches.

2. Fire Rated Doors: 1/16 inch in 2 inches.

C. Prefit Doors: Do not alter prefit factory finished doors.

D. Fire Rated Doors: Install doors in corresponding fire rated frames in accordance with the requirements of NFPA No. 80.

E. Factory Finished Doors: Field touch-up and restore finishes damaged during installation.

+ + END OF SECTION + +

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SECTION 08 22 00

FIBERGLASS DOORS AND FRAMES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced plastic (FRP) Doors

B. Fiberglass reinforced plastic (FRP) Frames

1.2 RELATED SECTIONS

A. Applicable provisions of Division 1 shall govern all work under this section.

B. Division 4 Section “Unit Masonry Assemblies” for installing anchors and grouting frames in masonry construction.

C. Division 8 Section “Door Hardware” for door hardware and weather-stripping.

D. Division 8 Section “Glazing” for glass in doors and frames.

E. Division 9 Section “Painting” for field painting factory-primed doors and frames.

1.3 QUALITY ASSURANCE

A. General: Provide fiberglass reinforced door and frame units made of components of standard construction furnished by one manufacturer as coordinated assemblies.

B. Manufacturer: Company specializing in the manufacture of fiberglass doors and frames with a minimum of five years documented experience.

C. Construction: Verify that FRP doors and frames are manufactured utilizing pultruded fiberglass components for flexibility, durability, superior strength and chemical resistance. Press-molded doors and frames will not be accepted. Resin rich door edges and gelcoat are prone to chipping and cracking (brittle).

D. Resins: Resins shall comply with USDA and FDA standards for incidental food contact.

E. Flame Spread Rating: Flame retardant structural shapes meet the minimum flame spread rating less than or equal to 25 when tested

according to ASTM E84.

F. Fire-rated doors (where applicable) and frames to conform to NFPA 252 (2008), CAN4 S104 (1985), UL10C (2001), and UL9 (2005).

G. Physical Endurance: FRP Doors and frames successfully completed 1,000,000 cycles Grade A swing test in compliance with ANSI/SDI A250.4-2011.

H. Impact Strength: FRP doors and panels 10.32 foot-pounds per inch of notch, ASTM D-256

I. Tensile Strength:

1. FRP doors and panels 12,000 psi, ASTM D-638

2. FRP frames 30,000 psi, ASTM D-638

J. Flexural Strength: FRP doors, panels and frames 25,000 psi, ASTM D-790

K. Compressive Strength:

1. FRP doors and panels 18,000 psi, ASTM D-695

2. FRP frames 30,000 psi, ASTM D-695

L. Water Absorption: FRP doors, panels and frames .27%, ASTM D-570

M. Hardware Reinforcements: FRP doors and frames fabricated with a minimum screw holding strength of 1,000 lbs. Tested with a #12 x 1-1/4" hinge screw.

N. Paint Adhesion: Coating for FRP doors, panels and frames to conform to AAMA 624-07 for color uniformity, film adhesion, specular gloss, direct impact, abrasion resistance, chemical resistance and USDA approved.

O. Warranty: Warranty fiberglass doors and frames for life of the initial installation against failure due to corrosion. Additionally, warranty fiberglass doors and frames for a period of 10 years against failure due to materials and workmanship from date of substantial completion.

1.4 - SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details and finishes.

1.5 – DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and replace damage items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Avoid using non-vented plastic or canvas covers that could create a humidity chamber

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PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Edgewater Door – 175 N. Western Ave. Neenah, Wisconsin 54956 Phone: 920-886-1995 Fax: 920-886-1998

2. Substitutions: as approved equal

2.2 DOORS

A. Interior Doors: Provide doors complying with requirements indicated below:

1. E-S Series (Heavy Duty) from the “Cutting Edge” product line (seamless).

2. Doors to have at least two internal full height heavy duty vertical solid FRP polymer stiffeners for warp resistance.

3. Expanded polystyrene solid foam core.

B. Acoustical Door: Provide door complying with the requirements indicated below:

1. CGA – Acoustical

2. STC ratings 31 through 47.

C. Vision Lite Systems: Lite opening shall be completely sealed utilizing solid

FRP polymer, integrated into the units sub-frame during construction.

D. Door Louvers: Provide sight-proof louvers for doors, where indicated. Stationary louvers to be manufactured utilizing fiberglass inverted "V" blades. Louver openings shall be completely sealed in the same manner as lite openings.

E. Transom/side Panels: Transoms to be identical to the doors in construction and materials – if applicable to this project.

2.3 – FRAMES

A. General: Provide pultruded fiberglass frames for doors, transoms, sidelites and borrowed lites – where indicated.

B. Frames: Comply with the requirements of grade specified for corresponding doors. Frames for E-S (standard). Profile must be of standard hollow type to permit installation into new concrete or block walls, as well as slip- on drywall situations. Solid (foam filled) or boxed frames will not be accepted.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

D. Plaster Guards: Provide plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

E. Supports and Anchors: Fabricated from no less than 0.125 inch (3.18 mm) thick pultruded fiberglass material.

1. Wall Anchors in New Masonry Construction: Provide T-strap or wire anchors.

2. Wall Anchors in Existing Masonry Construction: Provide six (three per jamb) Redhead or Lock-bolt type flat head, stainless steel expanding sleeve bolts, 3/8 inch diameter, 4 inches in length.

3. Existing Steel or Wood Stud: Provide drywall slip-on frame anchoring system – compression type.

2.4 – FABRICATION

A. General: Fabricate fiberglass door and frame units to be rigid, neat in appearance and free from defects including warp and buckle. Where

practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.

B. Core Construction: Manufacturer's standard core construction that complies with the following:

1. E-S (standard) series to have expanded polystyrene foam core

2. Hollow/honeycomb core will not be accepted

C. Stiles and Rails: Fabricate doors utilizing heavy duty solid FRP polymer members.

D. Door Faces: Laminated composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive and then cured under pressure until completely bonded.

E. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom, with standard being 5/8 inch (15.9 mm) at bottom.

F. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub free operation. Square lock-edge will not be accepted.

G. Tolerances: Maximum diagonal distortion – 1/16 inch (1.6 mm) measured with straight edge, corner-to-corner.

H. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium solid FRP polymer and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.

I. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.

J. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies, with an "R" value of 11-12.

K. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.

L. Frame Construction: Fabricate frames to size and shape shown on drawings.

1. Fabricate frames with mitered resin-welded corners and seamless face joints.

2. Provide set-up and resin welded frames with temporary spreader bars.

3. Provide 4 or 6 inch terminated/hospital stops – where indicated.

M. Hardware Locations: Locate hardware as indicated on shop drawings or if not indicated, according to manufacturer's standard locations.

N. Glazing/Louver Stops: Manufacturer's standard two-piece PVC retainers.

1. Provide non-removable stops on outside of exterior and on secure side of interior doors for glass, louver and other panels in doors.

2. Provide screw-applied, removable, glazing stops on inside of glass, louvers and other panels in doors.

3. Loose, eight piece trim kits will not be accepted. Additionally, retainers held in place by two-sided tape are not acceptable.

4. Glass to be supplied and installed under section 08800, unless stated otherwise.

O. Astragals: Fabricate astragals for pairs of doors utilizing fiberglass materials flat astragal – where indicated.

2.5 – FINISHES

A. Prime Finish: Pre-clean and shop prime each door and frame ready for finish painting, performed at the jobsite under Section 099123.

1. Where indicated, furnish fiberglass doors and frames factory pre-finished.

a. Finish: Manufacturers standard chemical resistant acrylic polyurethane topcoat

b. Sheen: Semi-gloss

c. Pencil Hardness, ASTM D3363 – 3H

B. Door Faces: Face skins shall be smooth. Due to the unit's extra-long life expectancy, minor repairs on facings must be easily blended in the event of damage. Slightly textured gelcoat facings will not be

accepted.

C. Finish on fiberglass frames must match that of the fiberglass doors to which they are installed.

2.6 HARDWARE

A. Hardware: All hardware shall be furnished under section 08710 unless stated otherwise.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Install fiberglass doors, frames and accessories according to Shop Drawings, manufacturer's data and as specified.

B. Placing Frames: Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge locations on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with stainless steel expansion bolts and masonry anchorage devices.

4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

C. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

D. Door Installation: Fit fiberglass doors accurately in frames. Shim as necessary.

3.2 – ADJUSTING AND CLEANING

A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

B. Cleaning: Clean fiberglass door and frame assemblies in accordance with manufacturer's recommended procedure.

+ + END OF SECTION + +

SECTION 08 33 00

SECURITY GATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Upcoiling Security Gates, power operated.

1.2 RELATED SECTIONS

A. Section 05 50 00, Metal Fabrications: Support framing and framed opening.

B. Section 08 36 80, Overhead Rolling Doors.

C. Section 08 71 00, Door Hardware: Product Requirements for cylinder core and keys.

D. Section 26 05 33, Raceway and Boxes: Conduit from electric circuit to gate operator and from gate operator to control station.

E. Section 26 05 73, Electrical Systems Analysis

F. Section 26 27 26, Wiring Devices

1.3 REFERENCES

A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

G. NEMA MG 1 - Motors and Generators.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Include detailed plans, elevations, and details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Install in areas designated by Architect.

2. Do not proceed with remaining work until workmanship and installation is approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

B. Alpine overhead Doors, Inc. 8 Hulse Rd., East Setauket, NY 11733 631-473-9300 . Alpinedoors.com - custom fabrication of slats at bottom, grilles at top

C. Substitutions: Or approved equal

D. Requests for substitutions will be considered in accordance with the provisions of the Contract Documents.

2.2 UPCOILING SECURITY GATES

A. Overhead Coiling Aluminum Grilles and Panels with an Automatic Release for power operated doors.

1. Curtain: Refer to architectural drawing forlayout.

a. Material: Aluminum.

b. For Security grille; Overhead Door , AP Security Grille system model 676

c. Alpine Overhead Doors – custom lower slats and upper grilles – as indicated on drawings

2. Finish:

a. Aluminum clear anodized.

3. Bottom Bar:

a. Tubular extruded aluminum, clear anodized.

4. Guides:

a. Extruded aluminum shapes with retainer grooves and continuous silicone treated wool-pile strips or PVC inserts to reduce noise and assist operation.

b. Guides face mounted on adjacent construction.

c. Guides free standing with tubular steel support frames supplied with gates.

5. Brackets: Minimum 3/16 inch (4.8 mm) steel to support barrel, counterbalance and hood as applicable.

6. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with maximum deflection of 0.03 inches per foot of span. Counterbalance adjustable by means of an adjusting tension wheel.

7. Hood:

a. Aluminum, mill finish with intermediate supports as required.

b. Aluminum, clear anodized with intermediate supports as required.

c. Aluminum, bronze anodized with intermediate supports as required.

d. Aluminum, black anodized with intermediate supports as required.

8. Electric Motor with Emergency Egress: Provide code compliant emergency egress operator system with self-locking mechanism that automatically unlocks, automatically releases, and opens gate fully to permit passage if power is not available. Provide UL listed electric operator, size as recommended by manufacturer to move door in

either direction at not less than 2/3 foot or more than 1 foot per second.

a. 1 horsepower, 460 volts, three phase.

9. Mounting:

a. Front of hood.

b. Mounting Left Hand or Right Hand.

10. Release: Push/Pull Emergency Release Button.

a. Surface mount.

b. Flush mount.

11. Entrapment Protection:

a. 2 wire electric sensing edge

b. Photo cell operation.

12. Control accessories: Control Panel is to be supplied at same voltage as operator selected.

13. Locking: Egress gate self-locking mechanism to prevent forced opening of a closed gate that does not interfere with normal electric operation but fail safe for emergency operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Division 26. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

G. Install perimeter trim and closures.

3.4 ADJUSTING

A. Test security gates for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

+ + END OF SECTION + +

SECTION 08 36 80

OVERHEAD ROLLING DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install overhead rolling doors.

2. The extent of overhead rolling doors is shown on the Contract Drawings and in schedules.

3. The types of rolling door Work required includes the following:

a. Insulated aluminum overhead rolling door. (unless otherwise indicated on drawings)

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the overhead rolling doors.

2. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for the installation of the units. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

C. Related Sections:

1. Division 26, Electrical.

1.2 QUALITY ASSURANCE

A. Wind Loading Design Criteria: Design and reinforce rolling doors to withstand a wind loading pressure of 30 pounds per square feet.

B. Source Quality Control: Provide overhead rolling doors as complete units produced by a single manufacturer specializing in the production of this type

of work, including hardware, accessories, mounting and installation components.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. Aluminum Association (AA) Standards and Finish Designations.

2. ASTM A446, Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

3. ASTM A525, General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

4. National Electrical Manufacturers Association (NEMA), Standard KS 1.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Drawings for components and installations as shown or specified.

2. Copies of manufacturer's specifications, roughing-in diagrams, and installation instructions for each type and size of rolling door. Include manufacturer's data, operating instructions and maintenance data. Indicate by transmittal form that installer has received a copy of diagrams and installation instructions.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver doors and frames cartoned or crated to provide protection during transit and job storage.

2. Inspect metal work upon delivery for damage. Minor damage may be repaired provided the finish items are equal in all respects to new work and acceptable to the Engineer, otherwise, remove and replace damaged items as directed.

B. Storage of Materials: Store doors and frames at the building site under cover. Place units up off the floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Door Curtain:

1. Door Curtain Slats: Fabricate rolling door curtain of flat interlocking slats designed to withstand the specified wind loading, of continuous length for the width of the door without splices. Unless otherwise shown or specified, provide slats of the material gauge recommended by the door manufacturer for the size and type of door required, as follows:

   a. Aluminum Door Curtain Slats: Provide the following minimum gage materials for all door types: 16 gage Brown and Sharpe. Double faced slats insulated with closed cell polyethylene foam. Provide the following equivalent anodic finish and color after AA Number M34C22 combined pretreatment (caustic etch with satin finish).

      1) AA Number A42 with medium bronze.

2. Endlocks: Heavy malleable iron castings, secured to curtain slats with 2 galvanized rivets. Provide locks on alternate curtain slats for curtain alignment and resistance against lateral movement.

3. Windlocks: Heavy malleable iron castings secured to curtain slats with 3 galvanized rivets. Space windlocks approximately 24 inches on center on both edges of curtain.

4. Bottom Bar: Consisting of 2 aluminum angles, each not less than 1-1/2 inches by 1-1/2 inches by 1/8 inch thick.

B. Curtain Jamb Guides:

1. Fabricate curtain jamb guides of Type 316 stainless steel shapes with sufficient depth and strength to retain the curtain against specified wind loading. Build-up units with minimum 3/16-inch thick steel sections complying with ASTM A36. Slot bolt holes for track adjustment.

2. Secure guides to continuous wall angles. Place anchor bolts on exterior wall guides so that they are concealed when door is in closed position. Provide removable stops on guides to prevent over-travel of curtain, and a continuous bar for holding windlocks.

C. Weather Seals, Exterior Doors: Provide natural rubber or neoprene rubber weatherstripping for exterior doors. Secure weather seals with continuous metal pressure bars. At door heads, use a 1/8-inch thick continuous sheet secured to the inside of the curatin coil hood. At door jambs, use a 1/8-inch thick continuous strip secured to the exterior side of the jamb guide.

D. Counterbalancing Mechanism:

1. Counterbalance doors by means of an adjustable steel helical torsion spring mounted around a steel shaft and mounted in a spring barrel and connected to the door curtain with the required barrel rings. Use grease-sealed ball bearings or self-lubricating graphite bearings for all rotating members.

2. Counterbalance Barrel:

a. Fabricate spring barrel of hot-formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support the roll-up of curtain without distortion of slats and limit barrel deflection to not more than 0.03 inch per foot of span under full load.

b. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance the weight of the curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to the barrel and the shaft.

c. Fabricate torsion rod for counterbalance shaft of case-hardened steel, of required size to hold the fixed spring ends and carry the torsional load.

3. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

4. Hood:

a. Form to entirely enclose coiled curtain and operating mechanism at opening head, and act as a weather seal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and any portion of jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.

b. Fabricate hoods of Alloy 3003 aluminum sheet not less than 0.032-inches thick, mill finish.

E. Product and Manufacturer: Provide one of the following:

1. Overhead Door Model 422 Sectional Steel Door, Model 630,631 Fire rated doors

2. Thermal Series as manufactured by Atlas Door Corporation.

3. Thermiser as manufactured by Cornell Iron Works Incorporated.

4. Or approved equal.

2.2 ACCESSORIES

A. Electric Door Operators:

1. General: Furnish electric door operator assembly of the size and capacity recommended and provided by the door manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, clutch, remote control stations, and control devices meeting NEMA 1 requirements.

2. Provide a hand-operated disconnect or a mechanism for automatically engaging a sprocket and chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so that they are accessible from floor level. Include an interlock device to automatically prevent the motor from operating when emergency operator is engaged.

3. Design operator so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.

4. Door Operator Type: Provide wall or bracket-mounted door operator units consisting of an electric motor, a worm gear drive from motor to reduction gear box, a chain or worm gear drive from reduction box to a gear wheel mounted on the counterbalance shaft, and a quick-clutch disconnect-release for manual operation. Provide motor, clutch, and drive assembly of horsepower and design as determined by the door manufacturer for the size of door required and as herein specified.

5. Electric Motors:

   a. Provide high-starting torque, reversible, constant duty, Class A insulated electric motors with overload protection.

   b. Provide UL Listed electric operator, size and type as recommended by the manufacturer (1 horsepower motor min.) to move door in either direction, from any position, at not less than 8 inches nor more than 12 inches per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.

   c. Coordinate wiring requirements and current characteristics of motors with the building electrical system; see Division 26 of these Specifications.

   d. Provide open-drip-proof type, unless otherwise shown or specified.

   e. Motors shall be 3 phase, rated for 460-volt operation.

6. Remote Control Station:

   a. Unless otherwise shown, provide momentary-contact, 3-button NEMA 1 control station with push button controls labeled "open," "close" and "stop." Install at location as shown or scheduled.

7. Safety Edge Device: Provide each door with an electric safety switch, extending full width of the door bottom, and located within a U-shaped neoprene or rubber astragal mounted to the bottom door rail. Design the unit to operate such that contact with the switch before fully closing will immediately stop the downward travel and reverse the direction to the fully opened position. Connect to the control circuit through a retracting safety cord. The compressible strip shall also serve as a weatherseal along the bottom of the door.

2.3 SURFACE PREPARATION AND SHOP PAINTING

A. Clean and prime coat ferrous metal surface of equipment in the shop in accordance with the requirements of Section 09 91 13.

B. Coat bearing, gear and similar mechanical, polished and non-ferrous metal surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operation.

C. Field painting is under Section 09 91 13.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor and his installer must examine the substrates and conditions under which the rolling door unit is to be installed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 INSTALLATION

A. Install, connect and adjust doors in full accordance with the manufacturer's written instructions, the approved Shop Drawings, and as shown and specified. Refer to paragraph 1.1.B of this Section for the requirements of coordination with others.

B. Install, wire, connect and adjust doors, motors, starters, pushbutton stations, limit and safety switches and all other electrical accessories and connections required in full accordance with the manufacturer's written instructions, the approved Shop Drawings, and as shown and specified. Refer to paragraph 1.1.B of this Section for the requirements of coordination with others.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation including the work by other trades, test and adjust doors to operate easily, free from warp, twist or distortion. Test the door in presence of Engineer to demonstrate compliance with the Specifications and the manufacturers design criteria.

3.4 ADJUSTMENT AND CLEANING

A. Adjust mechanism so moving parts operate smoothly.

B. Repair damage to rolling doors, and match manufacturer's original finish.

C. Leave work area clean and free of debris.

+ + END OF SECTION + +

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SECTION 08 43 13

ALUMINUM STOREFRONT DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed doors, storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

D. Door hardware.

1.2 RELATED REQUIREMENTS

A. Section 051200, Structural Steel

B. Section 055000, Metal Fabrications

C. Section 072800, Water resistive barrier and Air barrier

D. Section 079200, Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 087100, Door Hardware: Hardware items other than specified in this section.

F. Section 088000, Glazing: Glass and glazing accessories.

G. Section 013300, Submittals.

H. Section 017400, Construction Waste Management.

1.3 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.

D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

G. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.

H. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.

I. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

J. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

K. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

L. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

M. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

N. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

O. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

P. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

Q. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

R. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

S. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).

T. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

U. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2014a.

V. FLA (PAD) - Florida Building Code Online - Product Approval Directory; database at www.floridabuilding.org.

W. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.

D. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

I. Designer's Qualification Statement.

J. Manufacturer's Qualification Statement.

K. Installer's Qualification Statement.

L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in The State of New York.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.9 WARRANTY

A. See Section 017700 – Closeout Procedures

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five-year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN -

A. Center-Set Style, Non-thermal:

1. Basis of Design: Kawneer North America; 350 Swing Door, medium stile, Non-Thermal Framing Systems www.kawneer.com.

2. Medium stile, 3-1/2" (89 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.

B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:

1. Or approved equal

C. Substitutions: See Section 016000 - Product Requirements.

1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.3 BASIS OF DESIGN - SWINGING DOORS

A. Narrow Stile, Non-thermal

1. Basis of Design: Kawneer North America; 350 Series Tuffline Standard Entrance Doors: kawneer.com.

2. Thickness: 1 ¾" inches.

B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:

1. Or approved equal

C. Substitutions: See Section 016000 - Product Requirements.

1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

D. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.

a. Design Wind Loads: Comply with requirements of ASCE 7.

b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, having Florida Building Code "FLA (PAD)" approval for Large and Small Missile impact and pressure cycling at design wind pressure.

3. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.

4. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

5. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

6. Overall U-value Including Glazing:.35 Btu/(hr sq ft deg F), maximum.

2.6 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

1. Framing members for interior applications need not be thermally broken.

2. Glazing Stops: Flush.

3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

B. Glazing: As specified in Section 088000.

C. Swing Doors: Glazed aluminum.

1. Thickness: 2-1/2 inches.

2. Top Rail: 350 Series 3-1/2" inches wide.

3. Vertical Stiles: 350 Series 3-1/2 inches wide.

4. Bottom Rail: 350 Series 6-1/2" inches wide.

5. Glazing Stops: Square.

6. Finish: Same as storefront.

2.7 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Structural Steel Sections: ASTM A36/A36M; shop primed.

E. Structural Supporting Anchors: See Section 051200.

F. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.

G. Structural Supporting Anchors Attached to Reinforced Concrete Members: Design for welded attachment to weld plates embedded in concrete.

H. Fasteners: Stainless steel.

I. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.

J. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch minimum thickness.

K. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

L. Sealant for Setting Thresholds: Non-curing butyl type.

M. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

N. Glazing Accessories: As specified in Section 088000.

O. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

P. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.8 FINISHES

A. Anodized Aluminum:

1. Color Finish: Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 7 mils thick. More than 50 percent variation of the maximum shade range approved will not be accepted in a single component or in adjacent components, stiles, and rails on a continuous series.

B. Colors: As selected by Engineers and Architects from manufacturer's standard range.

2.8 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Other Door Hardware: Storefront manufacturer's standard type to suit application.

1. Finish on Hand-Contacted Items: Polished stainless steel.

2. For each door, include pivots, push handle, pull handle, and closer.

C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

F. Pivots: Center type; top and bottom.

1. Provide on doors as indicated.

G. Push/Pull Set: Standard configuration push/pull handles.

1. Provide on doors as indicated.

H. Door Closers: Concealed overhead.

1. Provide on doors as indicated.

I. Locks: keyed cylinder outside.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Install hardware using templates provided.

1. See Section 087100 for hardware installation requirements.

K. Install glass and infill panels in accordance with Section 088000, using glazing method required to achieve performance criteria.

L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

B. See Section 014000 - Quality Requirements, for general testing and inspection requirements.

C. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.

1. Perform a minimum of two tests in each designated area as indicated on drawings.

2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

D. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.

1. Perform a minimum of two tests in each designated area as indicated on drawings.

2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.

a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.

4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.

E. Repair or replace storefront components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.5 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

+ + END OF SECTION + +

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SECTION 08 51 23

COLD-ROLLED STEEL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Maintenance of Existing Steel Windows

1. Removal of light rust, flaking and excessive paint;

2. Priming of exposed metal with a rust-inhibiting primer;

3. Replacement of cracked or broken glass and glazing compound;

4. Replacement of missing screws or fasteners;

5. Cleaning and lubrication of hinges;

6. Repainting of all steel sections with two coats of finish paint compatible with the primer;

7. Caulking the masonry surrounds with a high quality elastomeric caulk.

B. Section includes steel windows from cold-rolled members.

C. Related Requirements

1. Section 08 11 13, "Hollow Metal Doors and Frames" for borrowed-lite interior steel windows.

2. Section 085123.13, "Hot-Rolled Steel Windows" for steel windows fabricated from hot-rolled members.

3. Section 085123.33, "Cold-Rolled Stainless-Steel Windows" for stainless-steel windows fabricated from cold-rolled members.

1.3 PRE-INSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Review requirements for cold-rolled steel windows, including, but not limited to, the following:

    a. Coordinating finishing of cold-rolled steel windows with other work where color and finish matching is indicated.

    b. Coordinating cold-rolled steel windows with other exterior wall components, including anchorage, glazing, flashing, weeping, air barriers, sealants, and protection of finishes.

    c. Sequencing work to construct a watertight and weathertight exterior building enclosure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.

2. Detail attachments to other work, and between units, if any.

3. Include hardware and required clearances.

4. Mullion details, including reinforcement and stiffeners.

5. Flashing details.

6. Glazing details.

7. Accessories.

C. Samples: For each exposed product and for each color specified, 12 inches (300 mm) long.

D. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.

E. Samples for Verification: For each type of cold-rolled steel window.

1. Main Framing and Sash Members: Full-sized sections 12 inches long, with factory-applied color finish, weather stripping, and glazing bead.

2. Hardware: Full-size units with factory-applied finish.

F. Product Schedule: For cold-rolled steel windows. Use same designations indicated on Drawings.]

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer and testing agency.

B. Product Test Reports: For cold-rolled steel windows, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For cold-rolled steel windows to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating cold-rolled steel windows that meet performance requirements indicated and of documenting performance by labels, test reports, and calculations.

B. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC Standard 17025].

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of cold-rolled steel windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.

b. Structural failures, including excessive deflection.

c. Excessive water leakage or air infiltration.

d. Faulty operation of operable sash and hardware.

e. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period:

a. Windows: Three years from date of Substantial Completion.

b. Finish: Five years or more from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. SWI Standards: Comply with applicable requirements in SWI's "The Architect's Guide to Steel Windows and Doors" and "Specifications: Cold-Rolled," except where more stringent requirements are indicated.

B. Structural Wind Loads: As indicated on Drawings.

C. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than L/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressures.

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, cold-rolled steel windows do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.

3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Air Infiltration: Not more than 0.37 cfm/ft. of sash crack length at an inward test pressure of 6.24 lbf/sq. ft. when tested according to ASTM E 283.

F. Water Penetration: No leakage for 15 minutes when window is subjected to a rate of flow of 5 gal./h/sq. ft with a differential pressure across the window of 4.5 lbf/sq. ft. when tested according to ASTM E 331.

G. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.80 Btu/sq. ft. x h x deg F or as approved by Architect in submittal.

H. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30. or as Approved by Architect.

I. Condensation Resistance: Provide cold-rolled steel windows with a CRF when tested according to AAMA 1503 CR determined according to NFRC 500 of 36 minimum.

J. Thermal Movements: Provide cold-rolled steel windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F) material surfaces.

K. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.

L. Fire-Test-Response Characteristics: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.2 REFINISHING EXISTING WINDOWS

A. Recommended methods for removing light rust include manual and mechanical abrasion or the application of chemicals.

B. Burning off rust with an oxyacetylene or propane torch, or an inert gas welding gun, should never be attempted because the heat can distort the metal. In addition, such intense heat (often as high as 3800 deg. F) vaporizes the lead in old paint, resulting in highly toxic fumes. Furthermore, such heat will likely result in broken glass.

C. Rust can best be removed using a wire brush, an aluminum oxide sandpaper, or a variety of power tools adapted for abrasive cleaning such as an electric drill with a wire brush or a rotary whip attachment.

D. Adjacent sills and window jambs may need protective shielding.

E. Bare metal should be wiped with a cleaning solvent such as denatured alcohol, and dried immediately in preparation for the application of an anticorrosive primer.

F. Since corrosion can recur very soon after metal has been exposed to the air, the metal should be primed immediately after cleaning. Spot priming may be required periodically as other repairs are undertaken.

G. Anticorrosive primers generally consist of oil-alkyd based paints rich in zinc or zinc chromate. Red lead is no longer available because of its toxicity.

H. All metal primers, however, are toxic to some degree and should be handled carefully. Two coats of primer are recommended. Manufacturer's recommendations should be followed concerning application of primers.

2.3 REPAIR IN PLACE EXISTING WINDOWS

A. Medium to heavy corrosion that has not done any structural damage to the metal sections can be removed either by using the chemical cleaning process described under Section 1.2 Maintenance or by sandblasting.

B. Sandblasting can damage the masonry surrounds and crack or cloud the glass, metal or plywood shields should be used to protect these materials.

C. The sandblasting pressure should be low, 80-100 pounds per square inch, and the grit size should be in the range of #10-#45. Glass peening beads (glass pellets) can be used in cleaning steel sections. Use pencil-point (sandblasting) blasters controlling the direction of the spray. The small aperture of the pencil-point blaster may be used in removing dried putty from the metal sections that hold the glass.

D. The bare metal (exposed to air) should be primed as soon as possible.

E. The inside rabbeted section of sash where glazing putty has been removed to be primed. To reduce the dust, some local codes may allow only wet blasting.

F. Either form of sandblasting (dry or wet) metal covered with lead paints produces toxic dust. Proper precautionary measures should be taken against toxic dust and silica particles.

G. Bent or bowed metal sections of the existing windows may be the result of damage to the window through an impact or corrosive expansion. If the distortion is not too great, it is possible to re-align the metal sections without removing the window to a metal fabricator's shop.

H. Glazing is removed, and pressure is applied to the bent or bowed section. In the case of a muntin, place a protective 2 x 4 wooden bracing behind the bent portion and a wire cable with a winch and apply progressively more pressure over several days until the section is realigned. The 2 x 4 bracing is necessary to distribute the pressure evenly over the damaged section. If a section, such as the bottom of the frame, will bow out as a result of pressure exerted by corrosion and it may be necessary to cut the metal section to relieve this pressure prior to pressing the section back into shape and making a welded repair.

I. Replace any and all cracked glass, deteriorated glazing compound, missing screws, and broken fasteners; hinges to be cleaned and lubricated; the metal windows painted, and the masonry surrounds caulked. If the glazing must be replaced, all clips, glazing beads, and other fasteners that hold the glass to the sash should be retained, if possible, as replacements for these parts are being fabricated.

J. When bedding glass, use only glazing compound formulated for metal windows.

K. Clean the hinges (brass or bronze), with a cleaning solvent and fine bronze wool should be used. The hinges should then be lubricated with a non-greasy lubricant specially formulated for metals and with an anticorrosive agent. Use lubricants in a spray form.

L. Paint windows with a paint compatible with the anticorrosive primer, and should proceed on a dry day. (Paint and primer from the same manufacturer should be used.) Two coats of finish paint are recommended if the sections have been cleaned to bare metal. Overlap paint on glass the slightly insuring weathertightness at that connection. After paint dries thoroughly, apply a flexible exterior caulking to eliminate air and moisture infiltration where window and surrounding masonry meet.

M. Caulking is undertaken after windows have received at least one coat of finish paint. The perimeter of the masonry surround should be caulked with a flexible elastomeric compound that will adhere well to both metal and masonry. Use exterior type caulking that has a high tolerance for material movement, be resistant to ultraviolet light, and have a minimum durability of 10 years.

N. Submit shop drawings for the following types of caulking for Architect approval: polyurethane, vinyl acrylic, and butyl rubber. If colored caulking is used and approved by Architect in a submittal, the windows shall have had two coats of finish paint prior to caulking.

2.4 COLD-ROLLED STEEL WINDOWS STANDARD (where applicable and indicated on drawings)

A. Repair of historic windows is preferred. Replacement should be considered only as a last resort. However, when the extent of deterioration or the unavailability of replacement sections renders repair impossible, replacement of the entire window may be justified. Coordinate field conditions with Architect approval on a per window basis.

B. Replacement in kind id deemed necessary (only if approved by Architect) is essential in order to maintain the historic character of the building. However, for less significant windows, replacement with compatible new windows may be acceptable. In selecting compatible replacement windows, the material, configuration, color, operability, number and size of panes, profile and proportion of metal sections, and reflective quality of the original glass should be duplicated as closely as possible.

C. For product information on replacement windows, the contractor should consult manufacturers' catalogues, building trade journals, or the Steel Window Institute, 1300 Sumner Avenue, Cleveland, OH 44115.Copy this article and re-edit for each product.

D. Recommended Basis-of-Design Product: Subject to compliance with requirements, provide Dynamic Architectural Windows & Doors, Inc. 30440 Progressive Wayl, Abbotsford, British Columbia, Canada, V2T 6W3 604-864-8200 email: Model: sales@dynamicwindows.com (Industrial Steel Sash - insulated, thermal breaks, hurricane resistant.

Or a comparable product by one of the following:

1. Arcadia, Inc.

2. D.V. Fyre-Tec, Inc.

3. Optimum Window Manufacturing Corp; Flex Series 2500, 5500, 6500

4. Hope's Windows, Inc.

E. Operating Types: (as applicable and indicated on drawings) Provide the following operating types in locations as indicated on Drawings:

1. Casement: Project in.

2. Casement: Project out.

3. Double hung.

4. Single hung.

5. Horizontal sliding.

6. Awning: Project out.

7. Hopper: Project in.

8. Fixed.

9. Fixed sidelight.

F. Cold-Rolled Steel Windows: Provide frame and sash members mechanically formed from metallic-coated, low-carbon, cold-rolled steel sheet complying with ASTM A 653/A 653M. Comply with SWI specifications for combined weight of frame and sash members and front-to-back depth of frame or sash members.

1. Thermally Improved Design: Provide frame and sash members designed to isolate interior and exterior surfaces for improved thermal performance.

G. Window Finish: Factory powder-coat painted.

1. Color: (To match existing windows)

H. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent

I. Mullions: Formed of cold-rolled steel matching window units; with anchors for support to structure and for installation of window units and having sufficient strength to withstand design pressure indicated. Provide mullions of profile indicated and with cover plates. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.

J. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.

K. Glazing Stops: Provide screw-applied or snap-On glazing stops fabricated from formed steel/stainless steel; coordinate with Section 08 80 00 "Glass, Plastic and Glazing" and with glazing system indicated. Provide glazing stops to match panel frames. Finish glazing stops to match window units if fabricated of steel; otherwise, provide manufacturer's standard finish.

L. Weather Stripping: Manufacturer's standard compressible weather stripping, complying with AAMA 701/702, ASTM C 509, or ASTM C 864 and designed for permanently resilient sealing under compression and for complete concealment when sash is closed.

2.5 COLD-ROLLED STEEL WINDOWS AND DOORS, FIRE-RATED (where applicable and indicated on drawings)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Optimum Window Manufacturing Corp; Fire-Rated Series FR6000 or a comparable product by one of the following:

1. Arcadia, Inc.

2. D.V. Fyre-Tec, Inc.

3. Dynamic Architectural Windows & Doors, Inc.

4. Hope's Windows, Inc.

B. Operating Types: Provide the following operating types in locations where applicable or as indicated on Drawings:

1. Double hung.

2. Single hung.

3. Horizontal sliding.

4. Awning: Project out.

5. Hopper: Project in.

6. Fixed.

C. Cold-Rolled Steel Windows: Provide frame and sash members mechanically formed from metallic-coated, low-carbon, cold-rolled steel sheet complying with ASTM A 653/A 653M. Comply with SWI specifications for combined weight of frame and sash members and front-to-back depth of frame or sash members.

D. Window Finish: Factory powder-coat painted.

1. Color: to match existing and with Architect’s approval

E. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

F. Mullions: Formed of two T-bar-shaped, hot-rolled steel profiles matching window units, fastened to interior and exterior frame-face where windows join together, and cover T-bar shapes using two "U-shaped" cold-rolled formed steel profiles, and having sufficient strength to withstand design pressure indicated. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections.

G. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.

H. Glazing Stops: Provide steel screw-applied glazing stops; coordinate with Section 088000 "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames. Finish glazing stops to match window units.

I. Weather Stripping: Manufacturer's standard compressible weather stripping, complying with AAMA 701/702, ASTM C 509, or ASTM C 864 and designed for permanently resilient sealing under compression and for complete concealment when sash is closed.

2.6 GLAZING

A. Glass and Glazing System: See Section 08 80 00 "Glass, Plastic, and Glazing" for glass units and glazing requirements for cold-rolled steel windows.

2.7 HARDWARE

A. General: Provide manufacturer's standard die-cast-metal hardware, with operating components of stainless steel, carbon steel complying with AAMA 907, brass, bronze, or other corrosion-resistant material designed to smoothly operate, tightly close, and securely lock cold-rolled steel window sash; and sized to accommodate sash weight and dimensions.

B. Self-Closing Device for Fire-Rated Windows: Manufacturer's standard heat-activated self-closing device, complying with NFPA 80.

C. Hung Window Hardware:

1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.

2. Locks and Latches: Cam-action sweep lock and keeper on meeting rail; [one] [two] per sash.

3. Locks and Latches: Spring-catch lock and keeper on top vent meeting rail; one per sash.

4. Handles: Lift handle; two per sash.

D. Projected Window Hardware: (to match existing windows being replaced)

1. Operating Device: Forklatched multi-point lockset with T-pull handle sash operator located at sill.

2. Hinges: Concealed, four-bar friction hinges with adjustable slide shoes complying with AAMA 904; two per sash.

3. Hinges: Balance arms with adjustable, nonabrasive friction pivots; two per sash.

4. Hinges: Balance arms with adjustable, nonabrasive friction shoes; two per sash.

   a. Provide sash operation that permits cleaning of the outside glass face from the interior.

   b. Provide jamb-mounted, sliding, brass friction shoes with screw adjusters.

5. Lock: Forklatched multi-point with T-pull handle.

6. Lock: Cam-action, sweep lock handle with surface-mounted strike.

7. Lock: Key-operated security lock and keeper.

8. Pole-Operated Lock: Cam-action, sweep lock handle and keeper (to match existing with Architect approval)

9. Pole Operators: Tubular-shaped, white bronze; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches (1500 mm) above floor; one pole operator and pole hanger per room that has operable windows more than 72 inches (1800 mm) above floor.

10. Limit Device: Adjustable, concealed friction adjustor/stay-bar, or support arms with adjustable, limited hold-open (all devices to match existing) limit devices designed to restrict sash opening.

E. Die-Cast-Metal-Framed Door Hardware:

1. Hinges: (to match existing with Architect approval).

2. Lockset: Mortise single-point (or to match existing with Architect approval.

3. Cylinder: Full cylinder keyed ext. /thumb turn int. (or to match existing with Architect approval.

4. Weatherseals: Custom extruded EPDM sponge weatherseals.

5. Stops: Standard 90-degree stainless-steel limit stops.

2.8 INSECT SCREENS

A. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, fully integrated with window. Locate screens on inside of window and provide for each operable exterior sash. Comply with SMA 1201.

B. Aluminum Screen Frames: Manufacturer's standard extruded-aluminum or formed-tubular-aluminum members; (submittal as approved by Architect) with mitered, coped joints, or corner extrusions; concealed fasteners; adjustable rollers; and removable PVC or PE spline/anchor concealing edge of mesh.

1. Frame Wall Thickness: 0.04-inch, minimum.

2. Finish: Anodized aluminum in manufacturer's standard color.

3. Finish: Baked-enamel or powder-coat finish in manufacturer's standard color, color selected by the Architect from manufacturer's full range, color to match existing steel windows.

C. Stainless-Steel Screen Frames (where applicable and approved by Architect): Fabricate frames of tubular-shaped, nonmagnetic stainless-steel members of 0.02-inch minimum wall thickness; in finish to match cold-rolled steel window.

D. Glass-Fiber Mesh Fabric(where applicable and approved by Architect): Complies with ASTM D 3656, 18-by-14 or 18-by-16 count per sq. in. (645 sq. mm) mesh of PVC-coated, glass-fiber threads; woven and fused to form

a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration.

1. Mesh Color: Gray.

E. Aluminum Wire Fabric: 18-by-16 count per sq. in. mesh of 0.011-inch diameter, coated aluminum wire.

1. Wire-Fabric Finish: Charcoal gray.

F. Stainless-Steel Wire Fabric: 18-by-16 per sq. in. mesh of 0.009-inch minimum diameter, nonmagnetic stainless-steel wire, Type 304 or 316.

G. Wickets: Provide hinged wickets, framed and trimmed for a tight fit and durability during handling.

2.7 ACCESSORIES

A. Fasteners: Provide fasteners of bronze, brass, stainless steel, or other metal that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of cold-rolled steel windows. (Fasteners to match existing windows in color and profile and as approved by Architect only)

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

B. Anchors, Clips, and Window Accessories: Provide units of stainless steel, hot-dip zinc-coated steel, bronze, brass, or iron complying with ASTM A 123/A 123M. Provide units with sufficient strength to withstand design pressure indicated.

C. Sealant: For sealants required within fabricated windows, provide manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.8 FABRICATION

A. General: Fabricate cold-rolled steel windows of type and in sizes indicated to comply with SWI standards. Include a complete system for assembly of components and anchorage of window units.

B. Provide units that are reglazable without dismantling framing.

C. Prepare non-fire-rated windows for site glazing.

D. Subframes and Operable Sash: Formed of cold-rolled steel of profile indicated. Miter or cope corners, and mechanically fasten and seal joints or weld and dress joints smooth.

E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

F. Provide weep holes and internal water passages to conduct infiltrating water to the exterior.

G. Provide water-shed members above casement sash.

2.9 METALLIC-COATED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A 780.

B. Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, powder-coat finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify rough-opening dimensions, levelness of sill plate and clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. SWI Publication: Comply with applicable requirements in SWI's "General Guidelines on the Installation of Steel Windows," except where more stringent requirements are indicated.

B. Comply with manufacturer's written instructions for installing windows, hardware, operators, accessories, and other components.

C. Install windows level, plumb, square, true to line, without distortion or impediment to thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

D. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

E. Install windows and components to drain condensation, water-penetrating joints, and moisture migrating within windows to the exterior.

F. Separate corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Field Quality-Control Testing:

1. Testing Methodology: Test windows for air-penetration resistance and water resistance according to AAMA 502, Test Method A, by applying same test pressures required for performance.

2. Testing Extent: Three mockup windows as selected by Architect and a qualified independent testing and inspecting agency. Test windows immediately after installation.

C. Prepare test and inspection reports according to AAMA 502.

D. Window will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

B. Clean factory-finished steel surfaces immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. Remove contaminants immediately according to manufacturer's written recommendations.

D. Refinish or replace windows with damaged finish.

+ + END OF SECTION + +

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.

2. Electromechanical door hardware.

3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Section 01 33 00, “Submittals”.

2. Section 01 74 00, “Construction Waste Management”.

3. Section 06 10 00, “Rough Carpentry”.

4. Section 06 20 23, “Finish Carpentry”.

D. Division 08 Section 08 11 13 “Hollow Metal Doors and Frames”. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. ICC/IBC - International Building Code.

3. NFPA 70 - National Electrical Code.

4. NFPA 80 - Fire Doors and Windows.

5. NFPA 101 - Life Safety Code.

6. NFPA 105 - Installation of Smoke Door Assemblies.

7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series

2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.

b. Manufacturer of each item.

c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

e. Explanation of abbreviations, symbols, and codes contained in schedule.

f. Mounting locations for door hardware.

g. Door and frame sizes and materials.

h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.

c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including

approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.

1. Test units according to ASTM E330, ASTM E1886, ASTM E1996 standards, certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicting windstorm approved product.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.

2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for extra heavy duty cylindrical (bored) locks and latches.

2. Seven years for heavy duty cylindrical (bored) locks and latches.

3. Five years for exit hardware.

4. Twenty five years for manual surface door closer bodies.

5. Five years for motorized electric latch retraction exit devices.

6. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 MANUFACTURERS

A. Butts

1. Stanley

2. McKinney

3. Hager

4. Bommer

5. Lawrence

B. Locksets, Passage Sets (Lever Type)

1. Yale SL 8800 FL Series mortise lock with JSL Jefferson Lever trim in satin stainless steel finish (US32D).

2. Sargent 8200 Series mortise lock with LW1B trim in satin stainless steel finish (US32D).

3. Schlage L9000 Series mortise lock with 07 lever and N escutcheon.

4. Marks BE101 5000-BL Series US 32D finish.

5. Best Access Systems 45H series mortise lock with 15J trim US 32D finish.

C. Rim Latch

1. Yale

2. Segal

3. Rockwood

D. Cylinders

1. Sargent

2. Corbin Russwin

3. Schlage

4. Marks

5. Yale

6. Falcon

E. Exit Devices

1. Von Duprin 99 Series, 22NL

2. Precision APEX 2100 and 2200 Series

3. Sargent 8700 and 8800 Series

4. Falcon 25 Series

F. Pulls

1. Rockwood

2. Ives

3. Burns Mfg.
4. Von Duprin

G. Push Plates

1. Rockwood

2. Ives

3. Burns Mfg.

H. Door Closers (non-ADA)

1. LCN

2. Norton

3. Sargent

4. Yale

5. Dorma

6. Falcon

I. Stop and Holder

1. Glynn Johnson

2. Architectural Builders Hardware

3. Rixson (Heavy-Duty 8HD Series)

4. Ives

J. Surface Bolts

1. Ives

2. Rockwood

3. Securitech

K. Flush Bolts

1. Ives

2. Rockwood

3. Glynn Johnson

L. Mortise Privacy Door Bolt

1. Ives

2. Sargent

3. Rockwood

M. Wall Bumpers, Floor Stops

1. Ives

2. Rockwood

3. Burns Mfg.

N. Kick plate**s**

1. Ives

2. Rockwood

3. Burns Mfg.

O. Silencers

1. Ives

2. Rockwood

3. Burns Mfg.

2.3 MATERIALS AND FABRICATION

A. General

1. Hardware: Heavy duty cast or forged (.080 min.) bronze with satin chromium finish U.S. 26D, except as otherwise specified.

2. Interior Door Holders: Steel, satin chromium U.S. 26D finish.

3. Door closers: As specified herein.

4. Interior butts and horizontal releases: As hereinafter specified with chrome finish.

5. Surfaces of castings shall be true, smooth and free from burrs. Lock mechanism and accessory components in contact with or bear upon other parts shall be dressed to a true, smooth surface.

6. Items of cast iron shall be annealed.

7. Whenever weight is specified, it shall mean actual weight of casting without screws, washers and accessories.

8. Backset: 2-3/4" for locksets and latch sets unless indicated otherwise.

B. Screws

1. Secure hardware with suitable screws and bolts of same material and finish as hardware items unless otherwise specified. Screws for strike and face plates, hinges shall be flat-headed counter-sunk screws. Screws for other exposed hardware shall be oval-headed. Screws for door butts, closers, and holders shall be machine screws. Screws shall be countersunk unless expressly specified otherwise. Provide Phillips head screws unless otherwise indicated.

2. Hardware for metal frames and doors shall be secured with suitable machine screws, mill screws and bolts.

3. Manufacturer of each hardware item shall provide the fastenings required for the installation of that item.

4. Self-tapping or TEK screws are not permitted.

C. Hubs

Hubs for lever spindles: Sintered steel, copper infiltrated.

2.4 FINISHES

A. Hardware finishes shall comply with requirements of U.S. Bureau of Standards for the following:

1. U.S. - DESCRIPTION

a. USP - Primed for Painting

b. US1D - Dull Black

c. US2C - Zinc Plated, Commercial

d. US3 - Bright Brass

e. US4 - Satin Brass

f. US5 - Satin Brass, Oxidized

g. US7 - Brass, Nickel oxidized, Bright Relieved

h. US9 - Bright Bronze

i. US10 - Satin Bronze

j. US10A - Antique Bronze, lacquered

k. US10B - Antique Bronze, oiled

l. US11 - Satin Bronze, oxidized

m. US14 - Bright Nickel Plated

n. US15 - Satin Nickel Plated

o. US15A - Nickel Oxidized Relieved

p. US17A - Half Polished Iron, Smooth

q. US20 - Statuary Bronze, Light

r. US20A - Statuary Bronze, Dark

s. US26 - Bright Chromium

t. US26D - Satin Chromium

u. US32 - Polished Stainless Steel

v. US32D - Satin Stainless Steel

2. In addition, the following finish symbols are used for door closers:

a. AL - Manufacturer's standard aluminum lacquer

b. BL - Manufacturer's standard brown, bronze or gold lacquer

2.5 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.

b. Three Hinges: For doors with heights 61 to 90 inches.

c. Four Hinges: For doors with heights 91 to 120 inches.

d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.

   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.

   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Cam Lift Hinges: Where specified provide hinges that move the door up and then lower it to create a tight seal when the door is closed.

6. Manufacturers:

   a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

   a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

C. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed teflon coated stainless pin, and twin self lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).

2.6 POWER TRANSFER DEVICES (where applicable and indicated on drawings)

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

a. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QC-R001.

b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.7 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.

2. Furnish dust proof strikes for bottom bolts.

3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

1. Model 586=5-24 flush mounted bolts

B. Deadlock Thumbturn

1. Thumbturn/Occupancy Indicator

2. Manufacturers:

a. Hager model 3216

3. Finish: US32D – Satin Stainless Steel

C. Single Dummy Trim

1. Manufacturers:

a) Schlage D170 Single Dummy Trim

b) Finishes: 619 -Satin Nickel

2.8 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.

2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

5. Keyway: Manufacturer's Standard.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

E. Permanent Cores: Match standard. Reference Division 01 "Cash Allowances""Product Allowances" for material required under project. Installation to be included under Division 08 "Door Hardware" base bid package.

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

2. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

F. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of

patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.

1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.

    a. Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.

    b. Level 2 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders constructed to provide protection against bumping and picking.

    c. Level 3 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders to be UL437 certified and constructed to provide protection against bumping, picking, and drilling.

    d. Refer to hardware sets for specified levels.

2. Manufacturers:

    a. Sargent Manufacturing (SA) - Degree Series.

    b. No Substitution.

G. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. New System: Key locks to a new key system as directed by the Owner.

H. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Three (3).

2. Master Keys (per Master Key Level/Group): Five (5).

3. Construction Keys (where required): Ten (10).

4. Construction Control Keys (where required): Two (2).

5. Permanent Control Keys (where required): Two (2).

I. Construction Keying: Provide temporary keyed construction cores.

J. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

K. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.9 MECHANICAL LOCKS AND LATCHING DEVICES

A. Tubular Locksets, Grade 1 (Extra-Heavy Duty): ANSI/BHMA A156.2 Series 4000, Grade 1 certified.

1. Locksets to withstand 3000 inch pounds of torque applied to the locked lever without gaining access.

2. Locksets to fit a standard 2 1/8” bore without the use of through-bolts.

3. Lever handles to be made of solid material with no plastic fillers.

4. Latchbolt head to be one-piece stainless steel construction encased within the lock body.

5. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA A156.2 requirements to 34 million cycles.

6. Furnish with standard 2 3/4” backset and 1/2" throw latchbolt (3/4" at rated paired openings).

7. Manufacturers:

a. Sargent Manufacturing (SA) – 11 Line.

b. No Substitution.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.

3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 9 million cycles.

4. Manufacturers:

a. Sargent Manufacturing (SA) – 10 Line.

b. No Substitution.

2.10 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

4. Dustproof Strikes: BHMA A156.16.

2.11 ELECTRIC STRIKES (where applicable and indicated on drawings)

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both

Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike where specified.

1. Manufacturers:

    a. HES (HS).

B. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Manufacturers:

    a. HES (HS) - 9500/9600 Series.

C. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.12 CONVENTIONAL EXIT DEVICES (where applicable and indicated on drawings)

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation

as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.

    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

10. Extended cycle test: Devices to have been cycle tested in ordinance with ANSI/BHMA 156.3 requirements to 50 million cycles.

11. Rail Sizing: Provide exit device rails factory sized for proper door width application.

12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1) Manufacturers:

a. Sargent Manufacturing (SA) - 80 Series.

b. Von Duprin – model 22NL

c. No Substitution.

2.13 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

a. Norton Door Controls (NO) - 7500 Series. No Substitution.

2.14 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.15 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

b CSW 18 wall mounted door stop

C. Kick Down Door Stop

1. Ives Schlage 455 Finish US28 Satin aluminum

2.16 Silencers

A. Silencers

1. Ives – SR64

2. Rockwood

2.17 ARCHITECTURAL SEALS (where applicable and as indicated in dwgs)

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

1. Manufacturers:

a. Pemko - model 179_P Latching panic Saddle Threshold

b. Pemko – model 1716 Heavy Duty ThresholdSmoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

c. Pemko -model S88 Adhesive backed Fire/Smoke gasket

1) Self-extinguishing and non-toxic. Unaffected by sunlight, ozone and ultraviolet rays.

2) Impervious to fungus and mildew; will not deteriorate under normal exposure.

3) Meets FAR 25.853 Airworthiness Standards for Compartment Interiors.

4) Smoke tested in accordance with UBC 7-2 and UL 1784-01; meets the requirements of NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives".

5) Category H gaskets for use with listed steel frames and/or classified steel covered composite, hollow metal doors rated up to and including 3 hours; wood and plastic covered composite doors rated up to and including 1-1/2 hours; and wood core doors rated for 20 minutes without hose stream. When applied to the door and frame assembly in accordance with the manufacturers installation instruction, the assembly will comply with UBC 7-2 (1997) part II.

d. Pemko 411_NBL Automatic Door Bottom

1) Smoke Tested - UL1784 - tested in accordance with UL 1784-2001 Air Leakage Tests of Door Assemblies, and meet the performance criteria for allowable air leakage as specified in NFPA 105-99 Installation of Smoke Control Door Assemblies. Meets the requirements for category H - Smoke Seals.

B. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

1. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

2. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

3. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

4. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

C. Manufacturers:

1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.18 ELECTRONIC ACCESSORIES (where applicable and indicated on plan)

A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

1. Manufacturers:

a. Securitron (SU) - XMS Series.

B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

a. Securitron (SU) - DPS Series.

C. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

a. Securitron (SU) - BPS Series.

2.19 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws.

Provide screws according to manufacturers recognized installation standards for application intended.

2.20 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS (as indicated on drawings)

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:

1. MK - McKinney
2. MR - Markar
3. RO - Rockwood
4. SA - Sargent
5. HS - HES
6. NO - Norton
7. PE - Pemko
8. SU – Securitron

PART 4 – SCHEDULES AND KEYING

4.1 FINISH HARDWARE SCHEDULE

A. Provide hardware for each door, each pair of doors, and each set of doors, in compliance with "Hardware Set Numbers" indicated in Door Schedule on Drawings, and as specified herein.

Manufacturer's names and product designations for hardware types are listed for the purpose of establishing minimum requirements. Provide the product specified or comparable product of other manufacturers listed in Art. 2.01 for each hardware type.

B. All door frames located in smoke partitions and fire-rated partitions shall be provided with continuous smoke seals at jambs and head, whether or not listed in Hardware Sets below. Manufacturer/model: Pemko S44D; McKinney S44D.

Item	Quantity	Mfr. & Cat. No.
SET 1		
Mortise Butt Hinge	1 ½ Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Office/Entry Lock Set	1	Schlage T301
Surface mounted Door Closer	1	Sargent 281 mounted with Extra Duty Arm
Wall mounted Stop	1	CSW 18
Silencer	3	Ives SR64

SET 2		
Mortise Butt Hinge	1-1/2 pair 4-1/2" x 4-1/2"	T4A3386 A5111 Stainless HVY
Storeroom Lock Set	1	Schlage T301
Wall mounted stop	1	CSW 18
Silencer	3	Ives SR64

SET 3		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Storeroom Lock Set	1	Schlage T301
Wall mounted stop	1	CSW 18
S.S. Kickplate	2	Ives 8400 S 32D
Silencers	3	Ives SR64

SET 4		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Passage Lock Set	1	Schlage T301
Occupancy Indic. Lock (thumb turn)	1	Hager 3216
Wall mounted stop	1	CSW 18
Silencers	3	Ives SR64

SET 5		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Passage Lock Set	1	Schlage T301
Surface mounted Closer	1 ea.	Sargent 281 mounted with Extra Duty Arm
Occup. Indicator lock (thumb turn)	1 ea.	Hager 3216
Wall mounted stop	1	CSW 18
Silencers	3 ea.	Ives SR64

SET 6		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Push plate	1 ea.	Rockwool 2RGL2
Pull handle	1 ea.	Rockwool
Surface mounted Closer	1 ea.	Sargent 281 mounted with Extra Duty Arm
Wall mounted stop	1	CSW 18
S.S. Kickplate	2	Ives 8400 S 32D
Silencers	3	Ives SR64

SET 7		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Push plate	1 ea.	Rockwool 2RGL2
Pull handle	1 ea.	Rockwool
Surface mounted closer w/ hold open	1	Sargent 281 mounted with Extra Duty Arm
Wall mounted stop	1	CWS18 Cal-Royal

SET 8		
Butt Hinge	(2)x 1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Passage Lock Set	1	Schlage T301
Dummy Trim	1	Schlage D170
Astragal	1 ea.	No. 375DR Series by PEMKO
Coordinator	1 set	CORG series by Ives Company
Automatic flush bolts (inactive leaf top and bottom)	1 ea.	Ives FB31P
Magnetic open hold door holder	2 ea.	SDC EH10 Flush Mount
Surface mounted closer	2 ea.	Sargent 281 mounted with Extra Duty Arm
Concealed auto. drop down seal	2 ea.	Pemko 434 mortised, HD
Silencers	(2) x 3 ea.	Ives SR64

SET 9		
Mortise Butt Hinge	(2) 1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Exit device vertical rod top and bottom bolts	2 ea	Precision 2102 x 1702A
Entry Lock Set	2 ea.	Schlage T301
Surface mounted Closer	2 ea.	Sargent 281 mounted with Extra Duty Arm
Kick down door stop	2 ea.	Ives by Schlage 455
Silencers	(2)x 3	Ives SR64

SET 10		
Mortise Butt Hinge	(2) - 1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Entry Lock Set	1	Schlage T301
Dummy Deadlock thumbturn trim	1	Hager 3216
Single Dummy Trim	1	Shlage D170
Surface mounted Closer	1	Sargent 281 mounted with Extra Duty Arm
Kick down door stop	2 ea.	Ives by Schlage 455
Silencers	(2)x 3	Ives SR64

SET 11		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Entry Lock Set	1	Schlage T301
Rim panic bar Exit Device	1	Von Duprin 22NL
Night Latch Pull	1	Von Duprin 230NL
Surface mounted Closer	1	Sargent 281 mounted with Extra Duty Arm
Weatherstripping	1 ea.	Pemko
Threshold	1 ea.	Pemko 179
Silencers	3 ea.	Ives SR64

SET 12		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Entry Lock Set	1	Schlage T301
Surface mounted Closer	1	Sargent 281 mounted with Extra Duty Arm
Weatherstripping	1 ea.	Pemko
Threshold	1 ea.	Pemko 179
Silencers	3 ea.	Ives SR64

SET 13		
Mortise Butt Hinge	(2) - 1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Entry Lock Set (active leaf)	1	Schlage T301
Surface mounted top and bottom bolts (active leaf) (inactive leaf no lever)	2	Rockwood 585-24
Surface mounted Closer (active leaf)	1	Sargent 281 mounted with Extra Duty Arm
Weatherstripping	1 ea.	Pemko
Threshold	1 ea.	Pemko 179
Silencers	(2)x 3 ea.	Ives SR64

SET 14		
Mortise Butt Hinge	1 1/2 Pair 4-1/2"x4-1/2" SS	T4A3386 A5111 Stainless HVY
Dummy Lever Pull	1	Rockwood
Push Plate (shaft side)	1	Rockwood
Cylindrical lock set	1	Sargent
Surface mounted Closer	1	Sargent 281 mounted with Extra Duty Arm
Door Seal (2 hr door)	1 ea.	Pemko S88
Concealed auto.drop down seal	1 ea.	Pemko 411_NBL
Silencers	3 ea.	Ives SR64

+ + END OF SECTION + +

SECTION 08 80 00

GLASS, PLASTIC, AND GLAZING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds and accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 33 00, Submittals.

B. Section 01 74 00, Construction Waste Management.

C. Section 08 11 13, Hollow Metal Doors and Frames

D. Section 13 12 00, Security Guardhouse Ticket Booth

1.3 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.

F. ASTM C1036 - Standard Specification for Flat Glass; 2011.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

I. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.

K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

L. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

M. GANA (GM) - GANA Glazing Manual; 2009.

N. GANA (SM) - GANA Sealant Manual; 2008.

O. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.

P. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).

Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

R. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.

S. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units; 2004.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.5 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data on Insulating Glass Unit, Glazing Unit, and Plastic Film Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 8 by 8 inch in size of glass units.

E. Samples: Submit 2-inch-long bead of glazing sealant, color as selected.

F. Certificate: Certify that products of this section meet or exceed specified requirements.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.

2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.7 MOCK-UPS

A. See Section 01 33 00 - Submittals

B. Provide mock-up of unit including glass and air barrier and vapor retarder seal (where applicable).

C. Provide on-site glazing mock-up with the specified glazing components.

D. Locate where directed.

E. Mock-ups may remain as part of the Work.

1.8 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 WARRANTY

A. See Section 01 77 00 – Closeout Procedures

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Glass Fabricators:

1. Viracon, Inc; Insulated Glass: www.viracon.com.

B. Float Glass Manufacturers:

1. AGC Glass North America, Inc; www.agcglass.com.

2. Cardinal Glass Industries; www.cardinalcorp.com.

3. Guardian Glass, LLC; www.guardianglass.com.

4. Pilkington North America Inc; www.pilkington.com.

5. Vitro (PPG Industries, Inc); www.ppgideascapes.com.

6. Substitutions: Refer to Section 01 33 00 – Submittals

C. Hurricane Resistant Glazing:

1. Oldcastle BuildingEnvelope®

2. Guardian Industries

3. Pilkington

4. Vitro Architectural Glass (formerly PPG)

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.

1. Design Pressure:

a. Positive Design Pressure: 30 psf.

b. Negative Design Pressure: 30 psf.

2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.

3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.

4. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.

5. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.

1. In conjunction with vapor retarder and joint sealer materials described in other sections.

2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.

3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:

1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.

3. Solar Optical Properties: Comply with NFRC 300 test method.

2.3 GLASS MATERIALS

A. Float Glass: Provide float glass-based glazing unless otherwise indicated.

1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.

2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.

3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

5. Impact Resistant Safety Glass: Complies with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.

6. Wired Glass Type: ASTM C1036, Type II - Wired Flat Glass, Quality - Q6, with color and performance characteristics as indicated.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.

1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.4 INSULATING GLASS UNITS (where applicable and as indicated)

A. Manufacturers:

1. Any of the manufacturers specified for float glass.

2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

3. Cardinal Glass Industries; www.cardinalcorp.com.

4. Guardian Industries Corp; Sunguard : www.sunguardglass.com.

5. Pilkington North America Inc; www.pilkington.com.

6. Basis of Design: Vitro (PPG Industries, Inc); Solarban 70XL: www.ppgideascapes.com.

7. Substitutions: Refer to Section 016000 - Product Requirements.

B. Insulating Glass Units: Types as indicated or otherwise on drawings.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.

2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.

3. Metal Edge Spacers: Aluminum, bent and soldered corners.

4. Warm-Edge Spacers:

a. Spacer Width: As required for specified insulating glass unit.

b. Spacer Height: 0.27 inch.

c. Manufacturers:

1) Substitutions: Refer to Section 016000 - Product Requirements.

5. Spacer Color: Black.

6. Edge Seal

a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.

7. Color: Black.

8. Purge interpane space with dry air, hermetically sealed.

C. Insulating Glass Units: Vision glass, double glazed.

1. Applications: Exterior glazing unless otherwise indicated.

2. Space between lites filled with air.

3. Outboard Lite: Laminated, 1/4 inch thick, minimum.

a. Tint: Clear.

b. Coating: Low-E (passive type).

4. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.

a. Tint: Clear.

5. Total Thickness: 1 inch.

6. Thermal Transmittance (U-Value), Summer - Center of Glass:.42, nominal.

7. Visible Light Transmittance (VLT): 50 percent, nominal.

8. Solar Heat Gain Coefficient (SHGC): 296 percent, nominal.

9. Glazing Method: Dry glazing method, gasket glazing.

10. Space between lites filled with air.

11. Glass Type: Same as Type IG-1 except use fully tempered float glass for both outboard and inboard lites.

12. Tint: Clear.

13. Total Thickness: 1 inch.

14. Thermal Transmittance (U-Value), Summer - Center of Glass:.42, nominal.

15. Visible Light Transmittance (VLT):.50 percent, nominal.

16. Solar Heat Gain Coefficient (SHGC):.296 percent, nominal.

17. Glazing Method: Dry glazing method, gasket glazing.

2.5 BASIS OF DESIGN - INSULATING GLASS UNITS

A. Basis of Design - Insulating Glass Units: Vision glazing, with Low-E coating.

1. Applications: Exterior insulating glass glazing unless otherwise indicated.

2. Space between lites filled with air.

3. Total Thickness: 1 inch.

4. Thermal Transmittance (U-Value), Summer - Center of Glass: nominal.

5. Spacer Color: Black.

6. Edge Seal:

7. Color: Black.

8. Purge interpane space with dry air, hermetically sealed.

9. Basis of Design - Guardian Glass, LLC: www.guardianglass.com/#sle.

10. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.

    a. Glass: Clear.

11. Inboard Lite: Annealed float glass, 1/4 inch thick.

    a. Glass: Clear.

12. Basis of Design - Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.

13. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.

    a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 70XL on #2 surface.

    b. Glass: Clear.

14. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.

2.5 Hurricane Resistant Glass

A. Monolithic Two-Ply Laminated Glass

1. Outer Ply - Coating Orientation: *(N/A, Surface #1 or 2)*

2. Interlayer - Interlayer Type: StormGlass™

    a Interlayer Tint: Clear

    b. Nominal Thickness: 0.075”

    c. Interlayer Type: StormGlass™

    d. Inner Ply

B. Laminated glass products to be fabricated in autoclave with heat, plus pressure, free of foreign substances and air pockets.

C. Interlayer material: Polyvinyl Butyral or Ionoplast sheets.

1. US Requirements:

a. Laminated glass shall comply with ASTM C1172 and with other requirements as specified (UL 972, ASTM F1233, etc.).

2. US Requirements:

a. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E2190.

b. Annealed float glass shall comply with ASTM C1036, Type I, Class 1 (clear), Class 2 (tinted), Quality-Q3.

c. Heat-Strengthened float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind HS.

d. Tempered float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3, Kind FT.

e. Laminated glass shall comply with ASTM C1172 and with other requirements as specified (UL 972, ASTM F1233, etc.).

2.6 GLAZING UNITS

A. Monolithic Interior Vision Glazing:

1. Applications: Interior glazing unless otherwise indicated.

2. Glass Type: Annealed float glass.

3. Tint: Clear.

4. Thickness: 1/4-inch, nominal.

5. Glazing Method: Dry glazing method, gasket glazing.

2.7 GLAZING COMPOUNDS (where applicable)

A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.

B. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color.

D. Manufacturers:

1. Bostik Inc; Pure Silicone: www.bostik-us.com.

2. Dow Corning Corporation; 999-A: www.dowcorning.com/construction.

3. Pecora Corporation; 896 Series: www.pecora.com.

4. Substitutions: Refer to Section 016000 - Product Requirements.

2.8 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3-inch-long by one half the height of the glazing stop by thickness to suit application, self-adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

1. Width: As required for application.

2. Thickness: As required for application.

3. Spacer Rod Diameter: As required for application.

4. Manufacturers:

a. Pecora Corporation: www.pecora.com.

b. Tremco Global Sealants www.tremcosealants.com.

c. Substitutions: Refer to Section 016000 - Product Requirements.

D. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to affect an air barrier and vapor retarder seal; 1/8 x 1/2 inch size.

1. Manufacturers:

a. Saint-Gobain Performance Plastics; www.plastics.saint-gobain.com.

b. Norton Performance Plastics; Norfix HP F960 / F970

E. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

2.9 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing for glass.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

C. Verify that sealing between joints of glass framing members has been completed effectively.

D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

B. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

C. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

D. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

E. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, firestopping, plastering, mortar droppings, etc.

3.4 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.5 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.

3.6 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Place setting blocks at 1/4 points and install glazing pane or unit.

C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24-inch intervals, 1/4 inch below sight line.

D. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.

E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24-inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

H. Place without air bubbles, creases or visible distortion.

I. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch to 1/8-inch gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.8 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.9 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.10 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

+ + END OF SECTION + +

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SECTION 08 90 00

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fixed, extruded-aluminum louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

D. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints,

overstressing of components, failure of connections, or other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.

2. Show mullion profiles and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of metal finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

2. AWS D1.3, "Structural Welding Code - Sheet Steel."

3. AWS D1.6, "Structural Welding Code - Stainless Steel."

C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.

2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.

4. For fastening stainless steel, use 300 series stainless-steel fasteners.

5. For color-finished louvers, use fasteners with heads that match color of louvers.

C. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.

1. Horizontal Mullions: Provide horizontal mullions at joints where indicated.

C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel unless otherwise indicated.

E. Include supports, anchorages, and accessories required for complete assembly.

F. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches o.c., whichever is less.

1. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.

2. Exterior Corners: Prefabricated corner units with mitered blades with concealed close-fitting splices and with semirecessed mullions at corners.

G. Provide subsills made of same material as louvers or extended sills for recessed louvers.

H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant, Sight-proof, Louver (Exterior louvers only):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Air Balance Inc.; a Mestek company.

    b. Air Flow Company, Inc.

    c. Airolite Company, LLC (The).

    d. All-Lite Architectural Products.

    e. American Warming and Ventilating, Inc.; a Mestek company.

    f. Arrow United Industries; a division of Mestek, Inc.

    g. Construction Specialties, Inc.

    h. Greenheck Fan Corporation.

    i. Industrial Louvers, Inc.

    j. NCA Manufacturing, Inc.

    k. Nystrom Building Products.

    l. Reliable Products, Inc.

    m. Ruskin Company; Tomkins PLC.

    n. United Enertech Corp.

2. Louver Depth: 5 inches.

3. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.

4. Louver Performance Ratings:

    a. Free Area: Not less than 5.0 sq. ft. for 48-inch- wide by 48-inch- high louver.

    b. Air Performance: Not more than 0.10-inch wg static pressure drop at 600-fpm free-area exhaust /intake velocity.

    c. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rainfall rate of 8 inches per hour and a wind speed of 50 mph at a core-area intake velocity of 300 fpm.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.

2. Screening Type: Insect screening.

B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.

2. Finish: Same finish as louver frames to which louver screens are attached.

3. Type: Rewirable frames with a driven spline or insert.

D. Louver Screening for Aluminum Louvers:

1. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.6 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Director's Representative.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 07 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

+ + END OF SECTION + +

SECTION 09 01 90

PAINT STRIPPER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Application of a paint stripper to remove multiple layers of existing organic paints and coatings from mineral surfaces.

B. Related Work:.

1. Section 05 70 05, Historic Ornamental Ironwork

2. Section 09 91 13, Exterior Painting

3. Section 09 91 23, Interior Painting

1.2 DEFINITIONS

A. Paint Stripper: A gel applied to a painted surface.

B. Plastic: A polyethylene plastic film.

1.3 SYSTEM DESCRIPTION

A. An environmentally-safe stripper effective on most existing organic paints and coatings.

1. Paint Stripper: An aromatic-free biodegradable water soluble paint remover.

2. Plastic: A polyethylene plastic film covering the applied paint stripper to increase stripper effectiveness.

1.4 SUBMITTALS

A. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Provide published documentation describing materials, characteristics, and limitations.

B. Samples: Submit samples for verification purposes, fabrication techniques and workmanship.

C. Manufacturer's Instructions: Submit manufacturer's instructions including technical data sheets, material safety data sheets, mixing instructions, application requirements, special procedures, and conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Provide evidence that Manufacturer is a firm engaged in the manufacture of paint removers of types required, and whose products have been in satisfactory use in similar service for a minimum of ten years.

2. Applicator Qualifications:

a. Provide evidence Applicator is a firm having a minimum of three years of successful application experience with projects similar in type and scope to that required for this Project, and having passed a product certification training course provided by the manufacturer prior to the execution of this unit of work.

B. Mock-ups:

1. Prior to application of the work, fabricate and erect mock ups for each type of finish and application to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.

2. Build mock ups to comply with the following requirements using materials indicated for final unit of work.

3. Locate mock ups as directed by the Architect.

4. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work.

5. Obtain the Architect's acceptance of mock ups before start of final unit of work.

6. Retain and maintain mock ups during construction in undisturbed condition as a standard for judging completed unit of work.

7. Maintain a record of approved mock up's product mixing and application steps to incorporate into final unit of work to ensure color consistency and textural aesthetics.

C. Tracking Job Progress with Daily Logs 1. Maintain a daily record of the weather conditions, of material ordered and delivered, material used, inspections, areas of work that began, areas of work that were completed, and questions raised and answers received.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with manufacturer's name, material and product brand name, and lot number, if any.

B. Store materials in their original undamaged packages and containers inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:

1. Substrate and ambient air temperature must be between 41 °F and 86 °F. Ideal temperature is 68 °F. Maintain temperature during application.

2. Do not apply when rain is expected, in high winds, or onto hot substrates.

1.8 WARRANTY

A. Warranty Period: Product warranty is one year from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Items specified are to establish a standard of quality for design, function, materials, compatibility, performance, warranty, and appearance.

2. Equivalent products by listed manufacturers are acceptable.

3. The Architect is the sole judge of the basis of what is equivalent.

B. KEIM Mineral Coatings of America, Inc., 10615 Texland Blvd. #600, Charlotte, North Carolina 28273. Telephone 704-588-4811. Email keim-info@keim.com. or equal.

2.2 MATERIALS

A. Paint Stripper:

1. Water emulsifiable mixture.

2. Contains no CFC's, chlorinated hydrocarbons, or aromatic hydrocarbons.

3. Removed with water.

4. 7 grams per liter VOC (Volatile Organic Content).

5. Basis of Design: "KEIM Bio-Stripper", KEIM Mineral Coatings of America, Inc.

B. Plastic: A polyethylene based plastic sheet provided in rolls 1 meter wide by 50 meters long. No VOC. 1. Basis of Design: "KEIM Plastic", KEIM Mineral Coatings of America, Inc

2.3 EQUIPMENT

A. Tools:

1. Paint Stripper: Apply a uniform saturation coat with a soft natural bristle brush, lambs-wool roller, or by airless spray.

2. Plastic: Trim using scissors or sharp bladed tool.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Confirm by examination the areas and conditions under which the work is to be applied for compliance with manufacturer's instructions. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Clean surfaces leaving them free of dirt or grease.

2. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Applicator.

3.2 PREPARATION

A. Protection:

1. Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.

3.3 APPLICATION

A. Conform to reviewed product data, manufacturer's written instructions, and provisions of the Contract Documents.

B. Plan the work properly.

1. Do not apply to hot surfaces. Work ahead of the sun or on shaded façades.

2. Protect from wind and rain prior to and during application.

3. Obtain manufacturer’s written instructions for application outside of the above parameters.

C. Paint Stripper and Plastic:

1. Determine ideal exposure time on a trial area. A longer exposure time may be required for thicker systems (multilayer coatings, crack-bridging systems, synthetic resin renders).

2. Apply a thick layer of Paint Stripper. Cover with polyethylene plastic and seal edges. Allow time for stripper to chemically penetrate paint layers. Test effectiveness with scraper to determine when paint coatings are soft enough for removal.

3. If the stripper film becomes matte without dissolving the undermost layer apply another coat wet-on-wet.

4. Remove paint coatings by one or more methods such as scrub brush and clean water, rinsing with low pressure hot water, or with a scraper. Perform hot water treatment from the bottom up.

5. Remove interior coatings with a scraper and wash down with clean water and a sponge or scrub brush.

3.4 CLEANING

A. Clean tools, spills, and accidental drips with plenty of water.

B. Leave applications clean and premises free from residue and debris from work of this Section.

+ + END OF SECTION + +

SECTION 09 21 00

PLASTER

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide materials, labor, equipment and services necessary to complete all plastering required.

1.2 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

B. American Society for Testing and Materials (ASTM), latest editions.

C 35 Sand

C 150 Portland Cement

C 206 Finishing Hydrated Line

C 897 Specification for Aggregate for Job Mixed Portland-Cement Based Plasters

C 926 Application of Portland Cement-Based Plaster

C. American National Specifications Institute (ANSI), latest edition.

A 42.1 Portland Cement Lime Plastering Exterior and Interior

1.3 SUBMITTALS

A. Product Data

Provide manufacturers' specifications and application instructions for each type of material specified, including the following:

1. Plaster

2. Bonding Compound

3. Plaster Accessories

4. Hydrated Lime

5. Aggregates for Base Coat Plaster

6. All Surface Mineral Finish for wall surfaces (brick arched entry to Bath House from Beach)

B. Quality Control Submittals

1. Certificates: Provide material certificates from Manufacturers, Material supplier, and Contractor certifying that each material complies with, or exceeds the specified requirements.

C. Quality Assurance Submittals

1. Installers affidavit certifying a minimum of five years experience installing items specified and three projects of similar scope.

1.4 QUALITY ASSURANCE

A. Qualifications

Company specializing in plaster installation having more than five years experience with the application of specified materials and experience on at least three projects of similar scope to project specified.

B. Regulatory Requirements

1. Building Code: Work of this Section to conform to all requirements of the New York City Building Code and all applicable regulations of other governmental authorities.

2. Fire Resistance Ratings: Where ratings are indicated, match applicable assemblies tested per ASTM E 119 by Fire Testing Laboratories.

C. Single Source Responsibility

Obtain materials from a single source for each type of material required to assure consistency in quality of performance and appearance.

D. Plaster Mock-up Samples.

1. Before commencing plaster work, submit the following mock-up samples to the Project Architect for approval:

   a. 12"x12" metal lath with a three-coat system of plaster (scratch, brown, finish), stepped to show construction and thickness of each coat. Provide sample for each type of plaster to be used on project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original sealed container, with manufacturer's label intact and legible.

B. Store all cement, gypsum and lime off ground, under cover and in a dry area.

C. Protect contiguous Work from soiling, spattering, moisture, deterioration and other harmful effects which might result from plastering.

1.6 PROJECT CONDITIONS

A. Environmental Requirements

1. Do not use frozen materials in plaster mixes.

2. Do not apply plaster to surfaces that are frozen or contain frost.

3. Do not apply plaster when ambient temperature is less than 50^{o}F, unless permission is given in writing by the Owner.

4. Maintain required temperatures for a minimum of 24 hours prior to application, during application and until plaster has cured.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate plaster installation with all other Work by other trades, above, supported by or penetrating walls, ceilings and soffits, including electrical, heating and ventilating and plumbing and drainage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Portland Cement Plaster

Base Coat Cements subject to compliance with ASTM C926. Finish Coat Cements subject to ASTM C150.

1. United States Gypsum Co.

2. Georgia-Pacific LLC.

3. Graymont Dolime

B. Finishing Hydrated Lime

Subject to compliance with requirements, provide products conforming to ASTM C206, Type S or Type N.

1. United States Gypsum Co.

   a. "Ivory Finish Lime" - Type S

   b. "Red Top Finish Lime" - Type N

2. Georgia-Pacific LLC.

3. CertainTeed

C. Silicate All Surface Finish

1. Keim Mineral Coatings 10615 Texland Boulevard, #600, Charlotte, N.C. 28273 704-588-4811 www.keim.com

   a. Solidalit Sol-Dilicate All surface finish

   b. Waterproofing and Weather resistant performance, follow manufacturers directions for 2 coats. Fully coat, with no pinholes, runs or holidays.

   c.

2.2 MATERIALS

A. Aggregates for Base Coat Plaster; ASTM C35. Type as listed below:

1. Sand aggregate, conforming to ASTM C897

2. Perlite aggregate, conforming to ASTM C 35

3. Vermiculite aggregate, where shown.

B. Water

Potable, free of substances capable of affecting plaster set or of damaging plaster, lath or accessories.

C. Bonding Agent

Comply with ASTM C631; and requirements listed below:

1. Material for Bonding agent: a resinous water-emulsion that will bond new plaster base or finish coats to concrete surfaces.

2. Material Viscosity: equal to that of ordinary paint and suitable for application by brushing or spraying.

3. Inert to oxygen and perfectly stable when water has dried out.

4. Vermin-proof, non-toxic, non-deteriorating and incapable of supporting flame.

5. Temperature range of from minus 35^{o}F to plus 300^{o}F. without failure of bond.

6. Minimum tensile strengths varying from 50 to 600 lbs. per sq. inch, depending upon materials being bonded together, and a minimum shear strength of 175 lbs. per sq. inch when properly cured and dried samples are tested.

7. Bonding agent shall be job-approved for at least five years without any failures.

2.3 MIXES

A. Portland Cement Base Coat Compositions

Comply with ASTM C926 and manufacturer's directions for Portland cement base coat proportions that correspond to application methods and plaster bases indicated below:

1. Base coat over concrete or unit masonry: 1 part Portland cement to 3 parts sand with 10% hydrated lime added.

2. First coat must dry out and be thoroughly wet down before applying second or finishing coat.

B. Portland Cement Finishing Coat over Concrete or Unit Masonry:

Comply with ASTM C926 and manufacturer's directions for Portland cement finishing coat proportions.

1. 1 part Portland cement to 2 parts sand with 10% hydrated lime added.

2.4 MECHANICAL MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable reference standard and with recommendations of plaster manufacturers.

PART 3 - EXECUTION

3.1 EXAMINATION OF SURFACES

A. Examine substrate surfaces to receive Work of this Section, preparatory Work performed by other trades, and conditions at the building. Report any defects or unsatisfactory conditions for correction to the Owner.

B. Starting of Work will be construed as acceptance of all substrate surfaces and conditions as satisfactory.

C. Partitions, grounds, furring, corners, lathing, etc., shall be in place, straight and plumb, before beginning plastering, and if any of the Work is found to be imperfect notify the Owner to rectify it.

D. Do not start plastering until all plaster work can be satisfactorily protected from exposure to water including water infiltration from roof leaks, wall openings, groundwater, flooding and other sources.

3.2 PREPARATION

A. Protection

1. Protect the Work of other trades from soiling or spattering using cover cloths or other approved means of protection. Should soiling or spattering occur, it can be removed by cleaning with wet sponges or brushes before the plaster or mortar sets, in a manner to avoid scratching, staining or other damage.

3.3 PLASTER APPLICATION, GENERAL

A. Apply portland cement plaster materials, compositions, and mixes to comply with ASTM C 926.

B. Plaster well up to the grounds and down to floor lines and screed all walls true and plumb. No imperfect angles or corners will be acceptable under any circumstances and any imperfect Work will call for re-plastering of all portions rejected by the Owner.

C. Do all patching required to complete the general construction Work of this Contract, leaving the Work clean and perfect in every at completion of the building.

3.6 CLEANING

A. Provide final protection and maintain conditions in a manner suitable to the Architect which ensures plaster work being without damage or deterioration at time of issuance of the Certificate of Final Completion.

+ + END OF SECTION + +

LIST OF SUBMITTALS

SUBMITTAL	**DATE SUBMITTED**	**DATE APPROVED**
Product Data:	_____	_____
1. Manufacturer's specifications and application instructions.		
Quality Control Submittals:	_____	_____
1. Certificates - materials comply with requirements. 2. Bonding Agent - test reports.		
Quality Assurance:	_____	_____
1. Installer's affidavit certifying experience 2. Mock-up Samples 12"x12" sample on metal lath for each plaster system, 3-coat.		

* * *

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

Non-load-bearing steel framing systems for interior gypsum board assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: ICC-ES.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

C. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

Steel Studs and Runners:

Minimum Base-Metal Thickness: As indicated on Drawings.

Depth: 3-5/8 inches.

2.2 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Detail control and expansion joints on Drawings.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

+ + END OF SECTION + +

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SECTION 09 24 43

HYDRATED LIME WHITE CEMENT PLASTER

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Hydrated lime white cement plaster finish.

B. Related Sections: Section 04 22 00, Concrete Unit Masonry, Section 09 97 26 – Cementitious Coatings

1.2 DEFINITIONS

A. Render: A hydrated lime white cement plaster.

B. Mesh: A glass fiber lattice mat for reinforcing rendered surfaces unaffected by high alkalinity.

1.3 SYSTEM DESCRIPTION

A. A materials-compatible vapor permeable substrate to receive protective decorative coating for exterior exposure. Install over CMU block.

1. Parge Render: A hydrated lime white cement render using 0-1.3mm quartz grains.

2. Base Render: A hydrated lime white cement render using 0-1.3mm quartz grains.

3. Mesh: Lattice mat embedded into wet surface of base render.

4. Top Render: A hydrated lime white cement render using 0-0.6mm quartz grains.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Published documentation describing materials, characteristics, and limitations.

C. Manufacturer's Instructions: Include Technical Data Sheets, Material Safety Data Sheets, mixing instructions, installation requirements, special procedures, and conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in work of this Section with minimum 5 years documented manufacturing experience.

B. Installer:

1. Company specializing in work of this Section with minimum 3 years documented experience of comparable scope and quality.

2. Acceptable to manufacturer as qualified for applying work of this Section, or accepted by Architect.

1.6 PRE-INSTALLATION CONFERENCE

A. Arrange, in accordance with Section 01 31 19.

B. Attendance: Contractor, Installer, Owner, Architect, Manufacturer's Representative, and those requested to attend.

C. Meeting Time: Prior to beginning work of this Section and work of related Sections affecting work of this Section.

D. Location: Project Site.

E. Inspect and determine full extent level of quality for work.

F. Review manufacturer's requirements, product, and execution.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 65 10 and manufacturer's instructions.

B. Deliver materials in manufacturer's labeled, unopened packaging.

C. Store to prevent puncture of packaging in cool but frost-free conditions away from direct sun and radiated heat.

1.8 PROJECT CONDITIONS

A. Substrate and Ambient Air Temperature: Between 41 degrees F and 86 degrees F. Maintain temperature during and after application.

B. Do not apply when rain is expected, in high winds or on sun-heated substrate.

1.9 COORDINATION

A. Conform to Section 01 31 13 for coordination with work of other Sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. KEIM Mineral Coatings of America, Inc.

1. Tel 1-866-906-5346 Ext 201, Cell 505-400-1257, Email Perri.Robinson@keim.com

2. Web Site http://www.keim.com

B. Substitution Requests: None allowed.

2.2 MATERIALS

A. Parge Render: KEIM UniversalPutz Standard. Hydrated lime white cement render containing 0-1.3mm quartz grains. No VOC.

B. Base Render: KEIM UniversalPutz Standard. Hydrated lime white cement render containing 0-1.3mm quartz grains. No VOC.

C. Mesh: KEIM Fiber Mesh. Glass fiber lattice mat for reinforcing rendered surfaces, unaffected by high pH renders. No VOC.

D. Top Render: KEIM UniversalPutz Fine. Hydrated lime white cement render containing 0-0.6mm quartz grains. No VOC.

2.3 EQUIPMENT

A. Tools:

1. Parge, base, and top render: application by trowel.

2. Initial set surface equalization: KEIM coarse orange silicone sponge.

3. Final set as directed in 2.4 FINISHES: use appropriate tools.

2.4 FINISHES

A. Parge Render: Finish smooth.

B. Base Render: Finish smooth.

C. Top Render:

1. Upon initial set: Use coarse sponge with plenty of water to equalize surface.

2. Upon final set: Finish to owner’s specification.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions as satisfactory to receive work of this Section before beginning.

B. Verify substrate is secure and sound, and free of dirt, grease, and other bond breakers.

C. Verify all materials to receive render are fully cured to manufacturer recommendations.

3.2 PREPARATION

A. Protection: Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.

3.3 APPLICATION

A. Conform to manufacturer's instructions and provisions of Contract Documents.

B. Plan the work properly.

1. Work ahead of the sun on shaded facades.

2. Protect from wind and rain minimum 12 hours after application.

C. Parge Render

1. Dampen substrate as needed to limit water absorption from parge render.

2. Apply parge render coat to equalize plane of surface.

3. Allow parge coat to set until dry to the touch before receiving base render coat.

D. Base Render

1. Precut mesh into strips. Extend mesh to within ½ inch of substrate edge or ¼” of metal corner beads or stop flashings. Overlap mesh strips 10cm (4 inches).

2. Apply 4mm (3/16 inch) layer of base render to substrate.

3. Position rolled mesh strips along top edge of substrate. Embed onto fresh wet render surface working from top down. Mesh must not contact substrate.

4. Allow to dry overnight.

E. Top Render

1. Apply 3mm (1/8 inch) layer of finish render over base render.

2. Finish as directed in PART 2.4 FINISHES.

3. Allow minimum 10 days curing time.

3.4 CLEANING

A. Clean tools, spills, and accidental drips immediately with plenty of water.

B. Leave installations clean and premises free from residue and debris from work of this Section.

+ + END OF SECTION + +

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SECTION 09 29 00

INTERIOR GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.

2. CertainTeed Corp.

3. Georgia-Pacific Gypsum LLC.

4. Lafarge North America Inc.

5. National Gypsum Company.

6. PABCO Gypsum.

7. Temple-Inland.

8. USG Corporation.

B. Gypsum Board: ASTM C 1396/C 1396M.

1. Thickness: 1/2 inch. (or as otherwise indicated on drawings)

2. Long Edges: Tapered.

3. In Wet areas, use Durock (USG) GWB and Taping

2.3 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.

4. Finish Coat: For third coat, use setting-type, sandable topping compound.

5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide

joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Ceiling Type: As indicated on Drawings.

2. Wall: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

   Stagger abutting end joints not less than one framing member in alternate courses of panels.

   At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

3.5 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration**.**

+ + END OF SECTION + +

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SECTION 09 30 13

CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall provide all labor, materials, equipment and services and perform all operations to complete the installation of the work in this Section and related work as indicated on the Contract Drawings and specified herein, including, but not limited to the following:

1. Furnish and Install ceramic floor tile in rooms only where indicated on the Contract Drawings and the Finish Schedule.

2. Furnish and Install marble saddles whereever shown on the Contract Drawings.

3. Provide all drop lights for work force for the installation of the Ceramic Tile in rooms and spaces not having natural light.

1.2 ALTERNATES

A. Contractor shall furnish proposals for the following alternates to the Specified Work:

1. To set all tile in mud, in lieu of thin set.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. The work included in this Section shall be coordinated with the work in the following other Sections:

1. Section 01 33 00, Submittals

2. Section 01 74 00, Construction Waste Management

3. Section 09 22 16, Gypsum Board Assemblies

4. Section 10 28 00, Toilet Bath, and Laundry Accessories

1.4 QUALITY ASSURANCE

A. Contractor shall provide a sufficient work force trained and skilled to perform the Work specified herein.

B. In procuring all items to be furnished as part of this Work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes, standards and references and to verify that the items procured for use in this Work meet or exceed the specified requirements.

1.5 REFERENCES, CODES, STANDARDS AND REGULATIONS

A. Comply with the following reference standards as published by the American National Standards Institute (ANSI) and The Tile Council of America (TCA):

1. ANSI A-108.1, Installation of Ceramic Tile with Portland Cement Mortar;

2. ANSI A-108.4, Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive;

3. ANSI A-108.5, Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement;

4. ANSI A-108.6, Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy;

5. ANSI A-108.7, Standard Specifications for Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar;

6. ANSI A-108.8, Installation of Ceramic Tile with Chemical Resistant Furan Mortar and Grout;

7. ANSI A-108.9, Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout;

8. ANSI A-108.10, Installation of Grout in Tile Work;

9. ANSI A-118.1, Standard Specifications for Dry-Set Portland Cement Mortar;

10. ANSI A-118.2, Standard Specifications for Conductive Dry-Set Portland Cement Mortar;

11. ANSI A-118.3, Standard Specifications for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive;

12. ANSI A-118.4, Standard Specifications for Latex- Portland Cement Mortar;

13. ANSI A-118.5, Standard Specifications for Chemical Resistant Furan Mortar and Grouts for Tile Installation;

14. ANSI A-118.6, Standard Specifications for Ceramic Tile Grouts;

15. ANSI A-118.8, Standard Specifications for Modified Epoxy Emulsion Mortar/Grout;

16. ANSI A-136.1, Standard for Organic Adhesives for Installation of Ceramic Tile; and

17. ANSI A-137.1, Standard Specifications for Ceramic Tile.

B. Comply with the following reference standards as published by the American Society for Testing and Materials (ASTM):

1. ASTM C373, Standard Method of Test for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Porous Whiteware Products;

2. ASTM C424, Standard Method of Test for Crazing Resistance of Fired Glazed Whitewares by Autoclave Treatment;

3. ASTM C482, Standard Method of Test for Bond Strength of Ceramic Tile to Portland Cement Mortar;

4. ASTM C483, Standard Method of Test for Electrical Resistance of Conductive Ceramic Tile;

5. ASTM C484, Standard Method of Test for Thermal Shock Resistance of Glazed Ceramic Tile;

6. ASTM C485, Standard Method of Test for Measuring Warpage of Ceramic Tile;

7. ASTM C499, Standard Method of Test for Determining Facial Dimensions and Thickness of Flat, Rectangular Wall and Floor Tile;

8. ASTM C501, Standard Method of Test for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser;

9. ASTM C502, Standard Method of Test for Wedging of Flat, Rectangular Wall and Floor Tile;

10. ASTM C609, Standard Method of Measurement of Small Color Differences between Ceramic Wall or Floor Tile; and

11. ASTM C648, Standard Method of Test for Breaking Strength of Ceramic Tile.

1.6 SUBMITTALS

A. Prior to the commencement or fabrication of any Work, Contractor shall submit the following for the Engineer's approval:

1. Shop Drawings Required:

   a. None

2. Samples Required:

   a. Sample selection boards from a minimum of two acceptable manufacturers displaying colors and sizes of each type of tile and grout to be furnished under this Section.

   b. Samples of each accessory - 1 piece

   c. Samples of adhesives - 1 container

3. Calculations Required:

   a. None

4. Test Reports:

   a. Provide certified copies of test reports on the performance of all materials and components furnished under this Section.

5. Certification:

   a. Submit Certification of Compliance of Specification on all items of work incorporated herein.

6. Material List:

   a. Materials list of items proposed to be provided under this Section.

7. Manufacturer's Instructions:

   a. Submit manufacturer's specifications and other data needed to prove compliance with the specified requirements;

   b. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.7 DELIVERY, STORAGE AND HANDLING

A. All materials shall be packed, loaded, shipped, unloaded, stored and protected in a manner which will prevent abuse, damage, and defacement. Refer to Section 016500 for additional requirements.

1.8 GUARANTEE

A. Contractor shall assume full responsibility and provide written guarantee of Work specified herein for one year form the date of substantial completion.

PART 2 – PRODUCTS

2.1 CERAMIC FLOOR AND WALL TILE

A. A137.1.

1. Tiles shall be as indicated on the Contract drawings.

2. Colors shall be provided to Contractor as selected by the Engineer during review of Contractor samples.

B. Base Tile:

1. Base Tile - sanitary cove at bottom, bullnose top.

2.2 MARBLE SADDLES

A. Marble Saddles - Tennessee or Vermont Marble of colors selected by the Engineer during review of Contractor samples; size, profiles and thickness as indicated on the Contract Drawings.

2.3 SETTING MATERIALS

A. Organic Tile Adhesive - water resistive organic type conforming to ANSI A-136.1, Type I. In addition, manufacturer must certify that adhesive is suitable type and is recommended for application as specified. Each container must bear label showing compliance with ANSI Standard A-136.1, Type I.

B. Dry Set Mortar: Conform to ANSI A118.1.

C. Mortar Materials:

1. Portland Cement - ASTM C150, Type I.

2. Sand - ASTM C144.

3. Hydrated Lime - ASTM C206, or ASTM C207, Type S.

4. Water - clean and free from injurious amounts of oil, acids, alkalis, organic matter or other deleterious substances.

2.4 GROUTING MATERIALS

A. Sand - Portland Cement Grout

1. For joints up to 1/8" wide: 1:1 Portland cement to fine graded sand.

2. For joints up to 1/2" wide: 1:2 Portland cement to fine graded sand.

3. For joints over 1/2" wide: 1:3 Portland cement to fine graded sand.

B. Dry - Set Grout

1. Comply with requirements of dry set mortar.

C. Latex - Portland Cement Grout

1. Conform to ANSI A108.1

2.5 ACCEPTABLE MANUFACTURERS

A. Ceramic Tile products shall be as manufactured by: (or as otherwise indicated on drawings)

1. American Olean Tile Company

2. United States Ceramic Tile Company.

3. Monarch Tile Company.

4. Daltile.

5 Crossville Inc. Tile.

B. Latex Portland Cement products shall be as manufactured by:

1. L&M Surco Manufacturing Co., Inc.; "Polycrete Latex Mortar"

2. Laticrete International Inc.; "Universal Thin Set 150"

3. W.R. Bonseal Co.

4. Bostik Construction Products/Upco

5. Durabond Div., USG Industries, Inc.

C. Dry Cure Wall Grouting products shall be as manufactured by:

1. L&M Surco Manufacturing Co., Inc.;

2. W.R. Bonseal Co.

3. Bostik Construction Products/Upco

4. Durabond Div., USG Industries, Inc.

D. Latex Modified Floor Grouting products shall be as manufactured by:

1. Laticrete International Inc.; "Laticrete 3701"

PART 3 - EXECUTION

3.1 INSPECTION AND PRE-EXISTING CONDITIONS

A. Visually examine all of the areas and conditions under which work of this Section will be performed. Contractor shall correct conditions detrimental to the proper and timely completion of the Work. Verify that all adjacent materials are thoroughly dry and ready to receive the Work to be performed. Do not proceed until unsatisfactory conditions are corrected.

B. Adjacent materials and the system shall be protected during installation while curing and/or unattended from weather and other damage.

C. Verify that the moisture content of the concrete slabs, building air temperature and relative humidity are within the limits required by the manufacturers of the materials being used.

3.2 INSTALLATION

A. Install tile work in accordance with the recommendations of the Tile Council of America, Inc.

B. Layout Of Tile:

1. Determine the location of all movement joints prior to the start of the installation.

2. Lay out all tile work so as to minimize cutting tile less than one half tile in size.

3. Lay out all wainscots to the next full tile beyond actual dimension indicated on the Contract Drawings.

4. Align all wall joints to give straight and uniform grout lines, plumb and level.

5. Align all floor joints to insure straight and uniform grout lines, parallel with walls. When using tile sheets, make joints between each sheet the same as joints within the sheets, so extent of each sheet is not visible in finished work.

6. Align all base joints with both floor tile and wall tile joints.

3.3 WORKMANSHIP

A. Supply first class workmanship in all tile work.

B. All products used during the installation of this work shall be in strict accordance with the manufacturer's current printed instructions.

C. All exposed edges of tile shall be smoothed. Ensure cut tile edges are clean before installing.

D. Fit tile carefully against trim and porcelain accessories, also around pipes, electric boxes and other built in fixtures so that escutcheons, plates and collars will completely overlap cut edges.

E. When using tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible with a hole saw.

3.4 SETTING BEDS

A. Organic Adhesives:

1. Use thin set organic adhesive method for installing tile on the following surfaces:

a. On Gypsum Wallboard installation shall conform to ANSI A108.4.

B. Dry Set Mortar:

1. Use dry set mortar method for installing tile on the following surfaces:

a. Dimensionally stable concrete conform to ANSI A108.5.

3.5 TILE SET WITH ADHESIVE

A. Surfaces must be straight and level and in proper condition to receive tile.

B. Spread adhesive with 1/16" "V" notched trowel, leaving no large deposits. Check coverage of adhesive to tile before starting to install tile. Apply adhesive only to as much area as can be covered within the open time of the adhesive. Set tiles without sliding. Tap tile with block to assure contact with adhesive. Do not damage the tile during taping.

C. Grout tile joints with a grout of type recommended by the manufacturer of the adhesive used for setting tile. Color of grout must be approved by the Engineer during review of Contractors samples.

3.6 TILE SET WITH DRY SET MORTAR

A. Set floor tiles in dry-set mortar placed in one (1) layer approximately 3/32" thick.

B. Dry-set mortar shall be a mixture of Portland cement with sand and additives imparting water retentivity.

C. Grout floors with Sand-Portland cement grout, color selected by Engineer during review of Contractor’s samples.

3.7 SETTING MARBLE SADDLES

A. Set marble saddles in dry-set mortar as specified above where adjacent floor tile is set in dry-set mortar; and set saddles with adhesive as specified above where adjacent floor tile is set with adhesive.

3.8 GROUTING AND CLEANING

A. Follow grout manufacturer's current printed instructions.

B. Remove all grout haze and observe grout manufacturer's recommendations as to use of acid and chemical cleaners.

C. Rinse tile work thoroughly with clean water before and after use of chemical cleaners.

+ + END OF SECTION + +

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SECTION 09 30 13.1

SWIMMING POOL CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Ceramic tile related accessories
3. Gutter grating assembly
4. Stone gutter surround

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required.
3. Handhold tile
4. Gutter grating assembly
5. Stone gutter surround
6. Stair nosing tile
7. Lane markings tile

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.

2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

3. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of pool tile installation.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE AND STONE PRODUCTS

A. REFER TO SCHEDULE ON THE DRAWINGS FOR POOL TILE AND STONE SELECTIONS AND RELATED INFORMATION.

B. Ceramic Tile: Factory-mounted unglazed ceramic tile.

1. Composition: Porcelain.

2. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.

3. Module Size: As indicated on the drawings

4. Thickness: 1/4 inch.

5. Face: Plain with cushion edges.

6. Surface: Smooth, without abrasive admixture.

7. Dynamic Coefficient of Friction: Not less than 0.42.

8. Finish: As indicated on the drawings.

9. Tile Color and Pattern: As selected by Architect from manufacturer's full range.

10. Grout Color: As selected by Architect from manufacturer's full range.

11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. External Corners for Thinset Mortar Installations: Surface bullnose, module size: As indicated on the drawings.

b. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch across nominal 4-inch dimension.

c. Handhold Units: Special shape units as indicated on the drawings.

C. Granite Surround: As scheduled and indicated on drawings

2.3 GUTTER GRATING

A. REFER TO SCHEDULE ON THE DRAWINGS FOR GUTTER GRATING ASSEMBLY SELECTIONS AND RELATED INFORMATION.

B. General: Reinforced manufactured stone units.

1. Cast removeable slotted gratings with locking device.

2. Refer to details on drawings for related information

2.4 SETTING MATERIALS

A. Epoxy Mortar (Thinset): ANSI A118.3, ISO 13007.

1. Provide prepackaged, two-part epoxy mortar mix, 100% solids epoxy.See the Evaluations for discussion on difference between normal and nonsagging mortar.

2. For wall applications, provide non-sagging mortar.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

1. Mapei (Kerapoxy or Kerapoxy CQ)

2. Laticrete (Latapoxy 300 Adhesive)

3. An approved equal

2.5 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.3.

1. Type: epoxy grout that is non-sagging/ nonslumping in joints up to 3/8".

2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

1. Laticrete (Spectralock 1)

2. Mapei (Kerapoxy or Kerapoxy CQ)

3. An approved equal

2.6 MISCELLANEOUS MATERIALS

A. PVC Edge Trim: Shape, height to match tile and setting-bed thickness, designed specifically for wall and flooring applications.

1. Manufacturer: Schluter Systems

2. An approved equal.

B. Refer to details on drawings for shapes and types.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cracks, holes and depressions in Pool Bond Coat shall be filled in by Pool Bond Coat installer. Tile installer shall inspect and accept surfaces prior to commencing tile and setting material installation.

B. Verify that Pool Bond Coat and tile setting materials are compatible and bondable.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

a. Exterior tile floors.

b. Tile floors in wet areas.

c. Tile swimming pool decks

B. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

C. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

D. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch .

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

3.4 EXTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Ceramic Tile Type: As indicated on the drawings.

+ + END OF SECTION + +

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SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide acoustical ceiling Work as indicated on Contract Drawings and as specified herein, including the following:

1. Acoustical Mineral Fiber Tile and Panel Ceilings.

a. Lay-in panel installation - exposed grid

B. Related Work Specified Elsewhere

1. Section 01 33 00, Submittals

2. Section 01 74 00, Construction Waste Management

1.2 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

B. American Society for Testing and Materials (ASTM), latest edition.

C423 Test Method for Sound Absorption and Sound Absorption Coefficient by the Reverberation Room Method.

C635 Metal Suspension System for Acoustical Tile and Lay-In Panel Ceilings.

C636 Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

D1779 Specification for Adhesion for Acoustical Materials

E84 Surface Burning Characteristics of Building Materials.

E90 Standard Test Method for Laboratory Sound Transmission Class

E119 Method for Fire Tests of Building Construction and Materials.

E413 Determination of Sound Transmission Class

E1264 Standard Classification for Acoustical Ceiling Products.

E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a common Ceiling Plenum (CAC)

E1477 Standard Test Method for Luminance Reflectance Factor (LR) LR1 >75%

C. AMA -1-II Ceiling Sound Transmission Test By Two-Room Method

D. Underwriters Laboratories Inc. (UL) Fire Resistance Directory

E. Acoustical and Insulation Materials Association, "Job Conditions."

1.3 DEFINITIONS

A. Direct Suspension System

1. Directly fastened to floor or roof construction above, installed as part of the Work of Section 05 50 00. (or as indicated on drawings)

B. Indirect Suspension System

1. Installed as part of the Work of this Section, as furnished by ceiling system manufacturer to be attached to direct suspension system.

1.4 SUBMITTALS

A. Product Data

1. Submit manufacturer's product specifications and installation instructions for ceiling materials, indicating compliance with applicable requirements. Include information pertaining to fire performance, flame spread, and smoke development.

B. Shop Drawings

1. Submit shop drawing details indicating the relationship to mechanical and electrical Work and other items penetrating or connected to the ceiling. Indicate framing and support details for the ceiling Work.

C. Samples

1. Submit samples of the following materials, prior to installation;

a. Acoustical panels: 6"x6" samples of each type, pattern and color.

b. Exposed runners and moldings: 8" long samples of each color and system type required.

c. Concealed suspension members: 1 set of each assembly specified.

2. Coordinate each approved sample type with mechanical work for purpose of matching diffusers.

D. Quality Assurance Submittals

1. Affidavit certifying experience of installation company.

E. Project Closeout Submittals

1. Guarantee (see Section 1.8).

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer is to be a firm with not less than five years of successful experience in the installation of the specified materials.

B. Regulatory Requirements

1. Building Code: Work of this Section shall conform to all applicable regulations of other governmental authorities.

2. Acoustical and Insulating Materials Association

C. Fire Performance Characteristics

1. Provide ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify ceiling components with appropriate marking of applicable testing and inspecting agency.

a. Surface Burning Characteristics: Tested per ASTM E84. Tested surfaces shall be the surfaces facing the occupied space.

1) Flame Spread: 25 or less.

2) Smoke Developed: 25 or less.

2. All materials exposed to the airflow in ceiling cavity plenums used for supply, return, or exhaust air shall be non-combustible or limited-combustible and have a maximum smoke developed index/rating of 50. Flame spread index shall not exceed 25. Tested surfaces shall be the surfaces facing the plenum.

D. Coordination of Work

1. Coordinate layout and installation of ceiling units and suspension system components with other work above, supported by, or penetrating through ceilings, including light fixtures, HVAC equipment, fire-suppression systems and partitions. Resolve all discrepancies and conflicts prior to start of Work.

E. Pre-installation Meeting

1. Prior to start of Work, installer of ceiling system and representatives of trades involved are to have a conference at the job site, in the presence of the Engineer, to discuss coordination of ceiling system installation and resolve all discrepancies.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Deliver all acoustical units in manufacturer's original, unopened packages fully identified with type, finish, performance data and compliance labeling.

B. Storage

1. Store materials where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

2. Store tile containers in space where they will be installed for at least 24 hours prior to installation to stabilize moisture content and temperature.

C. Handling

1. Handle ceiling units carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure

1. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet work in space is completed and dry, work above ceilings is completed, and until air temperature and humidity are maintained at values of final occupancy.

a. Pressurized plenums: Operate HVAC system for not less than 48 hours before beginning acoustical panel installation.

1.8 GUARANTEE

A. Work showing defects in workmanship or materials within the one year guarantee period specified in the Contract shall be corrected as directed by the Owner. Defects include but are not limited to:

1. Tiles or suspension system loose or improperly secured.

2. Tiles or suspension members showing discoloration or cracking.

3. Tiles or suspension members warping, sagging, or deforming.

1.9 EXTRA MATERIALS

A. Deliver extra materials to the Owner. Furnish extra materials, described below, matching products installed, packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish 60 square feet of full size units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, MODELS

A. Acoustical Panels

1. Mineral Composition Panels (24" x 24”) and (48” x 24”)

a. USG Interiors Inc.
Product name: "Frost"

b. Armstrong World Industries
Product name: "~~Endura~~" "Dune"

B. Indirect Metal Suspension Systems

1. Chicago Metallic Corporation

2. Donn Corporation / USG Interiors, Inc.

3. Armstrong World Industries, Inc.

4. Suspension members shall be by the manufacturer of the ceiling panels or by a company recommended by the panel manufacturer.

2.2 MATERIALS - ACOUSTICAL TILES AND PANELS

A. Mineral Fiber Tile and Panels

1. Provide units per ASTM E1264; of designation, style, finish, color, acoustical range, edge detail and size as indicated below:

a. Suspended (Exposed grid, lay-in) Installation

Style:	Medium Texture
Size:	24" x 24" x 3/4", or as indicated.
Edge Profile:	Reveal tegular, or as indicated.
Weight:	1.30-1.55 lbs./sq. ft.
NRC:	Min. .70
CAC:	Min. 35
Light Reflectance:	Min. .84 Average
Color:	White
Finish:	Factory finish

2. Mineral products shall be manufactured with a minimum of 60% of post and pre-consumer content materials.

B. Exposed Grid Suspension System:

1. Manufacturer's standard system, with face width, design and finish as selected by the Engineer.

2. Structural Classification: Heavy-duty system in accordance with ASTM C 635.

3. Face width: 15/16" face or as otherwise indicated.

4. Main runners: Connect to direct suspension system (refer to Specification Section 05170). Conform to ASTM C 635 for heavy-duty classification.

5. Provide runners suitable for attachment of hold-down clips and impact clips as applicable.

6. Hold-Down Clips for Non-Fire-Rated Ceilings: For ceilings composed of lay-in panels, provide hold-down clips spaced 2'-0" o.c. on all cross tees.

2.3 MISCELLANEOUS MATERIALS

A. Edge Moldings and Trim Pieces:

1. Provide manufacturer's standard molding for edges and penetrations of ceiling units which fit with type of edge detail and suspension system indicated.

B. Tile Fasteners:

1. Cadmium plated, type recommended by tile manufacturer, but for not less than 1/2" penetration of substrate.

C. Drop Clips

1. 18 gauge galvanized steel with key hole slot, or other configuration for connection of ceiling suspension members to carrying channels.

2. Drop clips shall be of length required for indicated ceiling height, and to provide clearances for lighting fixtures, mechanical equipment, and other items above the ceiling. Where necessary because of limited clearance, provide clips that connect runners tight to the bottom of carrying channels.

2.4 LEED BUILDING PERFORMANCE CRITERIA

A. See Paragraph 1.5(F) of this Section for LEED BUILDING performance criteria for products in this section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the building before beginning Work to determine that it is properly enclosed and the structure is in proper condition to receive acoustical materials and suspension system. Area shall be broom cleaned and uninterrupted for free movement of rolling scaffold. Do not proceed until satisfactory conditions prevail.

B. Verify that direct suspension system has been installed properly, that main runners are spaced evenly and have been leveled to a tolerance of 1/8" in 12' measured both lengthwise on each runner and transversely between parallel runners so that indirect suspension system installation may proceed accurately.

C. Start of Work constitutes acceptance of existing conditions; therefore, Contractor is advised to bring any discrepancies to the attention of the Engineer prior to start of Work.

3.2 PREPARATION

A. Coordination

1. Provide and coordinate the locations of inserts, clips, or other supports for support of acoustical ceilings.

2. Determine the length of drop clips required to maintain indicated ceiling height and to provide necessary clearance for electrical, mechanical and other equipment. Where necessary for clearance, clips that connect runners tight to the bottom of carrying channels shall be used.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans.

3.3 INSTALLATION - GENERAL

A. Install materials in accordance with manufacturer's printed instructions and in compliance with ASTM C636, governing regulations, fire resistance rating requirements, as indicated.

1. Coordinate requirements for Work of other trades to be built into ceiling system. Provide supplementary framing as required.

B. Arrange directionally-patterned units (if any) in manner shown by reflected ceiling plans, or as approved by the Engineer. Install in patterns indicated, (balanced borders all sided) symmetrical or centered about center line of corridors, panels, fixtures, beam haunches, rooms, spaces.

C. Cut as required for installation of electric fixtures, air diffusers, grilles, sprinkler heads, security devices, access doors, etc., provided under other contracts. Verify sizes and locations with other trades.

D. On completion, the acoustic ceilings shall present a uniform horizontal plane surface, unless otherwise indicated, free from blemishes and imperfections.

E. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.

2. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

F. Install panels in coordination with suspension system with suspension members concealed by support of tile units. Scribe and cut panels to fit accurately at borders and penetrations.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.

B. Remove and replace Work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

C. Remove and replace Work that is damaged or soiled by other trades as directed by the Owner.

+ + END OF SECTION + +

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SECTION 09 67 23

RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Definitions: Resinous flooring includes penetrating, moisture tolerant, two-component epoxy primer, a high performance, three-component, chemical resistant mortar consisting of bisphenol F epoxy resin, curing agent and selected, graded aggregates blended with inorganic pigments, a two-component, chemical resistant bisphenol F epoxy coating and a selected, graded, large grit silica aggregate.

B. Related Work

1. Section 03 30 00, Concrete Cast in Place

2. Section 07 92 00, Joint Sealers

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with requirements.

B. Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring required, applied to a rigid backing, in color and finish indicated.

1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this

section. Contractor shall have completed at least five projects of similar size and complexity; Stonhard or approved equal. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.

B. Pre-Installation Conference

1. General contractor shall arrange a meeting not less than thirty days prior to starting work.

2. Attendance

a. General Contractor

b. Architect/Owner's Representative

c. Manufacturer/Installer's Representative

C. ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

1.5 DELIVERY, STORAGE AND HANDLING

A. Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.

B. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

C. Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

1.6 PROJECT CONDITIONS

A. Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

B. Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor.

C. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.

D. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.7 WARRANTY

A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

PART 2 - PRODUCTS

2.1 COLORS

A. Colors: As selected by Architect from manufacturer's standard colors. (or as indicated on drawing)

2.2 EPOXY FLOORING

A. Stonclad HT coated with Stonkote HT4 with Texture #3 as manufactured by Stonhard, Inc., Maple Shade, NJ, (800) 257-7953 is a nominal 1/4"/6mm thick system comprised of a penetrating, moisture tolerant, two-component epoxy primer, a high performance, three-component, chemical resistant mortar consisting of bisphenol F epoxy resin, curing agent and selected, graded aggregates blended with inorganic pigments, a two-component, 100% solids, chemical resistant, bisphenol F epoxy coating and a selected, graded, large grit silica aggregate.

1. Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:

Compressive Strength ..... 11,500 psi
(ASTM C-579)

Tensile Strength..... 2,200 psi
(ASTM C-307)

Flexural Strength ..... 5,000 psi
(ASTM C-580)

Hardness 87-90
(ASTM D-2240/Shore D Durometer)

Impact Resistance ..... > 160 in. lbs.
(ASTM D-4226)

Abrasion Resistance..... 0.08 gm max. weight loss
(ASTM D-4060, Taber
Abrader CS-17 wheel)

Coefficient of Friction 0.80
(ASTM D-2047/Neoprene-Dry)

Flexural Modulus of Elasticity ..... 1.7×10^6 psi
(ASTM C-580)

Flammability..... Self Extinguishing
(ASTM D-635) Extent of burning 0.25 inches max.

Thermal Coefficient of
Linear Expansion ..... 2.0×10^{-5} in/in°C
(ASTM C-531)

Water Absorption 0.2%
(ASTM C-413)

Heat Resistance Limitation ..... 200°F/93°C
(for continuous exposure) 250°F/122°C
(for intermittent spills)

Cure Rate allow .....8 hours for foot traffic
(at 77°F/25°C) 24 hours for normal operations

2.3 JOINT SEALANT MATERIALS

A. Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Substrate: Concrete preparation shall be by mechanical means and include use of a scarifier or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.

3.2 APPLICATION

A. General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.

B. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate.

C. Troweled Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed box adjusted to manufacturer's recommended height. Hand trowel apply mixed material over freshly primed substrate using stainless steel finishing trowels.

D. Coating/Texture: Remove any surface imperfections by lightly abrading and vacuuming the floor surface. Mix coating according to manufacturer's recommended procedures. Squeegee apply and backroll coating with strict adherence to manufacturer's installation procedures and coverage rates. Broadcast silica aggregate into freshly rolled coating. Allow coating to cure and apply a second layer of coating according to manufacturer's recommended procedures.

3.3 FIELD QUALITY CONTROL

A. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.

B. The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.

C. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.

D. If test results show materials being used do not comply with specified requirements, Contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.4 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

B. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

C. Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

+ + END OF SECTION ++

SECTION 09 91 13

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

Galvanized metal.

Wood.

B. Related Requirements:

Sections 08 51 23, 08 14 00 for factory priming windows and doors with primers.

Section 09 91 13, "Interior Painting" for surface preparation and the application of paint systems.

Section 08 14 00, "Wood Doors" for surface preparation and the application of wood stains and transparent finishes.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

Submit Samples on rigid backing, 8 inches square.

Step coats on Samples to show each coat required for system.

Label each coat of each Sample.

Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

Director's Representative will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.

Other Items: Director's Representative will designate items or areas required.

Final approval of color selections will be based on mockups.

If preliminary color selections are not approved, apply additional mockups of additional colors selected by Director's Representative at no added cost to Owner.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director's Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

Maintain containers in clean condition, free of foreign materials and residue.

Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.

2. PPG Architectural Finishes, Inc.

3. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Director's Representative from manufacturer's full range.

30 percent of surface area will be painted with deep tones.

2.3 PRIMERS/SEALERS

A. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.4 METAL PRIMERS

A. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.5 WOOD PRIMERS

A. Primer, Latex for Exterior Wood: MPI #6.

2.6 WATER-BASED PAINTS

A. Latex, Exterior Semi-Gloss (Gloss Level 5):

2.7 EPOXY PAINTS FOR CONCRETE:

A. 100% Solids Epoxy Floor Coating

B. Manufacturer: Benjamin Moore COROTECH Gloss (V430

C. Self leveling, adhesion to concrete, smooth gloss finish.

2.8 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

Testing agency will perform tests for compliance with product requirements.

Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

Wood: 15 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

E. Wood Substrates:

Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

Sand surfaces that will be exposed to view, and dust off.

Prime edges, ends, faces, undersides, and backsides of wood.

After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

Use applicators and techniques suited for paint and substrate indicated.

Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.

Paint entire exposed surface of window frames and sashes.

Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards and switch gear.

b. Uninsulated metal piping.

c. Uninsulated plastic piping.

d. Pipe hangers and supports.

e. Metal conduit.

f. Plastic conduit.

g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

Contractor shall touch up and restore painted surfaces damaged by testing.

If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Galvanized-Metal Substrates:

Latex System:

Prime Coat: Primer, galvanized metal[, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated].

Intermediate Coat: Latex, exterior, matching topcoat.

Topcoat: Latex, exterior, low sheen (Gloss Level 3-4).

Latex System:

Prime Coat: Primer, latex for exterior wood.

Intermediate Coat: Latex, exterior, matching topcoat.

Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

+ + END OF SECTION + +

SECTION 09 91 23

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete masonry units (CMU).
2. Galvanized metal.
3. Wood.
4. Gypsum Board Wall Covering.

B. Related Requirements:

1. Division 01 Sections for submittals, construction waste management,.
2. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
3. Division 06 Sections for shop priming carpentry with primers specified in this Section.
4. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
5. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
6. Division 09 Section "Gypsum Board" for surface preparation interior decoration on gypsum board wall.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED Building Submittal Requirements: The contractor, subcontractor, and/or product manufacturer shall submit the following LEED Building certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section – Submittals under the LEED Submittals paragraph of these specifications. Information to be supplied includes: product name, product manufacturer, material only cost, provision of EPD, provision of CSR, provision of EPR, provision of MCI, provision of HPD, C2C compliance status, GSB compliance status, provision of SCO, CDPH compliance status, Emissions in mg/m3, VOC content in g/l, Volume of product in liters, and Area of installed product in square feet.

2. Third-party Certification including testing reports, provided from the product manufacturer, to verify the product information supplied for the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated in Paragraph 2.2(C) of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's

stamp, as confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets, for all applicable products. If the MSDS does not show the product's Volatile Organic Compound (VOC) content in grams per liter, this information must be provided through other published product literature from the manufacturer or stated in a letter of certification (on the manufacturer's letterhead) from the product manufacturer.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.

2. Step coats on Samples to show each coat required for system.

3. Label each coat of each Sample.

4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample

submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

    a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.

    b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.

2. PPG Architectural Finishes, Inc.

3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for products included in this section:

1. Paints and coatings fabricated, sourced (extracted, harvested or recovered) within 100 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements.

2. VOC Requirements:

a. Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. Table 4-1 is included at the end of this Section as **Appendix A**.

1) The default scenario is the private office scenario.

2) The manufacturer's or third-party certification must state the exposure scenario used to determine compliance.

3) Claims of compliance for wet-applied products must state the amount applied in mass per surface area.

4) Manufacturers' claims of compliance with the above requirements must also state the range of total VOCs after 14 days (336 hours), measured as specified in the CDPH Standard Method v1.1:

a) ·0.5 mg/m3 or less;

b) ·between 0.5 and 5.0 mg/m3; or

c) ·5.0 mg/m3 or more.

b. All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011. Product-specific environmental requirements are as follows:

1) The calculation of VOC shall exclude water, exempt compounds, and tinting color added at the point of sale.

2) The VOC content of coatings subject to the provisions of this rule shall be determined by:

a) U.S. EPA Reference Test Method 24 (Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings, Code of Federal Regulations Title 40, Part 60, Appendix A) with the exempt compounds' content determined by Method 303 (Determination of Exempt Compounds) in the South Coast Air Quality Management District's (SCAQMD) "Laboratory Methods of Analysis for Enforcement Samples" manual, or

b) Method 304 [Determination of Volatile Organic Compounds (VOC) in Various Materials] in the SCAQMD's "Laboratory Methods of Analysis for Enforcement Samples" manual.

3) General Prohibition: no paint or coating shall contain, in excess of 0.1% by weight, any Group II exempt compounds listed in SCAQMD Rule 102.

4) VOC limits include the following:

a) Bond Breakers: 350 g/L.

b) Clear wood finishes: varnish 275 g/L; lacquer 275 g/L; sanding sealers 275.

c) Concrete Curing Compounds: 100 g/L.

d) Concrete Surface Retarder: 250 g/L.

e) Fire Proofing Coatings: 350 g/L pigmented, 650 g/l clear.

f) Floor coatings: 50 g/L.

g) Paint: Flat 50 g/L; Non-flat 50 g/L.

h) Primers, Sealers, & Undercoaters: 100 g/L.

i) Rust Preventive Coatings: 100 g/L.

j) Shellacs: Clear 730 g/L; pigmented 550 g/L.

k) Stains: 100 g/L.

l) Waterproofing sealers: 100 g/L.

m) Wood Preservative: 350 g/L.

5) If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.

6) For projects in North America, methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.

c. Certification of these products shall be in accordance with the Submittal Requirements of Paragraph 1.4(B) of this Section.

D. Colors: As indicated in a color schedule.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

B. Primer, Alkali Resistant, Water Based: MPI #3.

C. Primer, Latex, for Interior Wood: MPI #39.

D. Primer, Bonding, Water Based: MPI #17.

E. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based: MPI #107.

B. Primer, Alkyd, Anti-Corrosive, for Metal: MPI #79.

C. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

D. Primer, Galvanized, Water Based: MPI #134.

2.6 WATER-BASED PAINTS

A. Latex, Interior, (Gloss Level 2): MPI #44.

B. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.

C. Latex, Interior, High Performance Architectural, (Gloss Level 2): MPI #138.

D. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5): MPI #141.

2.7 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at

Project site. Samples will be identified, sealed, and certified by testing agency.

2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

2.8 LEED BUILDING PERFORMANCE CRITERIA

A. See Paragraph 2.2(C) of this Section for LEED BUILDING performance criteria for products in this section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.

2. Masonry (Clay and CMU): 12 percent.

3. Wood: 15 percent.

4. Gypsum Board: 12 percent

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Gypsum Board Substrates: see Specification 092900 Gypsum Board.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Sand surfaces that will be exposed to view, and dust off.

3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards and switch gear.

b. Uninsulated metal piping.

c. Uninsulated plastic piping.

d. Pipe hangers and supports.

e. Metal conduit.

f. Plastic conduit.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.

b. Uninsulated metal piping.

c. Uninsulated plastic piping.

d. Pipe hangers and supports.

e. Metal conduit.

f. Plastic conduit.

g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. High-Performance Architectural Latex System:

a. Block Filler: Block filler, latex, interior/exterior, MPI #4.

b. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2), MPI #138.

c. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

B. Steel Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79 or primer, alkyd, quick dry, for metal, MPI #76.

b. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

2. Quick-Drying Enamel System:

a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.

b. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7), MPI #96.

C. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer, galvanized, water based, MPI #134.

b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

c. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

D. Fiberglass and Plastic Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer, bonding, water based, MPI #17.

b. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

E. Substrates: Gypsum Board and Wood

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.

b. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

F. Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.

b. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

Appendix A

Table 4-1 Target CREL VOCs and their maximum allowable concentrations

No.	Compound Name	CAS No.	Allowable Conc.[a] ($\mu g/m^3$)
1	Acetaldehyde	75-07-0	70
2	Benzene	71-43-2	30
3	Carbon disulfide	75-15-0	400
4	Carbon tetrachloride	56-23-5	20
5	Chlorobenzene	108-90-7	500
6	Chloroform	67-66-3	150
7	Dichlorobenzene (1,4-)	106-46-7	400
8	Dichloroethylene (1,1)	75-35-4	35
9	Dimethylformamide (N,N-)	68-12-2	40
10	Dioxane (1,4-)	123-91-1	1,500
11	Epichlorohydrin	106-89-8	1.5
12	Ethylbenzene	100-41-4	1,000
13	Ethylene glycol	107-21-1	200
14	Ethylene glycol monoethyl ether	110-80-5	35
15	Ethylene glycol monoethyl ether acetate	111-15-9	150
16	Ethylene glycol monomethyl ether	109-86-4	30
17	Ethylene glycol monomethyl ether acetate	110-49-6	45
18	Formaldehyde	50-00-0	16.5 [b]
19	Hexane (n-)	110-54-3	3,500
20	Isophorone	78-59-1	1,000
21	Isopropanol	67-63-0	3,500
22	Methyl chloroform	71-55-6	500
23	Methylene chloride	75-09-2	200
24	Methyl *t*-butyl ether	1634-04-4	4,000
25	Naphthalene	91-20-3	4.5
26	Phenol	108-95-2	100
27	Propylene glycol monomethyl ether	107-98-2	3,500
28	Styrene	100-42-5	450
29	Tetrachloroethylene	127-18-4	17.5
30	Toluene	108-88-3	150
31	Trichloroethylene	79-01-6	300
32	Vinyl acetate	108-05-4	100
33-35	Xylenes, technical mixture (m-, o-, p-xylene combined)	108-38-3, 95-47-6, 106-42-3	350

a) Refer to http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html. All maximum allowable concentrations are one-half the corresponding CREL adopted by Cal/EPA OEHHA with the exception of formaldehyde. For any future changes in the CREL list by OEHHA, values in Table 4.1 shall continue to apply until these changes are published in the Standard Method.

b) Formaldehyde has a CREL of 9 $\mu g/m^3$ (December 2008); guidance value established by this Standard Method at 16.5 $\mu g/m^3$ before Dec 31th, 2011 and at 9 $\mu g/m^3$ starting from Jan 1st, 2012. See Section 4.3.2.

Note: The above table 4-1 was copied from CDPH Standard Method v1.1–2010; mg = 1,000 ug.

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SECTION 09 97 26

CEMENTITIOUS COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Water repellency and sol silicate coating.

B. Related Sections: Section 09 25 23, Lime Based Plastering

1.2 DEFINITIONS

A. Water Repellency: Silane based water repellent applied as pretreatment under the cementitious coating.

B. Cementitious Coating: A sol silicate mineral coating applied over a lime cement plaster substrate.

C. Dilution: Diluent for the sol silicate coating.

1.3 SYSTEM DESCRIPTION

A. A materials-compatible highly vapor permeable decorative severe weathering protection coating system for exterior exposure. Install over lime cement plaster.

1. Water Repellency: A silane based water repellent that coats the interiors of the exposed micropores of the substrate preventing capillary water intrusion without reducing substrate permeability.

2. Cementitious Coating: A sol silicate mineral coating with UV resistant mineral pigments that penetrates to chemically react with the substrate resulting in a covalent bond with a hard amorphous microporous structure. Does not contain plasticizers. Protects water repellency from UV destruction. Provides substrate weathering protection without reducing substrate permeability.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Published documentation describing materials, characteristics, and limitations.

C. Manufacturer's Instructions: Include Technical Data Sheets, Material Safety Data Sheets, mixing instructions, installation requirements, special procedures, and conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in work of this Section with minimum 5 years documented manufacturing experience.

B. Installer:

1. Company specializing in work of this Section with minimum 3 years documented experience of comparable scope and quality.

2. Acceptable to manufacturer as qualified for applying work of this Section, or accepted by Architect.

1.6 PRE-INSTALLATION CONFERENCE

A. Arrange, in accordance with Section 01 31 19.

B. Attendance: Contractor, Installer, Owner, Architect, Manufacturer's Representative, and those requested to attend.

C. Meeting Time: Prior to beginning work of this Section and work of related Sections affecting work of this Section.

D. Location: Project Site.

E. Inspect and determine full extent level of quality for work.

F. Review manufacturer's requirements, product, and execution.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Section 01 65 10 and manufacturer's instructions.

B. Deliver materials in manufacturer's labeled, unopened packaging.

C. Store to prevent puncture of packaging in cool but frost-free conditions away from direct sun and radiated heat.

1.8 PROJECT CONDITIONS

A. Substrate and Ambient Air Temperature: Between 41 degrees F and 86 degrees F. Maintain temperature during and after application.

B. Do not apply water repellency or sol silicate coating over damp substrate, when rain is expected, in high winds, or on sun-heated substrate during application.

1.9 COORDINATION

A. Conform to Section 01 31 13 for coordination with work of other Sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. KEIM Mineral Coatings of America, Inc.

1. Tel 1-866-906-5346 Ext 201, Cell 505-400-1257, Email Perri.Robinson@keim.com

2. Web Site http://www.keim.com

B. Substitution Requests: None allowed. These products comprise a compatible system for installation, performance, and warranty.

2.2 MATERIALS

A. Water Repellency: Water Repellency: KEIM Silan 100. Alkylalkoxysilane based extremely water repellent with 100% active ingredients. Extremely vapor permeable as repellent coats surfaces of capillaries to break surface tension preventing water and salts migration without affecting diffusion of substrate. No VOC.

B. Cementitious Coating: KEIM Soldalit. Sol silicate based opaque coating thinned with diluent. Less than 1g/l VOC. Meets requirement for silicate dispersion paint – DIN 18.365, 2.4.1, ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration.

C. Diluent for Cementitious Coating: KEIM Soldalit Dilution, sol silicate dilution. Less than 1g/l VOC. ASTM E 96 Vapor Permeability – 77 perms, ASTM G 154 Accelerated Weathering – no fading, cracking, peeling, ASTM E 514 62-MPH Wind-Driven Rain Test – no water penetration.

2.3 EQUIPMENT

A. Tools:

1. Water Repellency: Low pressure KEIM or Hudson-type sprayer.

2. Cementitious Coating, Base and Top Coats: Natural bristle façade brush, professional KEIM roller, or professional airless spray equipment using a 0.027 inch tip, number 30 mesh filters, 91 bar (1320 PSI) back pressure, and 75 bar (1088 PSI) working pressure.

2.4 FINISHES

A. Water Repellency:

1. Apply wet coats sponging off material that is not absorbed.

B. Cementitious Coating:

1. Base and Top Coats: Apply to a smooth mineral matte finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify conditions as satisfactory to receive work of this Section before beginning.

B. Verify substrate is secure, sound, dry, and absorbent, and free of dirt, grease, salts, oil-based paints, and other bond breakers.

C. Verify all materials to be coated by Cementitious Coating are fully cured to manufacturer recommendations.

3.2 PREPARATION

A. Protection: Lay ground cloths and take measures as necessary to protect surfaces subject to contact by products specified by this Section.

B. Clean façade to remove all loose material and soiling. Observe local environmental regulations regarding removal and disposal.

3.3 APPLICATION

A. Conform to manufacturer's instructions and provisions of Contract Documents.

B. Plan the work properly.

1. Work ahead of the sun on shaded façades.

2. Work to logical stopping points (corners, seams, architectural features, etc.).

3. Apply coatings evenly without voids maintaining a wet edge to desired finish as indicated in 2.4 Finishes.

4. Protect from wind and rain prior to, during, and for a minimum 24 hours after application.

C. Water Repellency:

1. Apply to saturation by flooding over substrate.

2. Repeat application after 4 hours. Wipe excess material from substrate.

3. Allow 4 hours to maximum 24 hours drying time before applying cementitious coating.

D. Cementitious Coating:

1. Base Coat: Dilute sol silicate coating with 15 percent dilution (25kg with 3.75 liters dilution). Stir well by hand or 600-800 RPM mixing equipment.

a. Apply primer coat of diluted sol silicate coating.

b. Allow minimum 12 hours drying time before applying top coat.

2. Top Coat: Dilute sol silicate coating with 5 percent dilution (25kg with 1.25 liters dilution). Stir well by hand or 600-800 RPM mixing equipment.

a. Apply top coat of diluted sol silicate coating.

3.4 CLEANING

A. Clean tools, spills, and accidental drips immediately with plenty of water.

B. Leave installations clean and premises free from residue and debris from work of this Section.

+ + END OF SECTION + +

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SECTION 10 14 19

DIMENSIONAL LETTER SIGNAGE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Cut Aluminum Letters

B. Cut Stainless Steel Letters

1.2 SCOPE

A. Furnish letters and hardware necessary to install cut metal letters shown on drawings and herein specified.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Include detailed plans, elevations, and details of members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of metal lettering.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Install in areas designated by Architect.

2. Do not proceed with remaining work until workmanship and installation is approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.6 COORDINATION

A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.7 QUALITY ASSURANCE

A. Manufacturer to have a minimum of 20 years experience in manufacturing letters.

B. All letters to be manufactured by one manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

A. Impact Architectural Signs

26 E Burlington Ave LaGrange, IL 60525 (708) 469-7178

http://www.impactsigns.com/metal-letters/specifications@impactsigns.com

B. Substitutes: Substitutes with Submittal for Architects approval.

2.2 MATERIALS (METAL ALLOYS)

A. Aluminum - 5052 Alloy

B. Stainless Steel – 304 Alloy or 316 Alloy

2.3 FINISHES (AS REQUIRED TO MATCH EXISTING LETTERS OR AS OTHERWISE INDICATED ON DRAWINGS).

A. Aluminum

1. Natural Satin faces, bead-blasted returns, 2-part hardened acrylic polyurethane clear coat.

2. Painted baked enamel finish. Select from manufacturer's standard colors or specify PMS color match. Standard finish for paint is semi gloss. Matte and High gloss are available upon request.

3. Medium bronze anodized, bead-blasted return.

4. Dark bronze anodized, bead-blasted return.

5. Black anodized, bead-blasted return.

B. Stainless Steel

1. Specify Alloy 304 or Alloy 316

2. Natural satin stroke sanded face, bead-blasted return

3. US9 Finish, hand polished face, bead-blasted return

Note: Flat Cut Metal Letters do not have polished returns.

2.4 THICKNESS

A. Aluminum - ¼", ⅜", ½", ¾", and 1"

B. Stainless Steel – ¼", ⅜", and ½"

2.5 FONT STYLES

A. Select from Manufacturers Standard font list

B. Specify a custom font

C. Provide a vector art file for custom logo shapes.

2.6 MOUNTING HARDWARE

A. Cut metal letters are tapped for threaded stud insertion.

B. All aluminum letters under 18” use aluminum studs

C. All other letters use stainless steel studs.

D. Spacers can be used to “float” letters from wall. From .25”

E. Paper Installation template with marked stud locations should be provided.

2.7 FABRICATION

A. Letters shall be made of_Galvanized steel or Aluminum to match existing letters. (V.I.F.).

B. Letter shall be matched to existing letter style and shall be (V.I.F.) inches high, as indicated on the drawings.

C. Finish shall be as matching existing in field. Submit to Architect for approval.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. A qualified installer shall install cut metal letters.

B. Install in accordance with manufacturer's instructions.

C. Use anchorage devices to securely fasten assembly to wall construction without distortion or stress.

D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

E. Fit and align assembly including hardware; level and plumb.

F. Install signs level, plumb, and at the height indicated with sign surfaces free from distortion or other defects in appearance.

3.4 CLEANING

A. Clean components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 WARRANTY

A. Letters should be guaranteed for the life of the business against defects.

3.6 PROTECTION

A. Protect installed products until completion of project.

+ + END OF SECTION + +

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SECTION 10 14 23

PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Room-identification signs.

B. Related Requirements:

1. Section 01 33 00, Submittals

2. Section 01 77 16, Contract Closeout

3. MEP and Electrical Sections

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.

2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.

3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.

b. Deterioration of embedded graphic image.

c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.

2.2 SIGNS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. Signmojo.com, 2156 Amnicola Hwy, Chattanooga, TN 37406, 800.348.1349

C. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: “Santera” by Signmojo.com, 2156 Amnicola Hwy, Chattanooga, TN 37406, 800.348.1349, as indicated on Drawings.

2. Composite Phenolic-Core Sign: Solid phenolic panel core with integral subsurface graphic image covered with integral, polymeric face layer.

a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.

3. Mounting: Manufacturer's standard method for substrates indicated Surface mounted to wall with concealed anchors.

4. Surface Finish and Applied Graphics:

a. Integral Sheet Color: As selected by Director's Representative from full range of industry colors.

5. Text and Typeface: Accessible raised characters and Braille.

6. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

D. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: “Santera” by Signmojo.com, 2156 Amnicola Hwy, Chattanooga, TN 37406, 800.348.1349

2. Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition: Beveled.

b. Corner Condition in Elevation: Square.

E. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.

2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.

3. Exposed Metal-Fastener Components, General:

a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

b. Fastener Heads: For nonstructural connections, use screws and bolts with tamper-resistant one-way-head slots unless otherwise indicated.

4. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.

b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.

5. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.

3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.

4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.

5. Internally brace signs for stability and for securing fasteners.

6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.4 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that anchor inserts are correctly sized and located to accommodate signs.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Install signs so they do not protrude or obstruct according to the accessibility standard.

3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls according to accessibility standard.

C. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3. Shim-Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.

D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Director's Representative.

+ + END OF SECTION + +

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY OF WORK

A. Section includes: Plastic laminate partitions.

1.2 RELATED SECTIONS

A. Section 06 10 00, Rough Carpentry.

B. Section 10 28 00, Toilet, Bath, and Laundry Accessories.

1.3 REFERENCES

A. ASTM International: ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00; Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Literature indicating typical panel, pilaster, door, hardware and fastening.

2. Preparation instructions and recommendations.

3. Storage and handling requirements and recommendations.

4. Installation methods.

C. Shop Drawings:

1. Dimensioned plans indicating layout of toilet compartments.

2. Dimensioned elevations indicating heights of doors, pilasters, separation partitions, and other components; indicate locations and sizes of openings in compartment separation partitions for toilet and bath accessories to be installed in partitions; indicate floor and ceiling clearances.

3. Details indicating anchoring components (bolt layouts) and methods for project conditions; indicate components required for installation,

but not supplied by toilet compartment manufacturer.

D. Selection Samples: For each finish product specified, one complete set of color selection guides representing manufacturer's full range of available colors, textures and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, texture and pattern.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum five (5) years documented experience producing products specified.

B. Source Limitations: To the greatest extent possible products shall be provided by a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer, and installation location. Protect from damage.

C. Lay cartons flat, with adequate support to ensure flatness and to prevent damage to pre-finished surfaces.

D. Do not store where ambient temperature exceeds 120 degrees F (49 degrees C).

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not deliver materials or begin installation until building is enclosed, with complete protection from outside weather, and building temperature maintained at a minimum of 60 degrees F (15.6 degrees C).

1.8 WARRANTY

A. Manufacturers Standard Warranty: Provide warranty for Solid polymer HDPE Material: Against breakage, corrosion, and delamination for fifteen (15) years.

B. Manufacturers Standard Warranty: Provide warranty for Plastic Laminate Material: Against discoloration or delamination for two (2) years, assuming proper maintenance according to manufacturer's recommendations.

1.9 COORDINATION

A. Coordinate Work with placement of support framing and anchors in walls and floors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: ASI Global Partitions, which is located at: 2171 Liberty Hill Rd.; Eastanollee, GA 30538; Tel: 706-827-2700; Fax: 706-827-2710; Email:request info (sales@asi-globalpartitions.com); Web:asi-globalpartitions.com

B. Or Approved Equal.

2.2 COMPARTMENTS AND SCREENS

A. Toilet Compartments: Floor and wall anchored.

1. Compartment Depth and Width: As scheduled and indicated on Drawings.

2. Door Width: 24 inches (610 mm), minimum; at ADA accessible compartments 36 inches (915 mm) minimum.

3. Height Above Floor: 12 inches (305 mm).

4. Door/Panel Height: 58 inches (1473 mm).

5. Pilaster Height: 72 inches (1829 mm) - Ultimate Privacy.

B. Privacy and Urinal Screens: Floor and wall anchored.

1. Screen Panel Size: As scheduled and indicated on Drawings.

2. Height Above Floor: 12 inches (305) mm.

3. Panel Height: 42 inches (1066 mm).

4. Pilaster: 5 inches (127 mm) wide by 70 inches (1778 mm) high.

   a. 2 Panels: Length: 1’-0”

2.3 PLASTIC LAMINATE TOILET COMPARTMENTS

A. Doors, Panels, Screens, and Pilasters: Decorative plastic laminate bonded under pressure with non-toxic adhesive to wood core; edge banded prior to facing.

1. Doors, Screens, and Panels: 7/8 inch (22 mm) thick particleboard; finished thickness of 1 inch (25 mm).

2. Pilasters: 1-1/8 inches (29 mm) thick particleboard; finished thickness of 1-1/4 inch (32 mm). Reinforce pilaster with minimum 0.1196 inch (3 mm) thick steel sheet.

B. Finish: Plastic laminate, color as selected from manufacturer's standard colors.

C. Door Hardware:

1. Finish: Type 304 Stainless Steel, No. 4 satin finish attached with theft resistant barrel nuts and shoulder screws.

2. Hinges: Top and bottom hinges recessed into door with saddle on adjacent pilaster, providing bi-directional operation about axis within the plane of the door; adjustable cams supporting door, returning to resting position by gravity.

3. Strike and Keeper: Emergency access by lifting door.

4. Latch: Manufacturer's standard surface mounted.

5. Coat Hook and Bumper: Manufacturer's standard surface mounted. No tamper resistant screws required.

6. Door Pull: Standard on ADA compartments.

7. Fastening Hardware: Theft resistant heads.

D. Pilaster Anchors, Floor Anchored.

1. 1/4-inch (6 mm) by 1-inch (25 mm) steel mounting bar secured to pilaster with 3/8 inch (9.5 mm) steel fasteners. Pilasters to be secured to floor with 3/8-inch (9.5 mm) studs and nuts. Leveling adjustment to be concealed by pilaster shoe after installation.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Inspect and prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Clean surfaces thoroughly prior to installation.

B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

1. Verify dimensions of areas to receive compartments.

2. Verify locations of built-in framing, anchorage, bracing, and plumbing fixtures.

3.2 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturer's instructions.

B. Fasten components to adjacent materials and to other components using purpose-designed fastening devices.

C. Adjust pilaster anchors for substrate variations; conceal anchors with pilaster shoes.

D. Equip each compartment door with top and bottom hinges and door latch.

E. Install door strike keeper on pilasters in alignment with door latch.

F. Equip each compartment door with one coat hook and bumper.

G. Installation Tolerances:

1. Maximum variations from plumb or level: 1/8 inch (3 mm).

2. Clearance between wall surface and panels or pilasters: 1-1/2-inch (38 mm) maximum.

3.3 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors.

B. Adjust adjacent components for consistency of line or plane.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Remove factory protective coverings and clean finish surfaces in accordance with manufacturer's instructions before substantial completion.

+ + END OF SECTION + +

SECTION 10 21 19

SOLID PLASTIC SHOWER AND DRESSING COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid plastic shower and dressing compartments.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.

2. Section 102113, Toilet Compartments

3. Section 102800, Toilet, Bath, and Laundry Accessories

1.2 REFERENCES

A. ASTM International (ASTM)

1. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.3 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.

2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.

3. Samples: 2 x 3 samples showing available colors.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic shower and dressing compartments with products in satisfactory use under similar service conditions

B. Installer Qualifications: Minimum 5 years' experience in work of this Section.

1.5 WARRANTIES

A. Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Based on products by Scranton Products. (www.scrantonproducts.com)

B. Substitutions: Under provisions of Division 01., Section 013300 Submittals

2.2 MATERIALS

A. Doors, Panels and Pilasters:

1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.

2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.

3. 1 inch thick with radiused edges.

4. Fire hazard classification: Class A flame spread/smoke developed rating, tested to ASTM E84.

5. Color: To be selected from manufacturer's full color range.

B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

2.3 COMPONENTS

A. Panels: 70 inches high, mounted to pilasters with continuous brackets and to panels with continuous extruded aluminum brackets or continuous extruded aluminum shower corner brackets.

B. Pilasters: 80 inches high, fastened to panels with continuous brackets.

C. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail brackets and top of pilaster using stainless steel tamper-resistant Torx head screws.

D. Headrail Brackets: 20 gage stainless steel, secured using stainless steel tamper-resistant Torx head screws.

E. Brackets: 76 inches long, extruded aluminum, clear anodized finish, attached using stainless steel tamper-resistant Torx head screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install rigid, straight, plumb, and level.

C. Not Acceptable: Evidence of cutting, drilling, or patching.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 10 28 00

TOILET, BATH AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide toilet and bath accessories as indicated on Drawings and as specified herein.

1.2 REFERENCES

A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1.3 SUBMITTALS

A. Product Data

1. Manufacturer's specifications and catalog sheets indicating compliance with specified requirements, installation instructions and maintenance instructions.

B. Shop Drawings

1. Submit Shop Drawings for each item specified herein, indicating locations of all items, and installation details.

2. Submit mounting templates for coordination with other trades.

3. Prior to installation of adjacent drywall work submit elevations, details, and templates for locations of steel grounds to be furnished and installed in drywall partitions under Section 09 29 00 - Interior Gypsum Wallboard. Grounds and/or steel studs shall receive fasteners at all locations where the work of this Section is attached to drywall construction.

C. Affidavits certifying compliance with Quality Assurance requirements.

1. Manufacturer's qualifications.

2. Installer's qualifications.

1.4 QUALITY ASSURANCE

A. Manufacturer

1. Five (5) years' experience, minimum, in successful manufacture of product of type and quality specified.

B. Installer

1. Three (3) years' experience, minimum, in installation of product of type specified.

C. Comply with ANSI; Accessibility Design Guidelines for Public Facilities.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products as recommended by respective manufacturer to protect from damage.

1.6 WARRANTY

A. Manufacturer's Warranty

1. Standard, written, for each item.

1.7 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals.

B. Section 01 74 00, Construction Waste Management.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

Basis of Design: American Specialties, Inc., Yonkers, NY 10701 www.americanspecialties.com (or Equal).

2.2 TOILET PAPER HOLDERS

A. Provide one dual paper holder at each water closet; attach to toilet partitions and to walls as indicated on plans.

B. Accessory Schedule:

1. ACCESSORY A1: Partition Mounted Dual Twin Hide-A-Roll Toilet

Paper Dispenser Model 0032 (ASI Inc)

2. ACCESSORY A2: Recessed Toilet Paper Dispenser/Sanitary Napkin Disposal Model 04823

3. ACCESSORY A3: Semi-Recessed Twin Hide-A-Roll Toilet Paper Dispenser (ASI Inc) Model 0031

4. ACCESSORY A4: Surface Mounted End Stall Sanitary Napkin Disposal Model 0473-A

5. ACCESSORY A5: Recessed Sanitary Napkin Disposal Model 0473

6. ACCESSORY A6: Partition Mounted Dual Access Sanitary Napkin Disposal Model 0472 (ASI Inc)

C. Install paper holders at locations and at heights as indicated on the Drawings.

D. Secure to partitions and/or walls as detailed on the Drawings or as specified. Do not use plastic or lead expansion shields.

2.3 SOAP DISPENSERS

A. Accessory A9 Liquid Soap Dispensers - Countertop Mounted

1. Manufacturers/Models

a. Bobrick B-824 SureFlo Automatic 34 oz. Deck Mounted Liquid Soap Dispenser

b. Approved equal.

2. Construction

a. Battery operated, touch free, chrome plated finish with 32 oz. plastic soap container.

3. Provide one dispenser for each counter-mounted lavatory unless indicated otherwise, installed so end of spout extends over inner edge of bowl.

2.4 WALL MIRRORS

A. Manufacturers/Models

1. Mirror Only

a. Custom wall mount mirror

B. Construction

1. Polished Plate/float glass, 1/4" thick, electro-copper plated and waterproofed with metal backing.

2. Adhesive mounting directly on wall.

C. Size: Provide wall mirrors at sizes indicated on the Drawings, unless indicated otherwise.

D. Provide wall mirrors at locations indicated on the Drawings.

2.5 ACCESSORY A7 HAND DRYER:

A. Dyson Airblade US AB V Model HU02 . Touch free capacitive sensor activation

B. Input voltage: Low voltage = 120-127V, High voltage = 200-240V

Frequency: 50 or 60Hz, subject to voltage (85-115V at 50Hz);

(85-130V at 60Hz); (200-240V at 50 & 60Hz)

Standby power consumption: Less than 0.5 W

Motor specification: 1,000W digital brushless motor

Motor switching rate: 5,500 per second

Motor speed: 83,000 rpm

Amp: Recommended dedicated 15 amp circuit

(110V ~10A; 120V ~8.33A; 220V ~4.55A; 240V ~4.17A)

C. Machine dimensions

Height 15 1⁄2" (394mm) × Width 9 7⁄32" (234mm) × Depth 4" (100mm)

D. Minimum clearance

8 11⁄16" (220mm) clearance either side and 1 3⁄16" (30mm) above machine

E. Airbladeinfo@dyson.com | www.dyson.com

2.8 ACCESSORY A8 Grab Bars

A. American Specialties, Inc.

B. 1-1/2" DIAMETER [Ø38] GRAB BAR SERIES WITH SNAP-ON FLANGE COVERS

C. Series No. 3800

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate with drywall, framing, and ceiling trades for locations of concealed metal grounds to receive mounting hardware. Submit templates of fastener locations.

3.2 INSTALLATION

A. Install accessory items as detailed on Drawings and recommended by respective manufacturer.

B. Provide stainless steel expansion shields and bolts, and stainless steel toggle bolts at cavities. Do not use plastic or lead anchors.

C. Install units plumb, level and anchor securely.

3.3 CLEANING

A. Clean and polish exposed surfaces of accessory items.

B. Remove temporary labels, markings and protective coatings.

+ + END OF SECTION + +

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SECTION 10 44 16

PORTABLE FIRE PROTECTION EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install portable fire extinguishers.

2. The locations of the portable fire extinguishers are shown on the Drawings and specified herein.

3. The types of portable fire extinguishers required include the following:

a. Multi-purpose dry chemical extinguishers.

b. Carbon dioxide extinguishers.

B. Coordination:

1. Coordinate the installation-of items that must be installed with the portable fire extinguishers.

1.2 QUALITY ASSURANCE

A. Source Quality Control: Furnish portable fire extinguishers and accessories from only one manufacturer.

B. Requirements of Regulatory Agencies: Provide only portable fire extinguishers that are approved and labeled by UL in accordance with the State of New York Official Compilation of Codes, Rules and Regulations.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. UL, Fire Classification Rating.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's technical data, certification of UL rating, and installation instructions for all portable fire extinguishers required.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittals

B. Section 01 74 00, Construction Waste Management

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. General: Provide manufacturer's standard mounting bracket for portable fire extinguishers size as required.

B. Multi-Purpose Dry Chemical:

1. 20-pound capacity, enameled steel container with pressure indicating gauge, for Class A, Class B and Class C fires, UL rating 20A-120 BC.

2. Effective discharge time shall be 20 seconds minimum.

3. Manufacturer: Provide one of the following:

a. Model Cosmic 20E as manufactured by J. L. Industries.

b. Or equal.

C. Carbon Dioxide:

1. 20 pound capacity, UL rating 10 BC.

2. Product and Manufacturer: Provide one of the following:

a. Sentinel Model 20 as manufactured by J. L. Industries.

b. CD20 as manufactured by Larsen's Manufacturing Company.

c. Or equal.

D. Signs: Provide styrene, Y-shaped signs.

1. Background: White.

2. Lettering: "FIRE EXTINGUISHER," red or black.

3. Symbol: Of fire extinguisher, red.

4. Size: 7 inches by 12 inches.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor and his installer shall examine the substrate and conditions under which the portable fire extinguisher Work is to be installed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 INSTALLATION

A. Install wall mounted units in locations and at mounting of 3 feet-0 inches. Securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.

B. Wherever exact locations of units are not clearly established, locate as directed by Engineer.

C. Install signs directly above portable fire extinguishers, securely mounted, attached to substrate in accordance with manufacturer's instructions. Install signs level and plumb.

D. Inform County of next required inspection and recharging date.

3.3 SCHEDULE

Type	Capacity (lbs)	Units	Location
A	20	1	Electrical Room

3.4 EXTINGUISHER TYPES

A. Dry Chemical.

B. CO_2.

+ + END OF SECTION + +

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SECTION 10 51 26

PLASTIC LOCKER ROOM BENCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Solid plastic locker room benches.

1.2 RELATED SECTIONS

A. Division 06 Section "Rough Carpentry" for locker anchorage.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.

2. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for each type of product indicated include fabrication details, description of materials and finishes.

1. Product Test Reports: When requested by Architect, provide documentation indicating compliance of products with requirements, from a qualified independent testing agency.

B. Shop Drawings: Include overall bench dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.

C. Samples for Selection: Furnish samples of manufacturer's full range of colors for initial selection.

D. Samples for Approval: Furnish a physical sample of the material in the selected color.

1. Size: 6 by 6 inch (102 by 102 mm) in type of finish specified.

1.5 INFORMATIONAL SUBMITTALS

A. Installation instructions.

B. Warranty: Sample of special warranty.

1.6 MAINTENANCE SUBMITTALS

A. Operation and Maintenance Data.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum 5 years' experience in the manufacture of plastic lockers. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:

1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.

2. Samples of each component of product specified.

3. List of successful installations of similar products available for evaluation by Architect.

4. Submit substitution request not less than 15 days prior to bid date.

B. Installers Qualifications: An experienced Installer regularly engaged in the installation of benches for a minimum of 3 years.

C. Source Limitations: Obtain plastic benches and trim accessories from single manufacturer.

D. Accessibility Requirements: Comply with requirements of ADA/ABA and with requirements of authorities having jurisdiction.

E. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 100 or less.

2. Smoke-Developed Index: 450 or less.

F. Indoor Environmental Quality Certification: Provide certificate indicated that products have been certified under the following programs, or a comparable certification acceptable to Owner:

1. GREENGUARD Indoor Air Quality Certified.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver plastic benches to the site until the building is enclosed and HVAC systems are in operation. Deliver plastic lockers in manufacturer's original packaging. Store in an upright condition. Protect plastic lockers from exposure to direct sunlight.

1.9 WARRANTY

A. Special Manufacturer's Warranty: 20 year against rust, delamination or breakage of plastic under normal use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of Bradley Corporation, Menomonee Falls, WI 53051, (800)272-3539, fax (262)251-5817; Email info@BradleyCorp.com; Website www.bradleycorp.com.

1. Provide basis of design products or comparable products of one of the following approved manufacturers:

   Bradley Corporation

   ASI

   Or approved equal

   Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General Requirements.

2. Provide specified product; Owner will not consider substitution requests.

B. Materials

1. High Density Polyethylene (HDPE): 30 percent pre-consumer recycled content polyethylene thermoplastic formed under high pressure into solid plastic components.

2. Stainless-Steel Sheet: ASTM A 666, Type 304.

3. Fasteners: Tamper-Resistant Fasteners: Stainless steel torx-head screws.

Locker Connectors: No. 10-24 sex bolts.

Anchors: Type and size required for secure anchorage.

Drilled-in-place Masonry Anchors: Minimum 1/4 by 1-3/4 inch (6 by 44 mm) screws.

2.2 PEDESTAL BENCH

A. Basis-of-Design Product: Bradley LENOXPEDESTAL.

B. Pedestal Bench Dimensions

1. Length: 36 inch (914 mm).

2. Width: 9.5 inch (241 mm).

3. Height: 18-1/2 inch (470 mm).

C. Materials:

1. Bench Top: 1-1/2 inch (39 mm) thick HDPE plastic, 30 percent recycled material, with matte texture finish.

2. Pedestal: Black anodized aluminum with welded aluminum flanges top and bottom.

D. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install benches in climate controlled environment, shielded from direct sunlight.

B. General: Install on floor or other firm support. Install level, plumb, and true.

1. Position locker base per approved shop drawing. Using fasteners provided by manufacturer, anchor base sections to the floor.

2. Attach filler pieces to lockers with male-female sex bolts.

3. Position first locker according to submittal layout. Square and plumb the locker using concealed shims. Secure the locker to the wall at the top and bottom of the locker. Position second locker next

to first, square and plumb to align the tops and bottoms; and temporarily clamp lockers together. Drill four holes through the sides of the lockers and connect lockers using sex bolts provided by manufacturer.

C. Accessories: Fit exposed connections of trim, fillers, and closures together to form tight, hairline joints, with concealed fasteners and splice plates furnished by bench manufacturer. Install as indicated on approved shop drawings.

D. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, spaced as indicated. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.2 FINAL CLEANING

A. Clean locker interior and exterior surfaces.

B. Remove packaging and construction debris and legally dispose of off-site.

+ + END OF SECTION + +

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SECTION 12 36 23

PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes plastic-laminate countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.

2. Apply AWI Quality Certification Program label to Shop Drawings. C. Samples for Initial Selection:

a. Plastic laminates.

C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each color, pattern, and surface finish.

2. Wood-grain plastic laminates, 12 by 24 inches, for each type, pattern and surface finish.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For the following:

1. Composite wood and agrifiber products.

2. High-pressure decorative laminate.

3. Chemical-resistant, high-pressure decorative laminate.

4. Adhesives.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful inservice performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements

before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. Provide labels from AWI certification program indicating that countertops comply with requirements of grades specified.

2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Premium.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Formica Corporation.

b. Nevamar; a Panolam Industries International, Inc. brand.

c. Wilsonart International Holdings, Inc.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated on Drawings.

2. Grain Direction: Parallel to cabinet fronts.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard or medium-density fiberboard.

G. Core Material at Sinks: Exterior-grade plywood.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.

2. Particleboard: ANSI A208.1, Grade M-2.

3. Softwood Plywood: DOC PS 1.

2.3 ACCESSORIES (where applicable)

A. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett & Company, Inc.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.

2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.

2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavyclamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Secure backsplashes to walls with adhesive.

3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

+ + END OF SECTION + +

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13 12 00

SECURITY GUARDHOUSE TICKET BOOTH

PART 1 – GENERAL

1.1 SUMMARY

A. Provide all labor, equipment and materials to furnish one prefabricated steel Ticket Booth.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 260573, Electrical service supply and connection.

B. Section 024000, Demolition, Removals and Modifications

C Section 034000, Precast Concrete - Site/foundation work.

D. Section 055030, Anchor Bolts, Expansion Anchors and Concrete Inserts - Unloading, placement, installation and anchoring.

E. Section 224000, Plumbing

F. Section 230719, HVAC Piping Insulation

G. Section 235000, Heating, Ventilating, and Air Conditioning

1.3 SUBMITTALS

A. Upon award of order, manufacturer shall prepare and submit shop drawings for each different building required for this project. Drawings shall include elevations, section, floor plan, electric schedule, service entrance locations, and anchor clip detail.

1.4 QUALITY ASSURANCE

A. Structures shall be the product of a manufacturer with a minimum of 20 years-documented experience in the design and fabrication of portable steel buildings.

B. Prefabricated buildings by manufacturers other than the one approved shall submit sufficient data to enable approval to be given. As a minimum: design drawings and/or calculations, applicable certifications, catalog information, and color samples showing equal range of variety.

C. Design loads: Live Loads: Per requirements for the installation location. Unit to be manufactured to be in full compliance with the State Codes and State certification where applicable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products of the following manufacturer from the basis for design and quality intended.

1. B.I.G. Enterprises, Inc. South El Monte CA. 800-669-1449.

B. Or equal as approved in accordance with Section 013300 for Submittal, Substitutions.

2.2 STRUCTURE

A. Prefabricated steel building shall be single unit welded construction. Building to be shipped completely assembled. All welded joints ground smooth. Base Dimensions to be as indicated on drawings.

B. 2" x 2" x .083” cold drawn electro-welded structural mechanical steel frames.

2.3 WALLS

A. 16ga. Galvanized steel interior and exterior panels MIG welded between frame and mullions for self-aligning unitized system, creating a structural diaphragm. Booth to have an exterior continuous layer of R-10 insulation encapsulated within the final exterior layer of galvanized steel panels.

2.4 BASE AND FLOOR

A. Unit to have a 12ga. Galvanized steel plate floor welded to a 2” x 2” perimeter galvanized steel tube frame with structural joists welded to the frame. Floor deck to be covered with black polyvinyl chloride commercial resilient textured 1\4” x 20” x 20” inter locking tiles and 4" high black base cove. Floor to have four interior steel anchor plates welded to the floor frame with interior removable access panel above each anchor clip. No exterior anchor clips allowed.

2.5 DOOR

A. Unit to have one (or specify two) commercial steel framed 3’0” x 6’8” sliding door top hung by eight 2 1\4” rigid steel ball bearing rollers with a

lower stainless steel guide, stainless steel pull handles welded to the frame and mortise lock.

2.6 WINDOWS

A. 16ga. galvanized steel window frame system with flush mounted corners and welded fastening. Unit to have fixed windows on all sides. All windows glazed with 1\4" tinted tempered glass.

Recommended glazing upgrade: All windows glazed with 3\4" tinted tempered dual pane insulating glass.

2.7 ROOF

A. Roof to be standard design for interior or exterior use. Roof to be constructed of internal steel framing with 16-gauge galvanized steel roof deck that has a three part membrane with a SRI index of 95 or better. Roof to have a 8" fascia with 3" overhang on all sides. Roof to drain to downspouts from the rear overhang soffit. All booths 6' x 8' or larger have removable lifting rings for hoisting by crane.

2.8 COUNTER

A. Booth to have a 20" deep painted galvanized steel shelf (or as indicated on dwgs) at the front end wall mounted at 34" AFF.

2.9 ELECTRICAL

A. Load Center shall be 125 Amp rated, 120/240 volt, single phase, 3 wire 12 pole panel mounted in a location in full compliance with National Electric Code (NEC). Two 20 amp duplex outlets mounted under the front shelf, interior LED light(s) recessed in a 16ga. painted galvanized steel ceiling and controlled by a wall mounted switch.

B. Air conditioner to be a through the rear wall mounted unit with 12,000 BTU cooling and 11,200 BTU heating with dedicated 230 volt outlet.

2.10 WEATHER PROOFING

A. Weather-tight for exterior use. All seams and joints pressure bonderized. All openings fully weather stripped, roof coated as specified..

B. Rust inhibitive high build epoxy primer and two part polyurethane finish coat. Paint to have minimum 3500 hour salt sprat test. Booth to be painted one color inside and out as selected ted by Architect.

PART 3 - EXECUTION

3.1 GENERAL

A. Install prefabricated buildings on flat and level concrete pad in accordance with the manufacturer's recommendations and placement drawings. Position units over utility stub-ups, verify building is level and anchor.

3.2 INSTALLATION

A. Units shall be shipped fully assembled, fully wired, fully glazed and thoroughly painted.

B. Position units over electrical stub-up on level pad. Drill and set expansion type anchor bolts.

C. Connect power and seal around edges where the floor base meets the concrete pad.

+ + END OF SECTION + +

SECTION 13 15 00

SUMMARY OF SWIMMING POOL WORK

PART 1 – GENERAL

1.1 SUMMARY

A. The following includes but is not limited to swimming pool work which shall be performed by a qualified Swimming Pool Subcontractor under the General Construction work, unless otherwise noted.

1. Health Department approval is based on the design of products specified herein and on the drawings. Substitutions shall be permitted only if the Contractor obtains prior approval from the Westchester County Department of Health (DOH).

2. Provide all required shop drawings for the Swimming Pool and pool equipment as specified herein and in other Sections.

3. Provide prefabricated main drains, inlets and recirculation systems as scheduled on the drawings. (All systems shall be compliant with the Virginia-Graeme-Baker (VGB) Act.

4. Provide pool filtrations and chemical treatment equipment, including pool fittings, piping and valves as scheduled on the drawings and as required for fully operable swimming pool systems.

5. Provide pumps, piping and valves as required for operation of swimming pool circulation systems as scheduled on the drawings.

6. Provide circulating, pool drainage and equipment room piping as scheduled and noted on the drawings.

7. Provide guard rails, lifeguard chair, float lines, handicap lift, and maintenance equipment as scheduled on the drawings.

8. Provide Spray Deck Feature items and appurtenances as scheduled on the drawings.

9. Provide Gunite/ Shotcrete pool shell. Refer to Section 033610- “SWIMMING POOL GUNITE/SHOTCRETE”.

10. Provide all caulking and sealing of pool joints. Refer to Section 079200- “SWIMMING POOL JOINT SEALANTS”.

11. Provide tile marking, lane lines and feature bands within and around the swimming pool. Refer to Section 093013 “SWIMMING POOL CERAMIC TILING”.

12. Provide deck tile depth markers and “No Diving” signs as indicated on drawings and vinyl markers on pool gutter as indicated.

13. Provide pool fittings for: deck drains, floor drains, pit drains, hose bibbs, potable water supply to pool, auto fills, probes, controls, and pool wastewater disposal, as scheduled on the drawings.

14. Furnish pre-wired electrical control system to be installed under Division 26 (Electrical Contract).

15. Provide pool safety equipment as scheduled on the drawings.

16. Provide signage as scheduled on the drawings. Coordinate signage with main project architectural signage specified elsewhere.

17. Provide pool cementitious base coat waterproofing. Refer to Section 071417 “SWIMMING POOL BOND COAT WATERPROOFING”.

18. Provide pool finish coating. Refer to Section 071417 “SWIMMING POOL BOND COAT WATERPROOFING”.

19. Provide pool mesh cover as scheduled on the drawings.

20. Project Closeout and Record Documents to Owner including Final DoH inspection and equipment operation training as specified elsewhere in the Project Manual

1.2 RELATED WORK UNDER OTHER SECTIONS OR CONTRACTS

A. Site access for heavy equipment.

B. Benchmark and layout for exact pool location.

C. All bulk machine excavation, trenching and backfill for pool structure, swimming pool piping, deck equipment, balance, surge, settling tanks and pump pits and disposal of unsuitable excavated material.

D. All required backfill material.

E. All base and sub-base material for pool; compaction; and all compaction testing and soil testing.

F. Demolition of existing swimming pool structure, pool area, grading, and any other area preparation required prior to the start of pool construction.

G. Construction and backfill of all foundations, equipment room walls, footings, settling tank surge tank and sumps as required for swimming pool construction work.

H. Swimming pool deck construction, finishes, expansion joints, caulking, installation of anchors for deck equipment (anchors, furnished by Swimming Pool Subcontractor).

I. Swimming pool deck drains.

J. All required sleeves, openings, or other penetrations in equipment room walls, pump pits, surge and settling tanks, and closure of same required for pool construction work.

K. All dewatering for pool construction, as necessary, through entire pool construction period.

L. Fresh water piping in to filter room, including back flow prevention device, shut-off valve, and hose bibb; floor drains and deck drains; makeup water line to auto fill or balance tank; and waste water connection from filter to sewer including any sump pump connections is required. Install solenoid valve(s), water connection to Fill-operated valves.

M. Deck covers for permanent dewatering system if required.

N. All electrical connections for equipment furnished by the Swimming Pool Subcontractor including but not limited to the filter, pumps, motors, solenoids, relays, water level probes (with housing), motorized valves, etc. as shown on Drawings. All pool equipment controls, including VFD's, shall be furnished by the Swimming Pool Subcontractor and installed by the Electrical Contractor; the Electrical Contractor shall install and wire all electrical equipment furnished by the Swimming Pool Subcontractor and shall provide all disconnect switches as indicated or required by code.

O. The Electrical Contractor shall ground the entire pool structure, deck, and deck equipment in accordance with the National Electrical Code and all applicable local Codes and Ordinances and as indicated on the drawings.

P. All temporary construction utilities, water, electric heat and cold weather protection.

Q. All water for testing and filling.

1.3 QUALITY ASSURANCE

A. Design Standards:

1. The Swimming Pool work shall comply with the following requirements:

a. Association of Pool and Spa Professionals. (APSP)

b. State of New York Pool Design Standards.

c. National Electrical Code, Article 680.

d. National Sanitation Foundation Standards for Swimming Pool Equipment. (N.S.F.)

e. Current IBC New York State Building Code (2020)

f. New York State Sanitary Code, Subpart 6-1

B. Experience Qualifications: Work shall be performed by or under direct supervision of a qualified Contractor with at least five (5) years experience in construction and equipping of public pools of 250,000 gallons minimum. Submit a list of three (3) projects, completed in the last five years completed in Westchester County, for which the Swimming Pool Contractor was responsible for constructing and equipping of similar pools for public use.

C. Installation of Pool System and Equipment: Pool equipment and system shall be installed by specialists, experienced in swimming pool work and licensed or approved by manufacturer to ensure installation and performance in accordance with manufacturer's warranties and guarantees.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material in manufacturer's original, unopened containers and crates with all labels intact and legible.

B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.

C. Handle materials in a manner to prevent damage.

D. Store all materials on clean raised platforms with weather protective covering when stored outdoors. Provide continuous protection of materials against damage and deterioration.

E. Remove damaged materials from site.

1.5 SUBMITTALS

A. Refer to Division 01 for submittal procedures.

B. Shop Drawings: Submit coordinated shop drawings showing layouts of recirculation system, pool markings, pumps, filters, chemical treatment, valves, piping and related equipment. Drawings or brochures shall be submitted with diagrams including dimensions of all equipment. Show types of anchors and method of anchoring fixed equipment. Provide rough-in information interfacing plumbing, mechanical and electrical work and accurately dimensioned locations for sleeves, inserts, and anchors to be cast into concrete and installed into the project structure. Provide electrical schematic diagrams for all pump connections and pool bonding and grounding.

C. Certification: Submit complete equipment list and duplicate copies of certificate from equipment manufacturer, properly attested, with statement that materials meet requirements of Contract Documents. Submit certificate for approval before doing any work.

D. Product Data: Submit an electronic version in PDF format of manufacturer's data for operating equipment, valves, piping, drains, equipment, and maintenance data for shop drawing review and approval.

E. Maintenance Data: After approval, submit six (6) sets operating and maintenance manuals to the Owner. Include operating instructions, maintenance recommendations for equipment and finishes, parts list, troubleshooting information and similar data. Manual must be approved prior to training of Owner's personnel.

F. Contract Documents: Drawings are diagrammatic in part and are meant to indicate general arrangement of systems and equipment. Information shown on plans but not on Sections or schedules and vice-versa, shall be provided as if expressly required on both. It is not intended that Contract Documents indicate every fitting offset, line or component necessary for particular supplier's system; but it is intended that systems and equipment supplied shall be complete and operational, whether or not shown or specified. Specified items may in fact be disapproved during Submittal Review if they do not form part of a complete system.

G. Permits: Requirements for permits are specified elsewhere.

1.2 GUARANTEES

A. Provide standard written manufacturers' guarantees in the Owner's name for materials furnished under this Section where such guarantees are offered in the manufacturers' published product data.

B. Furnish written warranty for materials and workmanship of systems and work installed under this section against defect in materials and workmanship for a period of 1 year from the date of Substantial Completion. Warranty on equipment shall cover 100% parts and labor with no prorating.

C. The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted and that the Work will confirm with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, improper or insufficient maintenance, improper operation or insufficient maintenance, improper operation, modification not executed by the Contractor or the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. All warranties shall be for a period of one year from substantial completion unless otherwise specified.

D. The Contractor shall agree to repair or replace any Work at no cost to the Owner, upon written notification from the Owner within the warranty period. Prorated warranties are *not* acceptable.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Refer to Schedules on the drawings and other Specification Sections for manufacturers.

B. Products of particular manufacturers have been specified to establish a standard of quality and performance.

C. Proposals including list of manufacturers and itemized products for other systems will be reviewed by the Pool Consultant and Owner's Representative to compare against scope and quality required by the Contract Documents.

1. All equipment furnished hereunder shall be by manufacturers with at least 5 years experience in the fabrication and installation of the item specified with at least 10 installations on public pools similar in scope to this project.

2.2 MATERIALS

A. Refer to schedules on the drawings and other Specification Sections for individual items.

PART 3 – EXECUTION

3.1 TESTING AND INSPECTION

A. Pool Piping: Test pool piping to 35psi hydrostatic pressure for minimum 12 hours before placement of covering concrete slabs.

B. Concrete Pool Shell Leak Test:

1. Before application of interior pool finish, leak-test-tank as follows: Fill pools with water and allow to stand for 24 hours. Mark water level and observe for 24 hours. If water level drops more than ¼-inch, drain pool, repair leaks, and repeat testing until pool is approved watertight by Pool Consultant.

2. Water for testing shall be provided by Owner.

3. Test shall be done after installation of gutter, prior to installation of finish coat.

C. Start- up and turnover to Owner

D. DoH inspections:

1. Buried pipe inspections

2. Pool shell inspections including finished depths matching depth markings to +/- ½”.

3. Safety inspection including all equipment and signage per the approved Safety Plan

4. Final inspection including all pool equipment operations within specifications

E. Training, final testing and demonstration of equipment for Owner's staff

1. Provide for the storage of all pool related equipment, materials, and systems. All items are the responsibility of the contractor until accepted by the Owner.

2. Participate in obtaining final acceptance by jurisdictional Health Department.

3. Start, test, calibrate and adjust all mechanical equipment, electrical equipment, recirculation, chemical, and other supplied systems including deck mounted and loose equipment and accessories, maintenance, and safety equipment. Instruct the Owner's representative in the system operation and maintenance as described herein.

F. Provide operational manuals and warranty information for all mechanical equipment.

G. Start-up chemicals:

1. Dry-tab calcium hypochlorite for erosion feeder – ten (10) 5-gallon buckets

2. Dry-tab acid for erosion feeder – ten (10) 5-gallon buckets

3. CO2 – tank and gas by Owner

+ + END OF SECTION + +

SECTION 14 24 00

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies hydraulic elevators.

B. Work Required:

1. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.

2. All work shall be performed in a first class, safe and workmanlike manner.

3. In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

C. Related work not specified herein: The following sections contain requirements that relate to this section and are performed by trades other than the elevator manufacturer/installer.

1. Section 01 33 00, Submittals

2. Section 01 57 19 Environmental Control

3. Section 03 30 00, Cast-In-Place Concrete: elevator pit, elevator motor and pump foundation, and grouting thresholds.

4. Section 05 50 00, Metal Fabrications: pit ladder, divider beams, support for entrances and rails, hoisting beam at top of hoistway.

5. Section 26 27 26, Wiring Devices

6. Section 26 05 00 Common Work Results for Electrical

7. Section 28 31 00 Fire Detection and Alarm

D. Applicable Codes: Comply with applicable building and elevator codes at the project site, including but not limited to the following:

1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.

2. ADAAG, Americans with Disabilities Act Accessibility Guidelines.

3. ANSI/NFPA 70, National Electrical Code.

4. ANSI/NFPA 80, Fire Doors and Windows.

5. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.

6. ANSI/UL 10B, Fire Tests of Door Assemblies.

7. CAN/CSA C22.1, Canadian Electrical Code.

8. CAN/CSA-B44, Safety Code for Elevators and Escalators.

9. EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity”

10. Local Building Codes.

11. All other local applicable codes.

1.2 SYSTEM DESCRIPTION

Basis of Design is the Otis 3500# HydroFit Hydraulic Machine-Room Less Elevator or Equal by another manufacturer.

A. Equipment Description: Holeless Hydraulic elevator with Machine-Room Less application

B. Equipment Control: Elevonic® Control System.

C. Quantity of Elevators: 1

D. Elevator Stop Designations: 1,2

E. Stops: 2

F. Openings: 1 at Front, 1 at Rear.

G. Travel: 14 ft 10 in

H. Rated Capacity: 3500 lbs

I. Rated Speed: 125 fpm

J. Platform Size: 8’-9” W x 7’-5 ¼”D

K. Clear Inside Dimensions: 6’-5 9/16” W x 5’-5 9/16”

L. Cab Height: 7' 9"

M. Clear Cab Height: 7’-9”

N. Entrance Type and Width: Entrance Type and Width: Single Slide; 3' 6"

O. Entrance Height: 7' 2"

P. Main Power Supply: 480 Volts, 3-Phase, 60Hz + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.

Q. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.

R. Machine and Controller Location: No machine-room required, tank and controller in hoistway pit.

S. Signal Fixtures: Manufacturer’s standard with stainless steel metal button targets (exc. CA).

T. Controller Location: Inside hoistway, accessible by a door in the right side hoistway wall on the 1st or 2nd landing. (1st landing only if rear entrance)

U. Stopping Accuracy: ±1/4" (6.4 mm) under any loading condition or direction of travel.

V. Operation: Simplex Collective Operation- Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

W. Operating Features – Standard

1. Full Collective Operation

2. Anti-nuisance.

3. Fan and Light Protection.

4. Load Weighing Bypass.

5. Independent Service.

6. Full Collective Operation.

7. Firefighters' Service Phase I and Phase II **;**

8. Top of Car Inspection.

X. Door Control Features:

1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.

2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person. Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.

3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

Y. Provide equipment according to seismic zone: Zone 0

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:

1. Signal and operating fixtures, operating panels and indicators.

2. Cab design, dimensions and layout.

3. Hoistway-door and frame details.

4. Electrical characteristics and connection requirements.

5. Expected heat dissipation of elevator equipment in hoistway (BTU).

6. Color selection chart for Cab and Entrances.

B. Shop Drawings: Submit approval layout drawings. Include the following:

1. Car, guide rails, buffers and other components in hoistway.

2. Maximum rail bracket spacing.

3. Maximum loads imposed on guide rails requiring load transfer to building structure.

4. Clearances and travel of car.

5. Clear inside hoistway and pit dimensions.

6. Location and sizes of access doors, hoistway entrances and frames.

C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

1.4 QUALITY ASSURANCE

A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.

B. Installer: Elevators shall be installed by the manufacturer.

C. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

1.5 DELIVERY, STORAGE AND HANDLING

A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.

Should the storage area be off-site, and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.6 WARRANTY

A. The elevator contractor’s acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The warranty period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The warranty excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

1.7 MAINTENANCE AND SERVICE

A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 12 Months months after the elevator has been turned over for the customer’s use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days. This service shall not cover adjustments, repairs or replacement of

parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

B. The elevator control system must:

1. Provide in the controller the necessary devices to run the elevator on inspection operation.

2. Provide on top of the car the necessary devices to run the elevator in inspection operation.

3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.

4. [Optional] Provide the means from the controller to reset elevator earthquake operation.

C. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:

1. Remotely diagnose elevator issues with a remote team of experts

2. Remotely return an elevator to service

3. Provide real-time status updates via email

4. Remotely make changes to selected elevator functions including:

a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak / down peak mode, activate independent service

b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s)

c. Improve passenger experience**:** Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers

PART 2 – PRODUCTS

2.1 DESIGN AND SPECIFICATIONS

A. Provide machine-roomless holeless hydraulic elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:

1. The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.

2. Sleep mode operation for LED ceiling lights and car fan.

3. LED lighting standard in ceiling lights and elevator fixtures.

4. Sleep mode operation for LED ceiling lights and car fan.

B. Approved Installer: Otis Elevator

2.2 EQUIPMENT: MACHINE COMPONENTS

A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.

The entire hydraulic system with hydraulic-fluid storage tank, power component and valves shall be located in the hoistway pit and be easily accessible for maintenance through an access door in the hoistway wall.

B. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading.

The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system.

C. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

D. Pressure Switch

E. Tank Heater where required.

F. Low-oil control where required.

2.3 EQUIPMENT: HOISTWAY COMPONENTS

A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.

C. Polyurethane type buffers shall be used.

C. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.

D. Hoistway Entrances

1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.

2. Sills shall be extruded Nickle Silver.

3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.

4. Fire Rating: 1 HR Min..

5. Entrance Finish: Satin Stainless Steel

6. Entrance marking plates: Entrance jambs shall be marked with 4” x 4” (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.

7. Sight Guards: Black sight guards will be furnished with all doors.

E. Fascia: (as applicable and as per plans) Galvanized sheet steel shall be provided at the front of the hoistway

2.4 EQUIPMENT: CAR COMPONENTS

A. Cab**:** Steel shell cab with laminated vertical removable panels. Color to be selected from standard manufacturer's catalogue of choices. Brushed stainless steel finished vertical trim pieces optional. Brushed Steel Finish finished base plate located at top and bottom.

B. Car Front Finish: Satin Stainless Steel (or as otherwise indicated on plans)

C. Car Door Finish: Satin Stainless Steel (or as otherwise indicated on plans)

D. Ceiling Type: Flush steel ceiling with 4 LED lights in a real white (EW0) finish.

E. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.

F. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.

G. Handrail: 1.5" round bar handrail with a brushed steel finish.

Handrails shall be provided on the sides and rear of the car enclosure.

H. Threshold: Extruded Nickle Silver

I. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

J. Guides: Car roller type guides at the top and the bottom.

K. Platform: Car platform shall be constructed of metal.

L. Certificate frame: Provide a Certificate frame with a satin stainless steel finish. (or as otherwise indicated on plans.)

M. The LED ceiling lights, and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.

2.5 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: A standard car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a Satin Stainless Steel finish.

A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with:

1/8” (3mm) satin stainless steel projecting button with blue or white LED illuminating halo.

The car operating panel shall be equipped with the following features:

1. Raised markings and Braille to the left hand side of each push-button.

2. Car Position Indicator at the top of and integral to the car operating panel.

3. Door open and door close buttons.

4. Inspection key-switch

5. Elevator Data Plate marked with elevator capacity and car number.

6. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.

7. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.

Standard for USA, Optional in Canada

8. In car stop switch (toggle or key unless local code prohibits use)

9. Firefighter’s hat (standard USA)

10. Firefighter’s Phase II Key-switch (standard USA)

11. Call Cancel Button (standard USA)

Optional

1. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.

2. Please Exit Symbol: provided with emergency hospital service, Seismic Zones ≥2 or express priority in the hall.

B. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Integral Hall fixtures shall feature round stainless steel, mechanical buttons marked to correspond to the landings. Hall fixtures to be located in the entrance jamb. Therefore, separate wiring and installation of electrical boxes inside the wall for the hall buttons are not required. Buttons shall be in vertically mounted fixture. Fixture shall be Satin Stainless Steel.

Button Options: 1/8" (3mm) satin stainless steel projecting button with blue or white LED illuminating halo.

D. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

PART 3 - EXECUTION

3.1 PREPARATION

A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Installation of all elevator components except as specifically provided for elsewhere by others.

3.3 DEMONSTRATION

A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 21 05 00

GENERAL PROVISIONS FOR FIRE PROTECTION WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, any Supplemental Conditions and Division 1 specification sections, govern the work of this section.

1.2 GENERAL

A. This section is intended to augment Division 1 requirements. Where requirements of this section differ from Division 1 requirements, the more stringent requirements shall prevail.

B. Install all work in full accordance with all local, state and federal code requirements and in accordance with Owner's insurance company requirements.

C. The following basic definitions shall apply:

1. Where used on the drawings or within the specifications, the word "furnish" (including derivatives thereof) shall mean purchase and/or fabricate and deliver to the job site or other location when so designated.

2. Where used on the drawings or within the specifications, the word "install" (including derivatives thereof) shall mean build-in, mount in position, connect or apply the specified objects and where applicable adjust and start in operation.

3. Where used on the drawings or within the specifications, the word "provide" (including derivatives thereof) shall mean to furnish and install.

D. The Fire Protection Contractor will be responsible for material and workmanship until completion and final acceptance by the Owner. Replace any damaged, lost or stolen equipment or materials at no additional cost to the Owner.

E. Where disagreements occur between the plans and the specifications, or within either itself, the item or arrangement of higher quality, greater quantity or higher cost shall be included in the base bid.

F. Should any ambiguities or discrepancies be found on the drawings or in the specifications, or between the drawings and specifications, then the Architect shall interpret the intent of the drawings and specifications. The Fire Protection Contractor hereby agrees to abide by the Architect's interpretation and agrees to carry out the work in accordance with the decision of the Architect. It is expressly stipulated that neither the drawings nor the specifications shall take precedence, one over the other, and it is further stipulated that the Architect may interpret the drawings and specifications of the work, and of that question the Architect shall be the sole judge.

G. All equipment and materials shall be new, unless noted otherwise.

H. All equipment and materials shall be asbestos free.

I. Where, due to union regulations or trade agreements, any of the work of this Contract is not considered the work of the Fire Protection Contractor, subcontract the work in question, but assume full responsibility for the complete installation.

J. Before submitting bid, visit the site and examine all adjoining work and conditions on which this work is in any way dependent, including but not limited to, means of material egress and ingress, space limitations and parking facilities. Report any discrepancies to the Owner.

1.3 SCOPE OF WORK

A. Provide all labor, materials, appliances, tools, services, scaffolding, hoisting, support and supervision for furnishing and installing all fire protection work as shown on the Contract Drawings and specified herein.

B. Work under this section shall include, but not be limited to, the following:

1. Arrange and pay for a hydrant flow test to determine water supply parameters and perform hydraulic flow calculations for the system.

2. Preparation and submittal of shop drawings.

3. Procurement of all necessary permits and approvals and payment of all fees in connection with the work of this division.

4. Demolition and removal of existing materials and equipment that are to be replaced or are no longer required as a result of the new work.

5. Cutting and patching.

6. Rigging and scaffolding.

7. Hangers, supports, foundations and bases for piping, equipment, fixtures and associated appurtenances.

8. All work shown on the Contract Drawings and called for in the specifications.

9. Flashing, counter flashing, sleeves and seals for floor, wall and roof penetrations.

10. Insulation for piping and equipment.

11. Vibration isolation for piping and equipment.

12. Automatic controls including all control wiring.

13. Access doors for concealed devices.

14. Preparation and submittal of as-built drawings.

15. Start-up, testing and balancing.

16. Piping and equipment identification labels, valve tags and charts.

17. Preparation and submittal of operating and maintenance manuals.

1.4 WORK OF OTHER DIVISIONS

A. Electrical power wiring, except that furnished as an integral part of factory assembled equipment or as otherwise specified herein. (Unless otherwise noted, all control wiring shall be furnished and installed by the Fire Protection Contractor.)

B. Installation of motor starters.

C. Installation of access doors.

1.5 CONTRACT DRAWINGS

A. The Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement of piping, equipment and fixtures. The drawings show the various equipment and piping systems schematically. No added compensation will be permitted for variations due to field conditions. It is not the intent for the drawings to show, or the specifications to describe, complete details of every component of the systems. Furnish and install all work in accordance with standards of good practice and provide all required appurtenances and accessories for complete and operational systems.

B. The locations of items shown on the Drawings or called for in the Specifications that are not fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined and indicated on the shop drawing submittals. Do not scale Drawings.

C. Follow Drawings in laying out work and check Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom and space conditions appear inadequate, Architect shall be notified before proceeding with installation.

D. If directed by the Architect, without extra charge, make modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the Work.

1.6 CODES, STANDARDS, PERMITS, AND GUARANTEES

A. All work, equipment and materials under this Division shall meet the approval of all state and local agencies having jurisdiction, and shall comply strictly with all applicable codes. In addition, the installation shall be in accordance with the Owner's insurance company requirements. Requirements of the above shall take precedence over plans and specifications.

B. Pay all fees, and file all forms required by all municipal agencies or governing bodies having jurisdiction for all work installed under the Contract. Furnish all required permits and inspection certificates to the Architect prior to completion of the work.

C. Submit a guarantee to the Architect stating that all portions of the work are in accordance with the Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by he Owner, except that where guaranties or

warranties for longer terms are specified elsewhere in the specifications, such longer term shall apply. At no additional cost to the Owner, within 24 hours after notification, correct any deficiencies which occur during the guaranty period, all to the satisfaction of the Owner. The Fire Protection Contractor shall require similar guarantees from his subcontractors.

D. The following abbreviations used in the drawings and specifications refer to recognized organizations publishing specifications and standards. These shall be construed to mean the latest standard adopted and published at the date of advertisement for bids and such specifications are made part of the Contract Documents to the same extent as if written out in full.

AABC	ASSOCIATED AIR BALANCE COUNCIL
AGA	AMERICAN GAS ASSOCIATION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
API	AMERICAN PETROLEUM INSTITUTE
ARI	AMERICAN REFRIGERATION INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AWS	AMERICAN WELDING SOCIETY
AWWA	AMERICAN WATER WORKS ASSOCIATION
CGA	COMPRESSED GAS ASSOCIATION
CISPI	CAST IRON SOIL PIPE INSTITUTE
CTI	COOLING TOWER INSTITUTE
DOE	DEPARTMENT OF ENERGY
EPA	ENVIRONMENTAL PROTECTION AGENCY

FDA	FOOD AND DRUG ADMINISTRATION
FM	FACTORY MUTUAL INSURANCE CORPORATION
FS	FEDERAL SPECIFICATION
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
IRI	INDUSTRIAL RISK INSURERS
ISA	INSTRUMENT SOCIETY OF AMERICA
ISO	INSURANCE SERVICES ORGANIZATION
MS	MILITARY SPECIFICATIONS
MSS	MANUFACTURERS STANDARDIZATION SOCIETY OF VALVES AND FITTINGS INDUSTRY
NBFU	NATIONAL BOARD OF FIRE UNDERWRITERS
NEC	NATIONAL ELECTRIC CODE
NEBB	NATIONAL ENVIRONMENTAL BALANCING BUREAU
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIST	NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
NSF	NATIONAL SANITARY FOUNDATION
OSHA	OCCUPATIONAL SAFETY AND HEALTH ACT
PPI	PLASTIC PIPE INSTITUTE
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION
UL	UNDERWRITERS LABORATORIES

E. All equipment and components shall be UL listed and shall bear the UL classification number. This requirement will only be waived if there is no UL listed equipment manufactured for the application. When furnished as a

packaged unit, such equipment shall bear the UL label and classification number for the complete packaged assembly.

1.7 COORDINATION

A. Coordinate space requirements with other trades to assure that all materials can be installed in the space allotted.

B. Transmit to trades doing work of other divisions all information required for work to be provided under their sections of the work.

C. Furnish and set all sleeves required for the work of this division. Coordinate installation with the General Contractor. In the event that failure to do so requires cutting and patching of finished work, it shall be done by the Fire Protection Contractor without additional cost to the Owner.

D. Coordinate with the Architect before disconnecting any existing building services.

E. The building will be occupied and remain operational during the work of this contract. Coordinate work schedule with the Architect to minimize disruption to the occupants.

1.8 SHOP DRAWINGS

A. The Fire Protection Contractor shall submit for review, shop drawings for all materials and equipment furnished and installed under this contract. Submissions shall include, but not be limited to, the following:

1. Piping and equipment layout drawings.

2. Hydraulic calculations.

3. Piping materials, valves, hangers, supports and accessories.

4. Automatic control equipment, diagrams and control sequences.

5. Equipment and appurtenances.

6. Insulation.

7. Firestopping materials.

1.9 RECORD DRAWINGS

As work progresses, and on a weekly basis, the contractor shall keep an accurate record entered in colored pencil of all deviations in the work as actually installed

from work as shown on design drawings, paying attention to dimensioning all underground utility lines, utility structures, their offsets, valves, and grades. All inside and outside buried lines shall be dimensioned from column lines and elevation of lines noted from corners of building.

At substantial completion of the work, the Plumbing Contractor shall transfer all changes made during construction onto reproducible transparencies, or on a disc, with new information clouded and noted. Such drawings shall be stamped with the contractors name, date, and "As Built" in the lower right hand corner. A copy of the colored record drawing, an as built reproducible, and three (3) sets of prints made from said reproducibles shall be forwarded to the engineer prior to final payment.

Any conflict between these requirements and those set forth in paragraph 1.1A here-in, the more stringent requirement shall prevail.

A certification statement stating that the drawings do represent the "As Built" condition shall be stamped on the drawings.

A full set of drawings including unaffected sheets is to be submitted.

All sections in the Division 21 requirements of this specification shall comply with the above.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS

A. At the completion of construction, the Fire Protection Contractor shall prepare and deliver to the Architect three sets of operating and maintenance instruction manuals covering all equipment included in this Contract.

B. Manuals shall include all approved shop drawings, wiring diagrams, operating & maintenance instructions, valve charts, as-built drawings and shall be bound in a loose-leaf binder with tabs separating sections.

1.11 CUTTING AND PATCHING

A. All cutting and patching required for the work of this Contract shall be provided by the Fire Protection Contractor.

B. Cutting of beams, floors or walls shall be coordinated with and approved by the Architect. Do not cut any structural members without written permission from the Architect.

C. In general, penetrations through concrete walls and slabs shall be core drilled.

D. Provide in place all required sleeves, forms and inserts before walls, partitions, floors or roofs are built. All cutting and patching of walls, partitions, ceilings and floors necessary for reception of work, caused by failure to provide or properly locate sleeves, forms and inserts, or caused by incorrect location of work shall be done at the expense of the Fire Protection Contractor.

E. Where existing piping is to be abandoned in place, the piping shall be cut back and capped below or behind the rough patched surface, and covered by finish patching. Where existing piping or equipment is to be demolished and no new piping or equipment is to be installed, the Fire Protection Contractor shall provide all required patching to fill voids in construction resulting from removals.

F. Fire Protection Contractor shall cut and patch existing pavement and street surfaces that are removed or damaged for the execution of his work. All patching shall match existing conditions.

G. All openings shall be cut to a minimum so as to accept Fire Protection Contractor's work, and require minimum patching.

H. All areas and surfaces that are patched shall match existing adjacent finishes. Where a painted wall or ceiling is disturbed and is patched, the entire wall or ceiling must be painted. Existing ceiling tiles, boards, grids, etc. that have been damaged, stained, or marred shall be replaced with new materials equivalent to the existing.

1.12 CONFINED SPACES

A. The Fire Protection Contractor shall be aware that work under this Contract may require work to be performed in confined spaces. The Fire Protection Contractor shall adhere to all OSHA requirements and any other pertinent regulations for confined space work, including but not necessarily limited to permitting requirements.

1.13 OPERATION PRIOR TO COMPLETION

A. The Owner may require operation of parts or all of the installation prior to final completion and acceptance of the work.

B. The operation shall not be construed to mean acceptance of the work by the Architect for the Owner.

PART 2 – PRODUCTS

2.1 ACCESS DOORS

A. Furnish wall and ceiling access doors for installation by the General Contractor. Access doors shall be of the sizes required to provide access for the operation and maintenance of valves, vents, automatic controls, accessories and devices. Minimum size of access doors shall be 12-inches by 12-inches.

B. Access doors shall be complete with mounting frame suitable for flush mounting into the specific type of wall or ceiling surface in which it is to be installed. Access doors shall be provided with concealed piano hinges and cam locks with vandalproof screw operators.

C. Access doors shall be fabricated of steel with a prime coat of baked white enamel. Where access doors are to be installed in fire-rated ceilings or walls, they shall be UL listed for equivalent fire rating.

D. Access doors shall be as manufactured by Karp Metal Products, or approved equivalent.

PART 3 – EXECUTION (NOT APPLICABLE)

+ + END OF SECTION + +

SECTION 21 05 29

PIPE HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 210700 or Section 220700, Piping Insulation.

1.3 SUBMITTALS

A. Shop Drawings:

1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.

B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with the applicable requirements of the ASME B31 Piping Codes.

2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.

3. Materials for use in Sprinkler Systems shall comply with the requirements of NFPA 13 as applicable.

B. Company Field Advisor: Secure the services of a Company Field Advisor from seismic restraint manufacturer for the following:

1. Render advice regarding installation and final adjustment of seismic restraint system.

2. Render advice on the suitability of each seismic restraint for its particular application.

3. Inspect completed installation of seismic restraint system and certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.

4. Train facility maintenance personnel on the installation of seismic restraint system and routine maintenance of the system.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.

1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10
3 to 6	4	14	6	10

B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16

C. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.

1. Swivel ring type hangers will be allowed for sprinkler piping up to a maximum of 2 inches in size.

D. Adjustable Floor Rests and Base Flanges: Steel.

E. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

F. Riser Clamps: Malleable iron or steel.

2.2 ANCHORS AND ATTACHMENTS

A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.

B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.

C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.

D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.

E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.

F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).

G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.

H. Continuous Slotted Type Concrete Insert, Galvanized:

1. Load Rating 800 lbs/ft: Kindorf's D-986.

2. Load Rating 1500 lbs/ft: Kindorf's D-980.

3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.

4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.

I. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts.

J. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge shaped heads.

2.3 SEISMIC RESTRAINT SYSTEM FOR PIPING

A. All drawings or the restraining system shall be provided by the contractor and shall include proper seismic analysis. The seismic analysis shall be certified by a professional engineer licensed in the State of New York and under the employment of the manufacturer of the restraining system. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction. Chain, perforated strap, or wire hangers are not permitted. Seismic requirements are defined on the structural drawings.

All sections within this division (Division 21) shall comply with the above.

Any conflict between these requirements and those stated on the structural drawings, the structural drawings shall prevail.

2.4 FASTENERS

A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.5 SHOP PAINTING AND PLATING

A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint.

PART 3 - EXECUTION

3.1 PREPARATORY WORK

A. Place inserts into construction form work expeditiously, so as not to delay the Work.

3.2 INSTALLATION

A. Do not hang or support one pipe from another or from ductwork.

1. Do not bend threaded rod.

B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.

C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.

1. For Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

2. For Grooved End Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	7
2 through 4	10
5 and over	12

No pipe length shall be left unsupported between any two coupling joints.

3. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.

4. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.

5. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.

6. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.

D. Minimum Hanger Rod Size: Increase hanger rod size as required to meet requirements of seismic restraint system.

PIPE OR TUBING SIZE (Inches)	**SINGLE ROD HANGER SIZE (Inches)**		**DOUBLE ROD HANGER SIZE (Inches)**	
	PIPE	**TUBING**	**PIPE**	**TUBING**
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

1. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.

2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

3.3 UPPER HANGER ATTACHMENTS

A. General:

1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.

2. Do not attach hangers to steel decks that are not to receive concrete fill.

3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.

4. Do not use flat bars or bent rods as upper hanger attachments.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.

2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.

3. Do not drill holes in main structural steel members.

4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.

C. Attachment to Concrete Filled Steel Decks:

1. New Construction: Install metal deck ceiling bolts.

2. Existing Construction: Install welding studs (except at roof decks). Do not support a load in excess of 250 lbs from any single welded stud.

3. Do not attach hangers to decks less than 2-1/2 inches thick.

3.5 PIPING IN TUNNELS

A. Support piping in tunnels on adjustable stanchions, fabricated in accordance with the details on the Drawings, unless otherwise indicated. Install, secure and be responsible for the proper locations of all cast-in-place inserts and stanchion supports, in ample time so as not to delay construction Work. Secure tops of stanchions to overhead construction, as required and approved.

3.6 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.7 PIPE INSULATION SHIELDS

A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

+ + END OF SECTION + +

SECTION 21 07 00

PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 078400, Through Penetration Firestops.

B. Section 099103, Painting.

C. Section 210529, Pipe Hangers and Supports.

1.2 ABBREVIATIONS

A. FS: Federal Specification.

B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.

C. pcf: Pounds per cubic foot.

D. PVC: Polyvinylchloride.

1.3 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:

1. Insulation Materials.

2. Jacket Materials.

B. Quality Control Submittals:

1. Installers Qualification Data:

a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.

b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.4 QUALITY ASSURANCE

A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

B. Regulatory Requirements:

1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 - PRODUCTS

2.1 PIPING INSULATION

A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.

1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:

a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.

2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.

3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.

a. Suitable for temperatures up to 450 degrees F.

B. Flexible Elastomeric Foam Insulation:

1. FM tested and approved, meeting the following:

a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.

b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.

c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.

2. Pipe Insulation: ASTM C 534, Type I.

3. Polyethylene and polyolefin insulation is not acceptable.

C. High Density Jacketed Insulation Inserts for Hangers and Supports:

1. For Use with Fibrous Glass Insulation:

a. Cold Service Piping:

1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.

2. For Use with Flexible Elastomeric Foam Insulation: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

D. Cements:

1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.

2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.2 INSULATION JACKETS

A. Laminated Vapor Barrier Jackets for Piping: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.

1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.

a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.

2. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.

B. Canvas Jackets: Cotton duck, fire retardant, complying with NFPA 701, 4 oz or 6 oz per sq yd as specified.

C. Premolded PVC Fitting Jackets:

1. Constructed of high impact, UV resistant PVC.

a. ASTM D 1784, Class 14253-C.

b. Working Temperature: 0-150 degrees F.

2.3 ADHESIVES, MASTICS, AND SEALERS

A. Lagging Adhesive (Canvas Jackets): Childers' CP-50A, Epolux's Cadalag 336, Foster's 30-36.

B. Vapor Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-75 or 85-20.

C. Vapor Barrier Mastic/Joint Sealer (Fibrous Glass Insulation): Childers' CP-30, Epolux's Cadalar 670, Foster's 95-44 or 30-35.

D. Adhesive (Flexible Elastomeric Foam): Armstrong's 520, Childers' CP-80, Epolux's Cadoprene 488, Foster's 82-40.

E. Adhesive (Reinforcing Membrane): Childers' Chil-Spray WB CP-56.

F. Mastic (Reinforcing Membrane): Childers' AK-CRYL CP-9.

2.4 MISCELLANEOUS MATERIALS

A. Pressure Sensitive Tape for Sealing Laminated Jackets:

1. Acceptable Manufacturers: Alpha Associates, Childers, Ideal Tape, Morgan Adhesive.

2. Type: Same construction as jacket.

B. Wire, Bands, and Wire Mesh:

1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.

2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.

3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

C. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform the following before starting insulation Work:

1. Install hangers, supports and appurtenances in their permanent locations.

2. Complete testing of piping.

3. Clean and dry surfaces to be insulated.

3.2 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.

1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See 078400.

a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.

C. Do not intermix different insulation materials on individual runs of piping.

3.3 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced while installing insulation.

B. Install high density jacketed insulation inserts at hangers and supports for insulated piping.

C. Insulation Inserts For Use with Fibrous Glass Insulation:

1. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.

    a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.

        1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:

1. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.

2. Contour hardwood blocks to match the curvature of pipe, and shield.

3. Coat dowels and blocks with insulation adhesive, and insert while still wet.

4. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.

5. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1-1/2”	2 dowel plugs	6 o’clock; in tandem
2” thru 4”	1 block, 2 dowel plugs	6 o’clock, and 4 & 8 o’clock respectively
6” thru 8”	2 blocks, 4 dowel plugs	6 o’clock; in tandem and 4 & 8 o’clock; in tandem

3.4 INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.

B. Piping:

1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips.

    a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as jacket, may be used in lieu of butt strips.

2. Bed insulation in a 2-inch wide band of vapor barrier mastic, and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings or flanges at the following intervals:

    a. Horizontal Pipe Runs: 21 ft.

    b. Vertical Pipe Runs: 9 ft.

C. Fittings, Valves, Flanges and Irregular Surfaces:

1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.

2. Secure insulation in place with 16-gage wire, with ends twisted and turned down into insulation.

3. Butt insulation against pipe insulation and bond with joint sealer.

4. Insulate valves up to and including bonnets, without interfering with packing nuts.

5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.

6. When insulating cement has dried, seal fitting, valve and flange insulation, by imbedding a layer of reinforcing membrane or 4 oz. canvas jacket between 2 flood coats of vapor barrier mastic, each 1/8 inch thick wet.

7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.

8. Trowel, brush or rubber glove outside coat over entire insulated surface.

9. Exceptions:

    a. Type D Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.

1) Additional insulation inserts are required for services with operating temperatures under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not go below 45 degrees F.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive.

1. Where the slip-on technique is not possible, slit the insulation and install.

2. Re-seal with adhesive, making sure the mating surfaces are completely joined.

B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.

1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation with adhesive.

C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.

D. Piping Exposed Exterior to a Building, Totally Exposed to the Elements:

1. Apply flexible elastomeric foam insulation to piping with adhesive.

2. Apply reinforcing membrane around piping insulation with adhesive or mastic.

3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.

4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.6 FIELD QUALITY CONTROL

A. Field Samples: The Director's Representative, may at his discretion, take field samples of installed insulation for the purpose of checking materials and application. Reinsulate sample cut areas.

3.7 PIPING INSULATION SCHEDULE

A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.

B. Schedule of Items Not to be Insulated:

1. Water meters.

2. Piping buried in the ground, unless otherwise specified herein.

3. Items installed by others, unless otherwise specified herein.

4. Mechanical equipment with factory applied steel jacket.

5. Sprinkler and standpipe piping, unless otherwise specified.

3.8 COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
D	Domestic cold water, and as specified. 33 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All Sizes	1/2

A. **NOTES:**

1. Sprinkler and Standpipe Piping (First 10 feet connected to domestic water main within building): Insulate with same materials and thicknesses specified for domestic cold water.

+ + END OF SECTION + +

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SECTION 21 13 00

SPRINKLER PIPING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 078400, Through Penetration Firestops

B. Section 079200, Sealants

1.2 REFERENCES

A. NFPA 13 - Standard for the Installation of Sprinkler Systems.

1.3 SUBMITTALS

A. Product Data:

1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.

2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.

PART 2 - PRODUCTS

2.1 STEEL PIPE AND FITTINGS

A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A 53 or ASTM A 135.

B. Steel Pipe for Roll Grooving: Standard weight, Schedule 40, black or galvanized; ASTM A 53, Grade B, Type F for sizes 3/4 inch to 1-1/2 inch, and Type E or S for sizes 2 inch to 24 inch, or ASTM A 135.

C. Cast Iron Fittings:

1. Drainage Pattern, Threaded: ASME B16.12.

2. Steam Pattern, Threaded: ASME B16.4.

a. Standard Weight: Class 125.

b. Extra Heavy Weight: Class 250.

3. Flanged Fittings and Threaded Flanges: ASME B16.1.

a. Standard Weight: Class 125.

b. Extra Heavy: Class 250.

D. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.

E. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

F. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.2 DUCTILE IRON PIPE AND FITTINGS

A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151.

1. 3 and 4 Inch Sizes: Class 51.

2. 6 inch Size and Over: Class 50.

B. Fittings: Bitumin coated and cement-mortar lined; AWWA C110.

2.3 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

A. Couplings: Grinnell Corp.'s Rigidlok Fig. 7401, or Victaulic Co.'s Style 107, having minimum pressure rating of:

1. 750 psi from 1-1/2 inch to 4 inch.

2. 700 psi for 6 inch.

3. 600 psi for 8 inch.

B. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:

1. Steel: ASTM A 53 or A 106, Grade B.

2. Malleable Iron: ASTM A 47.

3. Ductile Iron: ASTM A 536.

2.4 BOLTED MECHANICAL BRANCH CONNECTION

A. Victaulic Co.'s 920 Mechanical T.

2.5 JOINING AND SEALANT MATERIALS

A. Thread Sealant:

1. LA-CO Industries' Slic-Tite Paste with Teflon.

2. Loctite Corp.'s No. 565 Thread Sealant.

3. Thread sealants for potable water shall be NSF approved.

B. Joint Packing:

1. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504) 466-1484.

C. Gaskets For Use With Ductile Iron Water Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.

D. Flange Gasket Material:

1. For Use With Cold Water: 1/16 inch thick rubber.

E. Gaskets For Use With Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.

F. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.6 DIELECTRIC CONNECTORS

A. Dielectric Fitting: Bronze ball valve with end connections and pressure rating to match associated piping.

1. Nipples with inert non-corrosive thermoplastic linings are not acceptable.

B. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers, and dielectric gasket.

1. Rated 150 psi at 250 degrees F: ANSI Class 150, full faced neoprene gasket with bolt holes, double phenolic washers, and mylar sleeves; Model 150 by APS, Lafayette, LA 70596, (337) 233-6116.

2.7 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

A. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504)466-1484.

B. Mechanical Modular Seals: Thunderline Corp.'s Link Seal wall and floor seals designed for the service of piping system in which installed.

2.8 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gage galvanized sheet steel.

C. Type C: Schedule 40 steel pipe with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

D. Type D: No. 16 gage galvanized sheet steel with 16 gage sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

2.9 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Solid type with polished chrome plated finish, and set screw.

1. Series Z89 by Zurn, 929 Riverside Drive, Grosvenordale, CT 06255, (800) 243-1830.

2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.

B. Stamped Steel: Split type, polished chrome plated finish, with set screw.

1. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.

C. Cast Iron or Malleable Iron : Solid type, galvanized finish, with set screw:

1. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.

2. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping at approximate locations indicated, and at maximum height.

B. Install piping clear of door swings, and above sash heads.

C. Make allowances for expansion and contraction.

D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.

E. Install horizontal piping with a constant pitch, and without sags or humps.

F. Install vertical piping plumb.

G. Use fittings for offsets and direction changes.

H. Cut pipe and tubing ends square; ream before joining.

I. Threading: Use American Standard Taper Pipe Thread Dies.

3.2 FIRE SPRINKLER PIPING SYSTEM

A. Install piping to be completely drainable.

3.3 PIPE JOINT MAKE-UP

A. Threaded Joint: Make up joint with a pipe thread compound applied in accordance with manufacturer's printed application instructions for the intended service.

B. Flanged Pipe Joint:

1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.

2. Provide a gasket for each joint.

3. Coat bolt threads and nuts with anti-seize lubricant before making up joint.

C. Rubber Ring Push-on Joint: Clean hub, bevel spigot, and make up joint with lubricated gasket in conformance with the manufacturer's printed installation instructions.

D. Grooved Pipe Joint: Roll groove pipe ends, make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions.

1. Cut grooved end piping is not acceptable.

E. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.

F. Dissimilar Pipe Joint:

1. Joining Bell and Spigot and Threaded Pipe: Install a half coupling on the pipe or tube end to form a spigot, and calk into the cast iron bell.

2. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.

3. Joining Dissimilar Non-Threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.

4. Joining Galvanized Steel Pipe and Copper Tubing: Make up connection with a dielectric connector.

3.4 PIPING PENETRATIONS

A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall or floor construction:

CONSTRUCTION	SLEEVE TYPE
1. Frame construction.	None Required
2. Foundation walls.	A*
3. Non-waterproof interior walls.	B*

4.	Non-waterproof interior floors on metal decks.	D*
5.	Non-waterproof interior floors not on metal decks.	B*
6.	Floors not on grade having a floor drain.	A
7.	Floors over mechanical equipment, steam service, machine, and boiler rooms.	A
8.	Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
9.	Floors finished or to be finished with latex composition or terrazzo, and not on metal decks.	A
10.	Earth supported concrete floors.	None Required
11.	Exterior concrete slabs on grade.	A
12.	Fixtures with floor outlet waste piping.	None Required
13.	Metal roof decks.	C
14.	Non-metal roof decks.	A

*Core drilling is permissible in lieu of sleeves where marked with asterisks.

D. Diameter of Sleeves and Core Drilled Holes:

1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.

2. Size holes thru exterior walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:

   a. Uninsulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.

   b. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.

c. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.

3. Size holes for sprinkler and fire standpipe piping in accordance with NFPA 13.

E. Length of Sleeves (except as shown otherwise on Drawings):

1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.

2. Floors, Finished: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:

a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.

3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.

4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.

F. Packing of Sleeves and Core Drilled Holes:

1. Unless otherwise specified, pack sleeves or cored drilled holes in accordance with Section 078400 - FIRESTOPPING.

2. Pack sleeves in exterior walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with Type 1C (one part) sealant. See Section 079200.

a. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.

3. Pack sleeves in exterior concrete slabs with oakum to full depth, and within 1/2 inch of top of sleeve and finish the remainder with sealant. See Section 079200.

a. Sealant Types:

1) Piping Conveying Materials up to 140 degrees F other than Motor Fuel Dispensing System Piping: Type 1C (one part).

b. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.

E. Weld metal collars of Type C and D sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.5 FLOOR, WALL AND CEILING PLATES

A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:

1. Piping 2 Inch Size and Smaller In Finished Spaces:

a. Solid Type: Chrome plated cast brass construction with set screw.

b. Split Type: Chrome plated stamped steel construction with set screw.

2. Piping over 2 inch size In Finished Spaces, and Piping in Unfinished Spaces:

a. Solid Type: Galvanized cast iron construction with set screw.

b. Split Type: Chrome plated stamped steel construction with set screw.

3. Piping in Unfinished Spaces (Including Exterior Concrete Slabs): Solid type, galvanized, cast iron or malleable iron construction.

4. Fasten plates with set screws.

5. Plates are not required in pipe shafts or furred spaces.

3.6 PIPE AND FITTING SCHEDULE

A. Where options are given, choose only one option for each piping service. No deviations from the selected option will be allowed.

B. Fire Standpipe and Sprinkler:

1. Option No. 1: Standard weight black steel pipe, with extra heavy cast iron fittings, and threaded joints.

2. Option No. 2: Standard weight black steel pipe, with roll grooved ends, grooved pipe fittings, and couplings.

C. Fire Standpipe and Sprinkler:

1. Option No. 1: Standard weight black steel pipe, with standard weight cast iron fittings, and threaded joints.

2. Option No. 2: Standard weight black steel pipe, with roll grooved ends, grooved pipe fittings, and couplings.

D. Sprinkler (Below Ground): Coated ductile iron water pipe and fittings, with mechanical or push-on joints.

+ + END OF SECTION + +

SECTION 21 13 13

SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 099103, Painting.

B. Section 210529, Hangers and Supports.

C. Section 211300, Sprinkler Piping.

1.2 REFERENCES

A. NFPA 13 - National Fire Protection Association Standard for the Installation of Sprinkler Systems.

1.3 SYSTEM DESCRIPTION

A. Wet System - Pipe Schedule.

B. Occupancy Classification:

1. Light Hazard Occupancy.

1.4 SUBMITTALS

A. Shop Drawings:

1. Complete sprinkler system layout indicating the locations of sprinkler heads, devices, and accessories. Include separate details of special or not easily visualized piping arrangements and inspector's test valves and connections.

2. Hydraulic calculations shall be complete and cross referenced to the appropriate drawing sheets.

3. Layout of any proposed deviation from the Contract Drawings. A complete system layout is not required.

B. Product Data: Catalog sheets, specifications, and installation instructions. Indicate UL or FM approval for each product. Include the following additional information:

1. Electrical Devices: Complete description of intended use, wiring diagrams, data plate information and, in the case of switching devices, whether normally on, or normally off. Include motor test data.

2. Mechanical Devices: Complete description of intended use, including normal operating capacities and working pressures.

3. Enclosures: Dimensions, materials, gages of metals; type of door hinges and locks, and methods of securing the enclosure members to the building construction.

4. Hose Threads: Verify that hose threads on fire department connections match threads on equipment used by the local or servicing fire department.

C. Quality Control Submittals:

1. Design Data: The portions of the sprinkler system not sized on the Contract Drawings shall be sized in accordance with NFPA requirements for Hydraulically Designed Systems. Submit drawings and hydraulic calculations for approval.

2. Certificates: As required under Quality Assurance Article.

3. Installers Qualification Data:

a. Name of each person who will be performing the Work.

b. Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.

D. Contract Closeout Submittals:

1. Operation and Maintenance Data. Deliver 2 copies to the Director's Representative:

a. Instruction manual describing the operation and maintenance of the system.

b. Parts list for each mechanical and electrical device.

c. Publication NFPA 25, Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.

1.5 QUALITY ASSURANCE

A. Qualifications: The persons employed to perform the Work of this Section and their supervisor shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of sprinkler systems.

1. Upon request, furnish to the Director the names and addresses of five similar projects which the foregoing people have worked on during the past 3 years.

B. Regulatory Requirements:

1. Materials for the Work of this Section shall be Underwriter's Laboratories listed, and/or Factory Mutual approved.

C. Certification: NFPA Contractor's Material and Test Certificate.

1.6 MAINTENANCE

A. Spare Parts: Furnish the following items and deliver to the Director's Representative for storage in spare sprinkler head cabinets:

1. Provide extra sprinkler heads under provisions of NFPA 13.

2. One sprinkler head wrench to fit each type sprinkler head provided.

PART 2 - PRODUCTS

2.1 VALVES AND ACCESSORIES

A. Gate Valves (175 psig non-shock working pressure):

1. 3/4 inch to 2 inch: Bronze body, OS & Y indicating type; double or wedge disc with threaded ends.

2. 2-1/2 inch and larger: IBBM, OS & Y indicating type; double or wedge disc with end connections as required to suit the piping system.

B. Inspector's Test Outlet Valve: Ball type, bronze body, Type 316 stainless steel ball and stem, teflon seats and stem packing, 400 psi WOG. Valve shall have padlocking feature in both the open and closed position.

C. Valve Locking Devices:

1. Chain: 3/16 inch galvanized steel, welded link.

2. Padlock: Series 800 by Yale, Eaton Corp., Charlotte, NC: Key all locks alike. Furnish 2 keys for each lock.

3. Key Tags: 1-1/2 inch dia., brass, stamped with valve number and service.

4. "S" Hooks: Brass, for securing keys to key tags.

D. Alarm Check Valve:

1. Two piece cast iron body, bolted and gasketed.

2. Moving parts brass, bronze, or stainless steel with replaceable rubber clapper facing.

3. Right or left hand trimming as required.

4. Suitable for horizontal or vertical installation.

5. Two pressure gages.

6. Main drain tap.

7. Alarm retarding chamber for water motor alarm device and electric alarm pressure switch.

8. Factory finish with corrosion resistant red paint.

9. Trim Package: Angle valve, globe valve, alarm line strainer, orifice restriction, pipe nipples and fittings.

E. Check Valves: IBBM, single clapper swing check with metal to metal or rubber faced checks, suitable for horizontal and vertical installation; end connections as required to suit the piping system; 175 psig non-shock working pressure.

1. Ball Drip (where shown on Drawings): Brass, automatic; threaded on both ends.

F. Pressure Gages: Range of 2 times system working pressure at point where installed. Equip with gage cock and provisions for draining.

G. Inspector's Test Connection: Cast brass, capped, sprinkler line tester fitting; Elkhart Brass Mfg. Co.'s. No. 112, or Seco Mfg., Inc.'s No. 445 or 446.

2.2 SPRINKLER HEADS AND APPURTENANCES

A. Sprinkler Heads: Brass or bronze, with standard 1/2 inch orifice, and deflector:

1. Upright or Pendent Type: Deflector designed to distribute water downward in a uniform hemispherical spray pattern.

2. Dry Pendent Type: Designed to prevent water and condensation from being trapped below the drainable system piping.

3. Flush Pendent Type: All or part of sprinkler body including shank thread mounts above lower plane of finished ceiling.

4. Sidewall Type: Horizontal or vertical sprinklers with special deflectors designed to discharge most of the water away from nearby wall in a pattern resembling 1/4 of a sphere with a small portion of discharge directed at wall behind sprinkler.

5. Institutional Pendent Type: Star Sprinkler Corporation's (Grunau Co.) Model PH-2, Style A and Style B, 165 degree temperature rating.

   a. Style A: Flat escutcheon (for rooms with recessed lighting).

6. Markings: Stamp sprinkler type on deflector in addition to NFPA's color code requirements covering temperature classification.

7. Finish:

B. Escutcheons:

1. Material:

2. Finish:

C. Sprinkler Guards For Exposed Piping: Welded steel wire cage with cast or pressed steel base plate and suitable retaining clamps.

1. Finish: Paint to match sprinkler piping.

D. Spare Sprinkler Head Cabinet: Steel, with hinged cover, constructed of minimum 20 gage material and fitted with 16 gage steel racks designed to hold quantities and types of spare sprinkler heads and sprinkler head wrenches.

1. Finish: Bright red, baked on enamel.

2.3 FIRE DEPARTMENT CONNECTION

A. Single Connection: Flush wall type, brass with a polished finish; 2-1/2 x 3 inch female connection with plug, chain and escutcheon.

B. Siamese Connection: Two way _____ wall type, brass with polished finish; size 2-1/2 x 2-1/2 x 4 inch , with two 2-1/2 inch female connections, 2 individual drop clapper valves, plugs and chains, and escutcheon.

1. Equip above with integral sillcock having hose bibb end, cap, chain and removable tee handle key. Furnish 2 keys. Deliver to the Director's Representative.

C. Sidewalk Siamese Connection: Two way free standing type, brass with polished finish; size 2-1/2 x 2-1/2 x 4 inch, with two 2-1/2 inch female connections, 2 individual drop clapper valves, plugs and chains; 18 inch ips brass pipe standpipe, and sidewalk escutcheon.

D. Identification: Cast the word _____ on escutcheon.

2.4 WATER FLOW ALARM DEVICE

A. Vane Type Waterflow Switch: Autocall Div., Federal Signal Corp.'s 4160, Potter Electric Signal Co.'s VSR-F, or Reliable's Model A., having:

1. Corrosion-resistant vane.

2. Splash/dust resistant enclosure with anti-tamper switch.

3. Adjustable pneumatic retard.

4. Screw type wiring terminals.

5. Switch rated minimum 7.0 amps at 125 V ac and 0.25 amps at 125 V dc.

2.5 WATER MOTOR ALARM

A. Construction: Weather-proof, steel rotary clapper, brass or aluminum gong, 8 inch minimum diameter provided with a protecting hood, removable brass inlet strainer, 3/4 inch alarm line and 1 inch drain.

B. Finish: _____.

2.6 ELECTRIC ALARM GONG

A. 6 inch diameter vibrating bell; 120 V ac. Sound rating 92 db at 10 feet minimum; Viking's 03115BA or Edward's 438-6N5.

1. Markings: The words FIRE ALARM in block lettering on a contrasting background.

2. Mounting: Suitable for both wall and ceiling mounting.

2.7 VALVE SUPERVISORY SWITCHES

A. Mechanically actuated, designed to close contacts and sound an alarm when supervised valve is closed and when switch cover removed.

1. For Gate Valves: Potter Electric Signal Co.'s OSYSU-A, or Grinnell's F640.

2. For Post Indicator Valves: Potter Electric Signal Co.'s PIVSU-A2, or Potter-Roemer, Inc.'s 6223.

2.8 AIR PRESSURE SUPERVISORY SWITCH

A. Pressure actuated switch designed to detect increase and decrease from normal system pressure in dry pipe systems. Potter Electric Signal's PS40-2, with BVL bleeder valve, and cover tamper switch.

2.9 ENCLOSURE

A. Size: Length and width as indicated; full ceiling height, but not to exceed 8'-0".

B. Construction and Materials: 1-1/2 inch diamond pattern woven mesh, with No. 10 W&M (0.135 inch) steel wire forming a panel framed with minimum 1 x 1/2 x 1/8 inch steel channel.

1. Panel width: 5'-0" wide panels with odd size fill-in sections as required.

2. Door Panel: Include one panel containing a 3'-0" wide door set in a steel frame. Hang door on not less than 3 butt hinges; equip door with mortise cylinder lock and 2 keys.

C. Accessories:

1. Cast iron floor sockets with set screws and means of anchoring.

2. 1 x 2 inch steel cap bar around top of panels.

3. Wall clips, bolts for fastening sections together and bolts, shields and hardware for fastening the enclosure to floor, walls and ceiling.

4. Finish: Factory applied light green enamel.

2.10 SIGNS

A. Steel with vitreous enamel finish, lettering on contrasting background to identify and indicate the function of:

1. Control valves.

2. Drain, test, air supply and alarm check valves.

3. Water motor alarm.

4. Anti-freeze loop.

5. Anti-freeze loop drain and test valves.

6. Hydraulic Design Nameplate Data: Size approx. 9 x 12 inches, inscribed with the following::

a. SPRINKLER SYSTEM HYDRAULICALLY DESIGNED (in block letters).

b. Location and area of hydraulically designed section.

c. Discharge density over designed area in gallons per minute.

d. Residual pressure at base of riser supplying water to designed section.

2.11 ANTI-FREEZE-SOLUTION

MATERIAL	SOLUTION (VOL.)	S.G.	FREEZE POINT (F)
Glycerine, C.P. or U.S.P. Grade*	30% Water	1.165	-40
Hydrometer Scale: 1.000 to 1.200			

*C.P. - Chemically Pure U.S.P. = United States Pharmacopoeia 96.5%

2.12 ANTI-FREEZE LOOP DIAGRAM AND INSPECTION PROCEDURE

A. Include the following information on charts mounted in stainless steel or aluminum frames with a glass fronts. Chart size 8-1/2 x 11 inches minimum.

1. Anti-freeze Loop Diagram: Single line, not necessarily to scale; show valves, properly labeled, and indicate sprinkler heads. Label spaces in which piping is located.

a. Identify the anti-freeze solution (generic, and trade name), give specific gravity and freezing point of solution.

2. Include a neatly typed copy of the annual maintenance and inspection procedure similar to the following example:

ANNUAL MAINTENANCE AND INSPECTION PROCEDURE

Before the heating season commences, perform the following inspection of the anti-freeze solution:

a. Close water supply valve to anti-freeze loop.

b. Open inspector's test valve, and drain valve. Drain anti-freeze solution into clean container.

c. After system is drained, open upper solution test valve and drain off remaining solution.

d. Test solution with hydrometer. Bring to proper specific gravity by adding concentrated solution of same type anti-freeze used originally.

e. Close drain valve.

f. Refill system. Close upper solution test valve when fluid reaches that level. Continue to fill until solution overflows inspector's test valve.

g. Close inspector's test valve.

h. Open water supply valve.

i. Check for leaks. Make necessary repairs and refill system.

PART 3 – EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Testing Existing System: Prior to installing the new system, test the existing system, as prescribed for new systems in accordance with NFPA 13, to ascertain its operating condition.

1. Prepare a written report for the Director's Representative indicating the repairs required, if any, to make the existing system function properly.

2. Repairs to the existing system are not included in the Work unless requested by Order on Contract.

3.2 PREPARATION

A. Existing Sprinkler System Shutdown:

1. Before shutting down the sprinkler system to perform the Work, notify the Director's Representative in writing, and the local fire department that the system is to be shut down temporarily. Give schedule which states date and time of proposed shut down and the approximate length of time that the system will be out of service. Request instructions for precautions that should be taken during the shut down period.

2. Do not shut down the system until schedule is approved by the Director's Representative.

3. Return the existing system to pre-shutdown operation immediately after the Work has been completed. Give written notice to the Director's Representative that the system has been returned to pre-shutdown operation.

3.3 INSTALLATION

A. Unless otherwise shown or specified, install the Work of this section in accordance with NFPA 13, and the item manufacturer's installation instructions.

B. Base Plate Air Compressor: Mount on a concrete pad. Level, grout-in and secure compressor and motor.

C. Strap-on Compressor: Mount on system piping above the level of dry valve using mounting brackets and straps. Connect air piping to sprinkler riser on

system side of dry pipe valve. Provide check valve and shut-off valve in air piping.

1. Test the air compressor for proper operation; verify that it can pressurize the dry pipe system in 30 minutes or less.

D. Locking Valves:

1. Lock gate valves in open position with chain looped through handwheel and around adjacent sprinkler pipe. Secure with padlock.

2. Lock test outlet valve in closed position with padlock.

E. Spare Sprinkler Head Cabinet: Secure to building wall or other permanent structure in vicinity of main valve controlling sprinkler system, unless otherwise directed.

F. Connection to Existing Main: A bolted mechanical branch connection may be used. Refer to Section 211300.

G. Signs: Install signs identifying the following:

1. Valves: One for each size, type and function.

2. Water Motor Alarm.

3. Anti-Freeze Loop.

4. Hydraulically Designed System.

H. Anti-Freeze Loop Diagram, Maintenance, Inspection Procedure and Charts: Install at location indicated on the Drawings or as directed.

3.4 FIELD QUALITY CONTROL

A. Tests: Unless otherwise shown or specified, perform tests in accordance with NFPA 13.

1. Flushing: In addition to the requirements of the Standard, flush new piping before making final connection to existing systems and before performing hydrostatic test. Flush at rates of flow prescribed in the Contractor's Material and Test Certificate. After making final connections, flush entire system and assure that debris is removed from piping and there are no stoppages or obstructions in the system.

2. System Tests:

a. Test all new Work.

b. Notify the Director's Representative when the Work of this Section is ready for testing.

c. Perform the tests when directed, and in the Director's Representatives presence.

++ END OF SECTION + +

SECTION 21 84 00

FIRESTOPPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, any Supplemental Conditions and Division 1 specification sections, govern the work of this section.

1.2 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.3 SCOPE OF WORK

A. All penetrations through rated partitions, walls and floors shall be firestopped.

B. Firestop rating must meet or exceed the rating of the penetrated partition, wall or floor.

C. All penetrations shall be indicated by the mounting of an identification plate in a visible location next to the seal. Plate shall identify seal as a firestop system and indicate the manufacturer and the date of seal.

1.4 QUALITY ASSURANCE

A. Provide submittal data sheets of firestopping products and manufacturer’s diagram indicating the application of the product, i.e. types of pipe, depth of bead, etc.

B. A manufacturer's direct representative (not distributor or agent) shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This shall be done per manufacturer's written recommendations published in their literature and drawing details.

C. Firestop System installation shall meet requirements of ASTM E 814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

D. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

E. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

F. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests shall be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

PART 2 – PRODUCTS

2.1 GENERAL

A. Firestop systems shall conform to ASTM E-814, UL-1479, and ULC-S115M, and shall be rated equal to that of the assembly being penetrated.

B. Firestop systems shall conform to ASTM E-84 for flame spread and smoke contributed, and shall be UL listed for use in “Through-Penetration Fire Stop Systems”.

C. The firestopping material shall be chosen to best suit the application and be of the following type, or approved equivalent.

1. Hilti FS-One Max High-Performance Intumescent Firestop Sealant

2. Hilti CP 643 Firestop Collar (Intumescent)

3. Hilti CP 618 Firestop Putty Stick (Intumescent)

4. Hilti CFS-BL Fire Block (Intumescent)

5. Hilti CFS-P PA Firestop Putty Pad (Intumescent)

6. Hilti CP 606 Firestop Sealant

7. Hilti CP 680/681 Cast in Firestop Devices

8. Hilti CP 620 Firestop Foam

9. Hilti CFS-S SIL SL Firestop Sealant

10. Hilti CFS-PL Firestop Plug (Intumescent)

11. Hilti CP 675 Firestop Board

12. Hilti CP 648 Firestop Wrap Strip

13. Hilti CP 637 Firestop Mortar

PART 3 – EXECUTION

3.1 GENERAL

A. Upon request of the Architect, Engineer or Owner, submit the UL system number for the firestop system being installed.

B. All firestopping shall be installed in strict accordance with manufacturer's written installation requirements.

C. Upon completion of the work, the Fire Protection Contractor shall submit a letter to the Architect attesting that he has provided firestopping at all mechanical penetrations of rated fire partitions, fire barriers, fire walls and other rated assemblies in accordance with the manufacturer's requirements and the specific listing for the application and the firestopping product.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 22 05 33

HEAT TRACING SYSTEM FOR PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide electric pipe heat tracing system complete with all accessories as shown and specified. System shall include:

1. Heat trace cable.

2. Heat trace controllers.

3. Thermostat for heat trace cable.

B. Related Work Specified Elsewhere:

1. Division 22, Plumbing.

1.2 PERFORMANCE REQUIREMENTS

A. Pipe Trace Heating: Freeze protection with outside temperature at 0°F and 2 inches of fiberglass insulation.

1.3 SUBMITTALS

A. Shop Drawings: Indicate heat trace cable layout, locations of terminations, thermostats and branch circuit connections.

B. Product Data: Provide data for heat trace cable and control components.

C. Manufacturer’s Installation Instructions: Indicate installation instructions.

1.4 COORDINATION

A. Coordinate installation of heat trace cable with installation of piping and fittings, and piping insulation, as specified in Division 22.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Raychem, Division of Tyco Thermal Controls

B. Thermon

C. Or approved equal.

2.2 HEAT TRACE CABLE

A. Heat Trace Cable: Self-limiting, parallel resistance heating cable, with outer jacket over braid. Raychem 5BTV1 or equal.

B. Rating: 120 V, 5 W/lineal ft., at 50°F.

2.3 HEAT TRACE CONTROLLERS

A. Controller shall provide heat trace cable control and monitoring.

B. Single or dual point, as required.

C. User friendly LCD display and interface.

D. Ground fault protection, including alarm and trip settings.

E. The controller shall monitor heat trace cable voltage and support high and low voltage alarming.

F. The controller shall monitor control temperature and support high temperature cut-off.

G. Electrical: 100 to 277V, 30A continuous.

H. Enclosure shall be rated NEMA 4X.

2.4 ACCESSORIES

A. Thermostat: NEMA 4X, ambient sensing, 40°F fixed setting. Manufacturer and Model: Raychem/DigiTrace AMC-F5, or approved equal.

B. Termination kits, splice kits, tape, etc. as required for a complete installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Bending Radius: six times cable diameter, minimum.

C. Avoid pinching and making sharp bends in cable.

D. Prevent damage by sharp rocks, metal, or other objects during installation.

3.2 FIELD QUALITY CONTROL

A. Test continuity of heating cable.

B. Demonstrate operation of thermostat.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 22 14 29

PNEUMATIC SUMP PUMPS

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. This Section includes all pumps except where integral with a manufactured piece of equipment.

B. Pump controls where self-contained or auxiliary. Provide and install all motor starters and H-O-A switches as required.

1.3 RELATED WORK

A. Section 230500 – Piping and Accessories.

1.4 SUBMITTALS

A. Submit shop drawings in accordance with Section 230110.

B. Submit equipment performance data, parts list and operation & maintenance manuals in accordance with Section 230110.

1.5 PERFORMANCE REQUIREMENTS

A. Ensure pumps operate at specified system fluid temperature and discharge pressures, and operate within 25% of midpoint of published maximum curve.

B. See drawing schedule for parameters.

1.6 OPERATION AND MAINTENANCE DATA

A. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with a minimum three (3) years documented experience.

1.8 EXTRA MATERIALS

A. Provide one (1) additional set of check valve seals.

B. Provide one (1) additional set of flange gaskets for check valve body.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Chicago Industrial Pump Company

2.2 GENERAL

A. Construction to locate operational components remotely

B. Pumps operate on compressed air (Supplied by others)

C. Pump connections to be flanged. Piping size shall be equal to or greater than pump connections.

D. Pumps to be suitable for handling brackish or contaminated water, including sand and debris up to the size of the inlet aperture.

2.3 PNEUMATICALLY ACTUATED SUMP PUMP

A. The casing shall be plain or stainless steel as per drawing schedule, with a flat bottom for facilitation of mounting on a pad.

B. The pump shall be fitted with replaceable check valve seals.

C. Pump shall contain no active components other than switch check inlet and discharge valves.

D. The pump controls shall incorporate a remote, pneumatically actuated control panel. Control panel shall include all pressure actuated switches, timers, filters, regulators and gauges as required for pump operation.

E. The pump control panel shall include a sensing tube to trigger pump cycling. Sensing tube shall extend into the sump chamber with end of tube vertically down into sump, 2” below top of pump casing.

2.4 OPTIONS AND ACCESSORIES

A. The casing shall be plain or stainless steel as per drawing schedule, with a flat bottom for facilitation of mounting on a pad.

B. Check valves shall be fitted with Viton seals unless otherwise specified on drawings.

C. Control panel shall be equipped with, at a minimum:

1. Inlet filter with auto drain,

2. Control pressure regulator with gauge, filter and auto drain,

3. Pump discharge pressure regulator with gauge,

4. Pressure relief valve,

5. Mechanical timer module (pneumatically operated),

6. Mechanical visual indicators of valve/control status,

7. Pilot operated pump discharge valve,

8. Pilot operated exhaust valve,

9. Enclosure with hinged, o-ring sealed door.

PART 3 – EXECUTION

3.1 PREPARATION

A. Verify that adequate compressed air is available at the required pressure and flow rates for specified pump performance.

3.2 INSTALLATION

A. Install in accordance with manufacturer’s instructions, recommendations and all governing codes and regulations.

B. Provide access space around pumps for service. Provide no less than minimum as recommended by the manufacturer.

C. Locate and install control panel as directed on drawings.

D. Provide die-electric connectors at all dissimilar materials.

E. Provide air shutoff valves at control panel inlet connection.

F. Adjust control panel components for desired pump cycling times.

3.3 GUARANTEE

A. Guarantee shall be for 2 years in accordance with Section 230190.

+ + END OF SECTION + +

SECTION 22 14 29.16

SUMP PUMP, SUBMERSIBLE

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Deliver the sump frame to the Construction Work contractor for installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 00, Earthwork

B. Section 03 30 00 Cast-In-Place Concrete

C. Section 22 00 00, Plumbing

D. Section 22 41 00, Valves

E. Section 26 29 00, Motor Controllers

1.3 SUBMITTALS

A. Product Data:

1. Catalog sheets, specifications, installation instructions, including pump capacity curve (capacity vs. head) and electrical schematics.

2. Catalog sheets, specifications and installation instructions for the sump cover and sump frame.

PART 2 - PRODUCTS

2.1 ELEVATOR SUMP PUMP

A. Type: Completely submersible, automatic operation, with a screenless suction, non-clog impeller, and lifting bail.

1. Motor Requirements (Supplementary to Section 262900):

a. Equip submersible motor with built-in thermal overload protection.

b. Power Requirements: Design to operate on a single phase, 60 Hertz, 120 volt circuit (NEMA standard motor voltage 115 V).

c. Power Cord: Waterproof, oil resistant, terminating with a 3 prong grounding type cord cap. Length as required.

B. Materials:

1. Casing, exterior covers and caps: Cast Iron.

2. Impeller: Bronze.

3. Shaft: Steel, sealed against contact with moisture.

4. Exterior fasteners: Stainless steel.

C. Liquid Temperature: Design to handle liquids up to 130 degrees F maximum.

2.2 PUMP CONTROLS AND ACCESSORIES

A. Liquid Level Control Device with Oil Guard detection system: Construct of corrosion resistant materials, with components designed for installation within the sump completely waterproof, including oil resistant grounding type power cord.

1. Integral with sump pump assembly

B. Control Panel: Factory wired, housed in a NEMA-4x enclosure; alternator liquid level control actuated. Include motor controller, H-O-A switch, run light, and circuit breaker for each pump motor.

2.3 SUMP (NOT APPLICABLE)

2.4 SUMP COVER AND FRAME

A. Cover: Steel or cast iron, coal tar enamel coated, with openings for pump access, power cord and discharge pipe. Provide rubber grommet in cover to protect power cord.

B. Frame: Steel, 1/2 inch minimum thickness, square shaped and provided with concrete anchors. Fabricate with recessed shoulder for flush mounting cover with finished floor.

2.5 COVER THICKNESS SCHEDULE

SUMP SIZE (INCHES)	MINIMUM COVER THICKNESS (INCHES)	
Round or Square	Steel	Cast Iron
36	1/2	5/8

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

B. Install liquid level control device at proper elevation to produce specified sump drawdown. Secure control device to pump discharge pipe with clamps or to side of sump basin with corrosion resistant brackets and fasteners.

C. Control Panel: Install and make electrical connections. Install liquid level control devices at elevation required to produce specified sump drawdown. Secure control devices to pump discharge pipe with clamps, or to side of sump basin with corrosion resistant brackets and fasteners.

D. Sump Frame: Install level at proper elevation.

E. Install sump cover.

3.2 PUMP OPERATION

A. Single Pump System: Set level controls to start pump when liquid depth in sump reaches 12 inches and stop pump when liquid depth is 3inches.

3.3 FIELD QUALITY CONTROL

A. Test sump pump system for proper operation at specified liquid depths.

B. Test high water alarm for proper operation at specified liquid depth.

+ + END OF SECTION + +

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SECTION 22 33 33

ELECTRIC HOT WATER HEATER

PART 1 – GENERAL

1.1 GENERAL

A. General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK DESCRIPTION

A. Furnish and install an electric water heater and all appurtenances (piping, pumps, trim, etc.) defined here-in and as shown on the drawings.

B. Codes

1. The following codes shall apply to the extent noted here-in.

a. Listing and Labeling: Provide electrically operated components specified in this section that are listed and labeled.

1) The terms “listed” and “Labeled”: As defined in NFPA 70, Article 100.

2) Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.

b. ASME Compliance: Water heaters shall bear ASME “H” stamp and be National Board listed, “HLW” were required.

c. Comply with NFPA 70 for electrical components and installation.

d. ETL/UL

e. ASHRAE 90.1

1.3 SUBMITTALS

A. Product Data: In accordance with Section 224000 paragraph 1.10, 1.11 and 1.12 include rated capacities; shipping, installed, and

operating weights; furnished specialties; and accessories for each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and field installed wiring.

C. Source Quality Control Tests and Inspection Reports: Indicate and interpret test results for compliance with performance requirements before shipping.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

E. Maintenance Data: Include in the maintenance manuals specified in Division 1. Include parts list, maintenance guide, and wiring diagrams for each water heater.

1.4 ASSOCIATED DOCUMENT

A. Section 224000 - Plumbing in its entirety forms part of this section.

B. Section 260000 - Electrical

C. Any conflict between this section and the sections noted above, the more stringent shall apply.

1.5 COORDINATION

A. Coordinate size and location of equipment and mounting/hanging appurtenances with all trades to avoid conflicts. See paragraph 3.02 part B here-in.

1.6 GUARANTEE

A. General Guarantee: The special guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other guarantees made by the Contractor under requirements of the Contract Documents. Installing contractor shall provide two years of guarantee parts and labor.

B. Special Guarantee: Submit a written guarantee, executed by the contractor:

1. Guarantee Period: Manufacturer's standard; Three year limited warranty on storage tank, 1 year warranty for all other components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum five (5) years experience. Subject to compliance with requirements, manufacturers offering boilers that may be incorporated into the work include, but are not limited to, the following:

B. Service Access: The water heaters shall located and orientated for easily accessing all serviceable components.

C. Controls: Water heater shall include thermostat with high level switch.

D. Manufacturers: Bradford White is the basis of design. Listed acceptable manufacturers shall be subject to compliance with requirements. Provide water heaters by one of the following:

1. Bradford White

2. A.O. Smith Water Products Co

3. Lochinvar Corp

2.2 COMPONENTS

A. Storage tank: Glass lined storage tank, ANSI rated for 150 PSIG working pressure/ 300 PSIG test pressure..

B. Heating elements: Electrical resistance elements; Medium watt density with zinc plated copper sheaths controlled by individually mounted thermostat and high temperature cutoff switch.

C. Jacket: Foam insulation enclosed by a steel outer cover with baked enamel finish.

D. Electrical: integral heavy duty terminal block for termination of field supplied and installed power wiring.

E. Drip pan: Field supplied and installed drip pan for units installed above ceilings.

F. Drain valve: Hose bibb drain valve.

G. Safety Relief Valve: ASME rated, factory set to protect water heater and piping as per schedule/drawings.

\PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine area to receive heater for compliance with requirements for installation tolerances and other conditions affecting water heater performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install water heaters level and plumb, according to manufacturer's written instructions and referenced standards.

B. Support water heaters using field assembled strut channel and 1/2" threaded rod from structure above. Coordinate with structural installation; See paragraph 1.05 here-in.

C. Install electrical devices furnished with water heater, but not specified to be factory mounted.

3.3 CONNECTIONS

A. Connect hot water piping to supply and return water heater tappings with shutoff valve and union or flange at each connection.

B. Electrical: Comply with applicable requirements in Division 26 Sections.

3.4 CLEANING

A. Flush and clean water heaters on completion of installation, according to manufacturer's written instructions.

B. After completing water heater installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and

construction debris and repair damaged finishes including chips, scratches, and abrasions with manufacturer's touchup paint.

3.5 COMMISSIONING

A. Verify that installation is as indicated and specified.

1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Section 260000. Do not proceed with water heater startup until wiring installation is acceptable to equipment Installer.

B. Complete manufacturer's installation and startup checklist and verify the following:

1. Water heater is level and secure.

2. No damage is visible to water heater jacket or insulation.

3. Pressure reducing valves are checked for correct operation and specified relief pressure. Adjust as required.

4. Clearances have been provided and piping connections are made for easy removal and servicing.

5. Pipes have been connected to correct ports.

6. Labels are clearly visible.

7. Water heater and surrounding area is clean and free of construction debris.

+ + END OF SECTION + +

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SECTION 22 34 36

GAS FIRED HOT WATER HEATER

PART 1 – GENERAL

1.1 GENERAL

A. General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK DESCRIPTION

A. Furnish and install a propane gas fired high efficiency hot water heater and all appurtenances (piping, pumps, trim, etc.) defined here-in and as shown on the drawings.

B Codes

1. The following codes shall apply to the extent noted here-in.

a. Listing and Labeling: Provide electrically operated components specified in this section that are listed and labeled.

1) The terms “listed” and “Labeled”: As defined in NFPA 70, Article 100.

2) Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.

b. ASME Compliance: Water heaters shall bear ASME “H” stamp and be National Board listed, “HLW” were required.

c. Comply with NFPA 54 National Fuel Gas Code.

d. Comply with NFPA 70 for electrical components and installation.

e. ETL/UL

f. ASHRAE 90.1

1.3 SUBMITTALS

A. Product Data: In accordance with Section 224000 paragraph 1.10, 1.11 and 1.12 include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer installed and field installed wiring.

C. Source Quality Control Tests and Inspection Reports: Indicate and interpret test results for compliance with performance requirements before shipping.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

E. Maintenance Data: Include in the maintenance manuals specified in Division 1. Include parts list, maintenance guide, and wiring diagrams for each water heater.

1.4 ASSOCIATED DOCUMENT

A. Section 224000, Plumbing in its entirety forms part of this section.

B. Section 260000, Electrical

C. Any conflict between this section and the sections noted above, the more stringent shall apply.

1.5 COORDINATION

A. Coordinate size and location of equipment and mounting/hanging appurtenances with all trades to avoid conflicts. See paragraph 3.02 part B here-in.

1.6 GUARANTEE

A. General Guarantee: The special guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other guarantees made by the Contractor under requirements of the Contract Documents. Installing contractor shall provide two years of guarantee parts and labor.

B. Special Guarantee: Submit a written guarantee, executed by the contractor:

1. Guarantee Period: Manufacturer's standard; Three year limited warranty on storage tank, 1 year warranty for all other components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum five (5) years experience. Subject to compliance with requirements, manufacturers offering boilers that may be incorporated into the work include, but are not limited to, the following:

B. Service Access: The water heaters shall located and orientated for easily accessing all serviceable components.

C. Controls: Water heater shall include thermostat with high level switch.

D. Manufacturers: Bradford White is the basis of design. Listed acceptable manufacturers shall be subject to compliance with requirements. Provide water heaters by one of the following:

1. Bradford White

2. A.O. Smith Water Products Co

3. Lochinvar Corp

2.2 COMPONENTS

A. Storage tank: Vitreous enamel lined storage tank, ANSI rated for 150 PSIG working pressure & 300 PSI test pressure.

B. Electronic ignition system

C. Premix closed combustion system .

D. Jacket: Foam insulation enclosed by a steel outer cover with baked enamel finish.

E. Drip pan: Field supplied and installed drip pan for units installed above ceilings.

F. Drain valve: Hose bibb drain valve.

G. Safety Relief Valve: ASME rated, factory set to protect water heater and piping as per schedule/drawings.

H. Digital LCD control panel display with adjustable thermostat up to 180 degrees.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine area to receive heater for compliance with requirements for installation tolerances and other conditions affecting water heater performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install water heaters level and plumb, according to manufacturer's written instructions and referenced standards.

B. Install gas fired water heaters according to NFPA 54.

C. Support water heaters on 4 in (100 mm) thick concrete base, 4 in (100 mm) larger on each side than base of unit. See paragraph 1.05 here-in.

D. Install electrical devices furnished with water heater, but not specified to be factory mounted.

3.3 CONNECTIONS

A. Connect gas piping full size to boiler gas train inlet with union.

B. Connect hot water piping to supply and return water heater tappings with shutoff valve and union or flange at each connection.

C. Install piping from safety relief valves to nearest floor drain.

D. Connect breeching to water heater outlet, full size of outlet. The water heater shall operate on negative stack pressure and Category I vent material according to ANSI standards (AGA) (standard vertical venting). The water heater shall operate on positive stack pressure and Category III vent material. A listed stainless vent must be used. (Through the wall horizontal venting). See Section 235750.

E. Electrical: Comply with applicable requirements in Division 26 Sections.

F. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory authorized service representative to supervise the field assembly of components and installation of water heaters, including piping and electrical connections. Report results in writing.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Manufacturer’s representative shall supply a factory authorized service technician to start up the boilers.

3.5 CLEANING

A. Flush and clean water heaters on completion of installation, according to manufacturer's written instructions.

B. After completing water heater installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes including chips, scratches, and abrasions with manufacturer’s touchup paint.

3.6 COMMISSIONING

A. Engage a factory authorized service representative to provide startup service. Start up to be performed only after complete boiler room operation is field verified to offer a substantial load, and complete system circulation. One year service guarantee shall be handled by factory authorized tech.

B. Verify that installation is as indicated and specified.

1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Section 260000. Do not proceed with water heater startup until wiring installation is acceptable to equipment Installer.

C. Complete manufacturer's installation and startup checklist and verify the following:

1. Water heater is level on concrete base.

2. Flue and chimney are installed without visible damage.

3. No damage is visible to water heater jacket, refractory, or combustion chamber.

4. Pressure reducing valves are checked for correct operation and specified relief pressure. Adjust as required.

5. Clearances have been provided and piping is flanged for easy removal and servicing.

6. Heating circuit pipes have been connected to correct ports.

7. Labels are clearly visible.

8. Water heater, burner, and flue are clean and free of construction debris.

9. Pressure and temperature gauges are installed.

10. Control installations are completed.

D. Ensure pumps operate properly.

E. Check operation of pressure reducing valve on gas train, including venting.

F. Check that fluid level, flow switch, and high temperature interlocks are in place.

G. Start pumps and water heaters, and adjust burners to maximum operating efficiency

1. Fill out startup checklist and attach copy with Contractor Startup Report.

2. Check and record performance of factory provided water heater protection devices and firing sequences.

3. Check and record performance of water heater fluid level, flow switch, and high temperature interlocks.

4. Run in water heaters as recommended or required by manufacturer.

H. Perform the following tests for each firing rate for high/low burners and four stage burners. Adjust boiler combustion efficiency at each firing rate. Measure and record the following:

1. Inlet gas pressure.

2. Gas pressure on manifold.

3. Combustion air box pressure(s).

4. Flue gas temperature at boiler discharge.

5. Flue gas carbon dioxide and oxygen concentration.

6. Natural flue draft.

I. Measure and record temperature rise through each water heater.

3.7 DEMONSTRATION

A. Engage a factory authorized service representative to train Owner's maintenance personnel as specified below:

1. Operate water heater, including accessories and controls, to demonstrate compliance with requirements.

2. Train Owner’s maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventative maintenance.

3. Review date in the maintenance manuals. Refer to Division 1 Section “Contract Closeout.

4. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

5. Schedule training with Owner with at least 7 days advance notice.

6. A signed attendance sheet is required.

+ + END OF SECTION + +

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SECTION 22 40 00

PLUMBING

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and General Requirements, apply to the work specified in this Section.

1.2 WORK DESCRIPTION

A. Provide all plant facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary or incidental to complete the work specified in this Section and as shown on the Drawings.

B. The Drawings indicate the extent and general arrangements of the Plumbing Systems. If any departures from the drawings are deemed necessary by the Plumbing Contractor, details of such departures and the reasons shall be submitted to the Owner and Engineer for approval. No such departures shall be made without prior written approval of the Owner and Engineer. Equipment and piping arrangements shall provide adequate and acceptable clearances for entry, servicing, and maintenance.

C. Plumbing Contractor shall be responsible for consulting with the General Contractor and others indicating locations of openings for his work.

D. Any conflict between the requirements of this section and the areas having jurisdiction, the more severe requirement shall apply.

1.3 WORK INCLUDED

A. Unless otherwise noted on the drawings the following is to be implemented.

1. Sanitary drainage and vent piping systems (excavating and backfilling inside of building to 5 foot outside of building).

2. Roof storm drainage systems.

3. Hot, cold, and recirculating water supply system.

4. Gas piping system modifications

5. Floor drains, area drains, trench drains and roof drains.

6. Hot water heater and storage tanks.

7. Sleeves, inserts, and hangers.

8. Required valved water piping for heating and air conditioning equipment.

9. Insulation, fire stopping and all ADA required coverings for lavatories, etc.

10. Pipe identification, valve tags, and charts.

11. Copper drip pans.

12. Core drilling.

13. Operating and maintenance manuals.

14. Lubricants.

15. Special tools.

16. Equipment drive guards.

17. All supplementary steel for piping and equipment supports.

18. Final connections to all existing storm, sanitary, water, and gas lines.

19. Plumbing connections to existing systems.

20. Hot water circulators.

21. Apply for, obtain, and pay all permits, certificates, inspections, and approvals required in connection with work under this Section.

22. Disinfection of interior domestic water piping system.

23. Removal and/or relocation of existing plumbing fixtures, piping, and equipment.

24. All copper shall be reclaimed from demolition and turned over to the facility.

25. Temporary water and extensions by trades requiring same.

26. The plumbing contractor will be responsible for all sanitary systems, fire mains, water mains in total and storm drainage inside the building to within 5 - 0" outside of the building. The General Contractor will be responsible for storm drainage from 5' – 0" outside of the building lines to, and including the drainage pools.

1.4 WORK NOT INCLUDED

A. Unless otherwise noted on the drawings the following items of work are to be done by others and shall not be included in the work of this Section. However, it shall be the responsibility of this Contractor to supply the Subcontractors with the necessary information, Drawings, and supervisions so that they can properly complete their phase of the installation.

1. Concrete structures (manholes, access covers, sand traps, catch basins, pits, etc.) for equipment.

2. Access doors – Plumbing Contractor is to be responsible for locations.

3. Toilet accessories, including soap dispensers.

4. Cutting and patching.

5. Electrical wiring and mounting of starting and control equipment for electrically operated plumbing equipment.

6. Roof drain flashing.

7. Finish painting of all exposed piping and hangers.

8. Foundation drains and sand traps.

9. Electric heat tracing.

10. Concrete equipment bases.

11. All excavating and backfilling for plumbing lines both inside and outside of building. Plumbing Contractor is responsible for supervision of proper bedding and backfilling to 12 inch above crown of pipe.

12. Equipment flues (gas flues).

13. Flashing for pipes penetrating roof.

14. Refrigerant piping.

15. Storm and sanitary laterals from site drains to within 5 foot – 0 inch from building line.

16. Excavating and backfilling with selected gravel material for exterior foundation wall drainage system.

17. Condensate piping from air conditioning equipment to floor drain.

18. Water service from main to within 5 foot-0 inch of building line.

1.5 VISITING THE PREMISES

A. The Plumbing Contractor, before submitting a bid on the work, must visit the site and familiarize himself with all visible existing conditions.

B. If an existing equipment/item is to be removed and replaced in kind, it is the contractor's responsibility to bring to the attention of the engineer any existing condition (electrical, mounting, size, etc.) that is not compatible with the equipment/item (scheduled or otherwise) defined on the drawings.

C. The submission of a bid will be considered an acknowledgment on the part of the bidder of his visitation to the site. The Plumbing Contractor shall be responsible for the installation of the work as shown on the Drawings and specified herein.

1.6 DEFINITIONS

A. ***Furnish and Install Implemented or provide*** means to supply, erect, install, and connect up to complete for readiness for regular operation, the particular work referred to.

B. ***Plumbing Contractor*** means the Plumbing Contractor and any of his subcontractors, vendors, suppliers, or fabricators.

C. ***Piping*** includes pipe, all fittings, valves, hangers, and other accessories relative to such piping.

D. ***Concealed*** means hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, or in crawl spaces.

E. ***Exposed*** means not installed underground or concealed as defined above.

F. ***Invert Elevation*** means the elevation of the inside bottom of pipe.

1.7 QUALITY ASSURANCE

A. The work shall be executed in strict accordance with the latest edition of the prevailing State Plumbing and Building Codes (or BOCA as applicable) and all local regulations that may apply. In case of conflict between the Contract Documents and a governing code or ordinance, the more stringent requirements shall apply.

B. Unless otherwise specified or indicated, materials and workmanship shall conform with the latest edition of the following codes and standards:

1. American National Standards Institute (ANSI).

2. Underwriter's Laboratories, Inc. (UL).

3. American Society for Testing and Materials (ASTM).

4. National Fire Protection Association (NFPA).

5. American Gas Association (AGA).

6. National Electric Code (NEC).

7. Plumbing Code of New York State (PCNYS).

C. If any work is performed and subsequent changes are necessary to conform to the ordinances, the changes shall be made at the Plumbing Contractor's expense.

D. All new plumbing equipment shall be designed to conform to applicable state and local energy codes. Pipe insulation, water heaters, mixing valves, flow control fittings, operating costs of equipment, shall be selected with operating efficiencies and design conditions to meet applicable energy codes.

E. Availability of a ***Certificate of Approval*** from the Board of Examiners of Plumbers and Gas Regulatory Board or a similar governing authority shall be a prerequisite to scheduling a final inspection of this Contract. Non-availability of these certificates may be grounds for cancellation and postponement of the scheduled inspection. A copy of the certificate shall be submitted to the Engineer.

1.8 WORKMANSHIP AND MATERIALS

A. Workmanship shall be of the best quality. Competent mechanics skilled in their trades shall be employed. The Plumbing Contractor shall furnish the services of an experienced Superintendent, who will be constantly in charge of the erection of the work, until completed and accepted.

B. Unless otherwise hereinafter specified, all materials and equipment under this Section of the Specifications shall be new, of best grade, and as listed in printed catalogs of the manufacturer. Each article of its kind shall be the standard product of a single manufacturer.

C. The Engineer shall have the right to accept or reject material, equipment, and/or workmanship and determine when the Plumbing Contractor has complied with the requirements herein specified.

D. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating.

E. Reference to standards are intended to be the latest revision of the standard specified.

1.9 MANUFACTURER'S RECOMMENDATIONS

A. Equipment installed under this Section of the Specifications shall be installed according to manufacturer's recommendations, unless otherwise shown on the Drawings or herein specified.

B. The plumbing system shall be capable of supplying the required quantity of domestic (hot and cold) water for the various utilities, provide immediate disposal of necessary quantities of sanitary waste and storm water, and shall include any required water treatment where specified.

1.10 FIXTURE & EQUIPMENT SUBMITTALS AND SAMPLES

A. The Plumbing Contractor shall prepare a complete submittal of all plumbing fixtures, piping, and equipment included under this Section and as shown on the drawings.

B. The submittal shall show, in detail, the size and arrangements of all parts including piping and method of support, the relation of the work of other trades, elevations, and all other details required for the proper installation of the work.

C. Equivalent/Equal: Where, in these specifications and/or certain kinds, types, brands, or manufacturers of materials are named, they shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal, and the contractor may select one of those items. If the contractor desires to use any kind, type, brand, or manufacturer of material other than those named in the specification, he shall indicate in writing, ten (10) working days, prior to contract award, what kind, type, brand, or manufacturer is included in the base bid for the specified items, and submit information describing in specific detail where it differs from the quality, performance and size required by the base

specifications, and why a substitution is requested. The engineer will be the sole judge as to acceptability. A copy of this information is to be included in all subsequent equipment submittals. Failure to do so is cause for rejection. All sections within the Division 22 requirements of this specification shall comply with the above.

D. Whenever deemed necessary, the Engineer may request samples of equipment and materials.

E. Prior to delivery of any material to job site, and sufficiently in advance to allow the Engineer ample time for checking, six copies of complete fixtures and equipment submittals or catalog cuts, showing manufacturer's name, model number, construction, size arrangement, operating clearances, performing characteristics, and capacity of material and equipment shall be forwarded to the Architect/Engineer. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish, and durability to that specified.

F. Plumbing Contractor shall furnish all necessary templates, patterns, etc. for installing work and for the purpose of making adjoining work conform and shall furnish setting plans and shop details to other trades as required.

1.11 SUBMITTALS

A. Drawings, specifications and catalogs submitted for approval shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, Plumbing Contractor's name, identification mark, and name of job and owner. Catalog items shall be clearly marked in ink. Data of general nature will not be accepted. Six (6) complete sets of documentation shall be submitted within 30 calendar days after contract award.

B. Shop Drawings: Shop drawings shall include drawings, schedules, performance charts, instructions, brochures, diagrams, and other information to illustrate the requirements and operation of the system. Shop drawings shall be provided for the complete plumbing system including piping layout and location or connections; schematic (elementary) diagrams and wiring diagrams or connection and interconnection diagrams.

C. Equipment catalog cuts or shop drawings but not limited to the following fixtures and equipment must be submitted for approval:

1. Floor cleanouts.

2. Wall cleanouts.

3. Floor drains and trench drains

4. All toilet room fixtures (including trim, supports, and carriers).

5. Electric water coolers

6. Water heaters.

7. Circulators.

8. Service sinks.

9. All lavatories and sinks.

10. Pipe and equipment insulation.

11. Gate valves, globe valves, hose bibbs, balancing valves, check valves, backwater valves, pressure and temperature relief valves, backflow preventers, vacuum breakers, pressure-reducing valves, strainers, gauges, thermometers and master thermostatic mixing valves.

12. Exterior, interior wall hydrants.

13. Roof drains, marquee drains, and scupper gutter drains.

14. Urinals, water closets

15. Fire stopping

1.12 SUBSTITUTION OF MATERIAL OR EQUIPMENT

A. If apparatus or materials substituted for those specified necessitate changes or additional connections, piping supports, or construction; same shall be provided and the Plumbing Contractor shall assume the cost and the entire responsibility thereof.

B. The Architect's/Engineer's permission to make such substitutions shall not relieve the Plumbing Contractor from full responsibility for the work.

1.13 INTERRUPTION OF SERVICES

A. While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing systems. Interruptions shall be coordinated with the Owners as to time and duration. The Contractor shall be responsible for any interruptions to service and shall repair any damages to existing systems caused by his operations.

1.14 BASES AND SUPPORTS

A. All concrete bases and supports will be provided by the General Contractor.

B. The Plumbing Contractor shall furnish to the General Contractor all required foundation sizes, bolts, washers, sleeves, plates, and templates, for the plumbing equipment.

C. The size of the foundation bolts shall be as recommended by the manufacturer.

D. The foundation bolts shall be set in pipe sleeves, which are held in place by a template. Sleeves shall be 2-1/2 inch diameter larger than the bolt to allow movement for final positioning of the bolts.

E. All equipment shall be set on the foundations and shimmed level with steel shims and grouted up under base for uniform bearing.

F. All plumbing equipment shall be so installed and shall so operate that no noise or vibration shall be transmitted to any part of the building beyond the room or rooms in which equipment is located.

G. All metal supports shall be furnished and installed by the Plumbing Contractor.

H. The anchoring of all equipment to the structure shall comply with all applicable requirements of the codes pertaining to earthquake proofing. (See paragraph 2.07 part W here-in).

1.15 GIVING INFORMATION

A. The Plumbing Contractor shall keep himself fully informed as to the shape, size, and position of all openings and foundations required for his apparatus and shall give full information to the General Contractor sufficiently in advance of the work, so that all such openings and foundation may be built in advance. He shall also furnish all sleeves and supports herein specified or required, so the General Contractor may build same in place.

B. Plan all work so that it proceeds with a minimum of interference with other trades. Inform the General Contractor of all openings required in the building construction including roof openings for the installation of his work. Provisions shall be made for all special frames, openings, and pipe sleeves as required. The cutting, patching, and core drilling made necessary by his failure to properly direct and supervise such work at the correct time shall be done and paid for by the Plumbing Contractor.

1.16 OBTAINING INFORMATION

A. The Plumbing Contractor shall obtain detailed information from the manufacturers of the equipment, which he is to provide, for the proper methods of installation. He shall also obtain all information from the General Contractor and other Subcontractors to ensure full comprehension of the work to be done and to ensure coordination between work under this Section and all other work under this Contract.

1.17 CLEANING & PAINTING EQUIPMENT AND MATERIALS

A. The Plumbing Contractor shall provide for the safety and good condition of all materials and equipment until final acceptance by the Owner; protect all materials and equipment from damage; provide adequate and proper storage facilities during the progress of the work; provide protection for bearings, open connections, pipe coils, pumps, compressors, and similar equipment.

B. All fixtures, piping, finished surfaces, and equipment shall have all grease, adhesive labels, and foreign materials removed.

C. All pumps, motors, tanks, and all other factory manufactured and assembled apparatus shall be factory coated with one coat of primer and one coat of machinery enamel except where specified finished is specified herein.

D. All piping shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, flush valves, and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all liquid strainer screens after the system has been in operation ten (10) days.

E. Air, oil, and gas piping shall be blown out with clean compressed air or inert gas.

F. When connections are made to existing systems, the Plumbing Contractor shall do all cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.

1.18 PIPE MARKERS

A. All piping shall be color-coded and labeled with W.H. Brady pipe markers or equal. Use Brady marker style 1 on all pipes 3 inch diameter and larger. Apply markers on the two lower quarters of the pipe and where view is not obstructed. Apply pipe marker and arrow marker at each valve to show contents and direction of flow. When a pipe passes through a wall, pipe marker and arrow marker shall be applied on the pipe on both sides of the wall. Arrow markers must point away from pipe markers and in direction

of flow. Apply pipe markers and arrow markers every 50 foot along continuous lines. Apply pipe marker and arrow marker on each riser and T-joint.

1.19 VALVE TAGS

A. On all valves and controls, furnish identifying numbered metal tags (Seton or equal) fastened to stem or handle by heavy brass S-hooks. Tags shall be 2 inch diameter, 14-gauge aluminum with stamped number filled in with black paint.

B. Four (4) sets of separate charts shall be furnished, one set in each service manual, and one set under glass, located in mechanical/custodial room, showing each pipe system in diagrammatic form with all valves and controls numbered to correspond to numbered metal tags. Chart shall also include size of valve, type, function, and manufacturer.

1.20 OPERATING AND MAINTENANCE MANUALS

A. Operating Instructions: Provide 4 sets of operating instructions to the Owner with respect to operation functions and maintenance procedures for all equipment and systems installed. The cost of such instruction shall be included in the contract price. Three days shall be a minimum time for instruction.

B. Maintenance Manuals: At the completion of the project, three complete manuals containing the following shall be turned over to the Architect/Engineer:

1. Complete shop drawings of all equipment.

2. Operation description of all systems.

3. Names, addresses, and telephone numbers of all suppliers of the systems and service agents.

4. Preventive maintenance instructions for all systems.

5. Spare parts list of all system components.

C. All information shall be in one hardback binder or equivalent.

D. These maintenance manuals will be reviewed by the Architect/Engineer.

1.21 AS-BUILT RECORD DRAWINGS

A. As work progresses, and on a weekly basis, the contractor shall keep an accurate record entered in colored pencil of all deviations in the work as actually installed from work as shown on design drawings, paying attention to dimensioning all underground utility lines, utility structures, their offsets, valves, and grades. All inside and outside buried lines shall be dimensioned from column lines and elevation of lines noted from corners of building.

B. At substantial completion of the work, the Plumbing Contractor shall transfer all changes made during construction onto reproducible transparencies, or on a disc, with new information clouded and noted. Such drawings shall be stamped with the contractors name, date, and "As Built" in the lower right hand corner. A copy of the colored record drawing, an as built reproducible, and three (3) sets of prints made from said reproducibles shall be forwarded to the engineer prior to final payment.

C. Any conflict between these requirements and those set forth in paragraph 1.01A here-in, the more stringent requirement shall prevail.

D. A certification statement stating that the drawings do represent the "As Built" condition shall be stamped on the drawings.

E. A full set of drawings including unaffected sheets is to be submitted.

F. All sections in the Division 22 requirements of this specification shall comply with the above.

1.22 GUARANTEE

A. Unless otherwise noted here in, all materials, equipment, fixtures, piping, and devices shall be guaranteed to be free from mechanical defects or faulty workmanship for a period of two (2) years from the date of written acceptance by the Owner. All sections within this division shall comply.

B. The Engineer is aware and the bidders are hereby made aware that certain manufacturer's equipment guarantees are valid only for a period of one (1) year from the date of shipment or of equipment installation and will therefore not be valid until the date of guarantee set forth herein. It shall therefore be noted that this Plumbing Contractor shall be fully responsible for all material, equipment and labor for the full guarantee period as set for herein (i.e., two (2) years from date of acceptance). If the manufacturer's guarantee on his equipment is more than two (2) years, the Plumbing Contractor shall be responsible for the full length of the guarantee period.

C. Labor and material required to fulfill the requirements of this guarantee shall be furnished to the Owner by this Contractor at no additional cost.

D. The Plumbing Contractor shall be responsible for servicing the system for a period of twelve (12) months after acceptance. Guarantee shall include servicing of the equipment during this time and answering any necessary trouble calls.

E. Before acceptance, Owner may call for any specific test necessary to determine if the system is functioning as intended. That is to see if any excess noise or vibration is apparent or other objectionable items are apparent.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials shall be new, unused, best of their respective kinds, and free from defects.

B. Reference to Specifications of recognized authorities, to establish bases of quality shall be of the latest edition in force at date of bidding.

2.2 PIPE

A. Pipe and fittings shall conform to the latest ANSI, ASTM, ASME, and Commercial Standards (CS).

B. Each length of pipe, each pipe fitting, trap, material, and device used in the plumbing system shall have a cast stamped or indelibly marked on it, the manufacturers name or mark, weight and quality of the product when such marking is required by the approval standard that applies.

C. Soil waste, vent, and storm drainage (above ground) use one of the following:

1. Cast Iron-All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International, and shall be manufactured by Charlotte Pipe and Foundry Co. or equal.

    a. For bell and spigot pattern, use service weight or heavy weight, as noted on the drawing, in accordance with ASTM-A-74.

    b. For hubless cast iron, use service weight or heavy weight, as noted on the drawing in accordance with ASTM-A-74

    c. Joints to be in accordance with paragraph 2.03 part A,B, and C here-in.

2. ABS (Acrylonitrile-Butadiene-Styrene) Schedule 40 pipe and fittings. ASTM D2661. (For exterior use only.)

3. Schedule 40 ASTM A53 grade A galvanized steel pipe with cast iron plain or galvanized drainage pattern fittings for waste, cast iron, or galvanized malleable iron fittings for vents conforming to ANSI B16.3 Class 150 threaded or grooved end fittings for storm water only. ASTM A120 & B16.12.

4. Hard drawn Type L copper tubing with cast brass drainage fittings. ASTM B88.

5. Schedule 40 chrome plated red brass I.P.S. (Exposed piping at fixtures.)

6. Storm and sanitary piping above ground shall be ductile iron with mechanical joints in accordance with AWWA C151, Class 51. Joints shall be in accordance with ANSI/AWWA C111/A21.11.

7. PVC (Polyvinyl Chloride) schedule 40 pipe and fittings (for external use only). ASTM D2665. Use for sump pump and sewer ejector discharge up to but not including three (3) inches. Three (3) inches and larger shall be flanged cast iron.

D. Soil, Waste, Vent, and Storm (below ground):

1. Cast Iron-All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International, and shall be manufactured by Charlotte Pipe and Foundry Co. or equal.

   a. Bell and spigot pattern, use service weight or heavy weight, as noted on the drawing, in accordance with ASTM-A-74. Pipe shall be coated with two coats of hot tar or asphaltum.

   b. Joints to be in accordance with paragraph 2.03 part A, B, and C here-in.

2. ABS (Acrylonitrile-Butadiene-Styrene) Schedule 40 pipe and fittings (for exterior use only). ASTM D2661.

3. Hard drawn Type K copper tubing with cast brass drainage fittings. ASTM B88 & ANSI B16.18.

4. Ductile iron, bituminous coated with push on mechanical joints in accordance with AWWA C151, Class 51.

5. PVC (Polyvinyl Chloride) schedule 40 pipe and fittings (for exterior use only). ASTM D2665.

6. Cast iron shall be used for all interior piping.

E. Indirect Waste Piping:

1. Hard drawn Type L copper tubing with cast brass drainage fittings. ASTM B88 & ANSI B16.18.

F. Water Piping (above ground):

1. Type L hard-drawn copper tubing with wrought copper fittings. ASTM B88.

G. Water Piping (below ground):

1. Type K hard-drawn copper tubing with brazed joints. ASTM B88.

H. Water Piping (exterior water service 2 inch and smaller):

1. Type K soft tempered copper tubing with brazed joints. ASTM B88.

I. Water Piping (exterior water service 3 inch and larger):

1. Class 250 cast iron cement lined pipe and fittings – mechanical gasket joints with bituminous seal coat. ASTM A377.

K. Gas Piping (3 inches and larger to be butt welded):

1. Schedule 40 black steel pipe with welding fittings and joints.

a) ASME B36.10, 10M;

b) ASTM A 53; or

c) ASTM A 106

d) Cast iron pipe shall not be used.

L. Gas Piping (2-1/2 inches and smaller):

1. Schedule 40 black steel pipe with 150# malleable iron threaded fittings.

a) ASME B36.10, 10M;

b) ASTM A 53; or

c) ASTM A 106

d) Cast iron pipe shall not be used.

M. Any gas piping devoid of black and/or safety yellow finish is to be painted black/yellow as required.

N. Sleeves:

1. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gauge galvanized steel.

2. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel. All pipe sleeves shall be 2 standard sizes larger than the pipe being used.

3. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing; Prefabricated fire rated sleeves including seals and UL listed.

4. Sleeves for Round Ductwork: Form with galvanized steel.

5. Stuffing or Fire Stopping Insulation: Glass fiber type, non-combustible, cover with fire barrier caulk. (See Paragraph R “Caulk and Sealants” below.)

O. Caulk and Sealants:

1. All penetrations thru non-fire and fire rated walls and assemblies shall be sealed with 3M-Fire Barrier Caulk #CP25WB and/or 3M-Fire Barrier #FS-195 plus wrap/strip or, an approved equal, meeting the requirements of ASTM-E-814 and ANSI/UL1479, as shown on the drawings.

P. Lead pipe shall not be used in new construction, additions, or modifications.

Q. Lead pipe in existing structures to remain unless otherwise shown on drawings.

2.3 JOINTS AND CONNECTIONS

A. Caulked (cast iron soil pipe):

1. Caulked joint for cast iron bell and spigot soil pipe shall be firmly packed with oakum or hemp and filled with molten lead not less than 1 inch deep and not to extend more than 1/8 inch below the

rim of the hub. No paint, varnish, or other coatings shall be permitted on the jointing material until after the joint has been tested and approved. Lead shall be run in one pouring and shall be caulked tight.

2. Joints in acid-resistant cast iron pipe shall be made with a wax-free asbestos free rope packing and molten lead as specified for cast iron soil pipe.

B. Gasketed (cast iron soil pipe):

1. A positive seal, one piece elastomeric compression type gasket may be used for joining hub and spigot cast iron soil pipe as alternate for lead or oakum joints. The joint is formed by inserting an approved gasket in the hub. The inside of the gasket is lubricated and the spigot end of the pipe is pushed into the gasket until seated, thus effecting a positive seal.

2. A positive-seal, one piece elastomeric compression type gasket for joining hub and spigot cast iron soil pipe may be used for a drainage and waste system above and below ground.

3. Compression gaskets for cast iron soil pipe shall be neoprene, marked as such, with ASTM C564 and the CISP symbol of Cast Iron Soil Pipe Institute to indicate the gasket meets the standard.

C. No-Hub (Cast iron soil pipe):

1. Joints for hubless cast iron pipe shall be made with an approved neoprene gasket and stainless steel or cast iron retaining sleeve.

2. No-Hub gaskets shall be marked with the manufacturer's name, ASTM C564, the work "No Hub", nominal diameter, and the CI symbol of the Cast Iron Soil Pipe Institute indicating it meets the standard Stainless steel couplings for No-Hub shall be marked "All Stainless", name and manufacturer, words "No-Hub", nominal diameter, and the CI symbol indicating it conforms to CISPI Standard 301.

3. Installation of the hubless cast iron soil pipe system shall in accordance with CISPI Pamphlet 100 – "Installation Suggestions for CI No-Hub Pipe and Fittings".

D. Soldered or Sweat:

1. Soldered or sweat joints for tubing shall be made with approved fittings. Surfaces to be soldered or sweated shall be properly cleaned and reamed. The joints shall be properly fluxed and made

by approved lead free solder. Joints in copper water tubing shall be made by appropriate use of approved brass or wrought copper water fittings in accordance with ANSI B16.22, properly sweated or soldered together.

2. Flanges shall be cast bronze in accordance with B16.24. The joining between tube and fittings shall be made with brazing filler metals complying with ANSI/ASW A58. Fluxes and brazing filler metal shall be lead-free. Threaded joints at valves shall be made with lead-free polyetraflu-orethylene sealant.

E. Threaded:

1. Threaded joints shall conform to American National Taper Pipe Thread ANSI B2.1-68. All burrs shall be removed. Pipe ends shall be reamed or filed out to size of bore, and all chips shall be removed. Screwed joints may be made up with Teflon tape. Pipe joint cement and paint shall be used only on male threads.

2. All close and shoulder nipples shall be extra heavy.

F. Slip:

1. Slip joints shall be made using approved packing or gasket material, or approved joint brass compression rings. Ground joint brass connections, which allow adjustment of tubing but provide a rigid joint when made up shall not be considered as slip joints. Slip joints may be used on the house side of the trap only.

G. Plastic (ABS and PVC Pipe. See paragraph 2.02 parts C3, C8, D2 and D5) here-in.

1. Joints in plastic piping shall be made with approved fittings by solvent welded connections. Solvent welded connections shall be made only with a solvent cement manufactured specifically for the materials to be joined.

H. Plastic (Polypropylene pipe):

2. Joints shall be made by the heat fusion method in accordance with the manufacturer’s recommendations.

I. Grooved:

1. Joints using grooved end pipe and grooved type couplings shall be installed in accordance with the manufacturer’s instruction.

J. Unions:

1. Unions in the water supply system shall be metal-to-metal with ground seats.

2. Unions on drainage systems may be used only in the trap seal or on the inlet side of the trap. Unions shall have metal-to-metal ground seats.

3. Dielectric unions/couplings: Insulated union/couplings shall be provided for connecting dissimilar materials. Union shall have a water impervious insulation barrier capable of limiting galvanic current to one percent of the short circuit current in a corresponding bimetallic joint. When dry, insulation barrier shall be able to withstand a 600 – volt breakdown test.

K. Brazed:

1. Brazed joints shall be made in accordance with the provisions of Section 6 of the Code of Pressure Piping. ANSI B31.1-1955.

L. Welded:

1. Joints to be welded shall be cleaned free from rust and scale and welded by certified welders who qualify according to Section 6 of the Code for Pressure Piping. ANSI B31.1-1955.

M. Joints between different piping materials:

1. Cast iron to copper tube: Every joint between cast iron and copper tube shall be made by using a brass caulking ferrule and properly soldering the copper tube to the ferrule or other approved methods. Solder shall be lead free.

2. Cast iron to vitrified clay: Every joint between cast iron piping and vitrified clay piping shall be made either of hot poured bitumastic compound or by a preformed elastomeric ring. This ring shall, after ramming, completely fill the annular space between the cast iron spigot and the vitrified clay hub.

3. Copper tube to threaded pipe joints: Every joint from copper tube to threaded pipes shall be made by the use of brass converter fittings or dielectric fittings. The joint between the copper pipe and the fitting shall be properly soldered, and the connection between the threaded pipe and fitting shall be made with a standard pipe size screw joint. Solder shall be lead free.

4. Existing lead to cast iron or steel pipe: Every joint between lead and cast iron or steel pipe shall be made by means of wiped joints to a caulking ferrule, soldering nipple, bushing or by means of a mechanical adapter.

5. Threaded pipe to cast iron: Every joint between wrought iron, steel, or brass, and cast iron pipe shall be either caulked or threaded or shall be made with approved adapter fittings.

6. Special joints for drainage piping: Different types of drainage piping materials shall be joined either by adapter fittings or by means of an acceptable prefabricated sealing ring or sleeve as specifically approved by the Plumbing Code.

7. ABS or PVC DWV to other materials: ABS or PVC DWV joints to other materials shall be subject to the following requirements.

    a. Threaded joints: ABS or PVC DWV joints, when threaded, shall use the proper male or female threaded adapter. Only approved thread type or lubricant seal, or other approved material as recommended by the manufacturer, shall be used. Threaded joints shall not be over-tightened. After hand tightening the joint, one-half to one full turn with a strap wrench will be sufficient.

    b. Cast iron hub joints: Joints may be made by caulking with lead and oakum or by use of a compression gasket that is compressed with the plastic pipe. Adapters are not required for this connection.

    c. Cast iron spigot ends: Schedule 40 steel pipe or copper DWV tube: Joints between these materials and plastic shall be joined with an approved adapter fitting.

8. Connections between earthenware of any fixture and flanges in soil and waste piping shall be made absolutely gas and watertight with the closet setting compounds and gaskets which must be absolutely gas and fire-proof, watertight, stain proof, containing neither oil nor asphaltum, and which will not rot, harden or dry under any extreme climatic change, and must adhere on wet surfaces.

9. Any fitting or connection on a drainage system, which has an enlargement chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain, is prohibited.

2.4 VALVES

A. Valves shall be furnished and installed in all branches serving more then two pieces of equipment or group of plumbing fixtures, on both sides of equipment such as tanks, pumps, meters, etc., for isolating of branch mains eliminating the necessity of interrupting service to the entire building structure for maintenance purposes and where indicated on the Drawings. Valves shall be installed with the best workmanship and appearance shall

be grouped so that all parts are easily accessible from a minimum number of access doors. Manufacturers figure numbers are specified to indicate type and quality and construction, but products of listed approved manufacturers may be substituted for those specific numbers shown.

B. All valves of similar service to be of the same manufacturer and shall have manufacturers name or trademark and the working pressure stamped or cast on the body.

C. Valves shall be in accordance with Section 224100.

2.5 SPECIALTIES

A. Non Freeze Hydrants:

1. For wall mount applications: JR Smith Series 5518 cast brass, cast bronze, heavy duty, box type wall hydrant with polished brass or stainless steel face – 3/4 inch npt straight hose outlet – T-handle key or approved equal.

2. For slab mount applications: Zurn Z 1360 Series: Galvanized steel casing, bronze interior parts, bronze seat and replaceable seat washer, non turning operating rod with free-floating compression closure valve with 3/4 inch NPT straight hose outlet – plain bronze box type with operating key lock. Hydrant to be equipped with a tapped 1/4 inch drain port valve housing

B. Hose Bibbs:

1. For wall mount applications hose bib to be Zurn Z 81307 or approved equal with vacuum breaker and removable T handle.

2. For above head applications, use Chicago Faucet Co. No. 952 or approved equal, chrome plated sill faucet with vacuum breaker, 3/4 inch hose thread outlet with lockshield cap, No. 293-6 removable T-handle and 3/4 inch flanged female threaded inlet.

C. Shock Absorbers, (Water Hammer Arrestors):

1. Zurn Shocktrol Z-1700, J.R. Smith Series 5000 or approved equal. Each shock absorber shall be located in accordance with the manufacturer's recommendations.

2. Sizing of shock absorbers shall be in accordance with Plumbing and Drainage Institute "Standard PDI WH201."

3. Shock absorbers shall be provided and installed on both hot and cold water supply lines.

D. Air Vents:

1. Bell and Gossett #7 or approved equal. Install at all high points at hot and cold pipe runs and risers which may become air bound.

E. Vacuum Breakers:

1. Watts Regulator Co. Series 288A; Wilkins 35 or approved equal (sinks and hose bibbs).

2. Watts Regulator Co. Series 9D; Wilkins 750 or approved equal (boiler feeder lines).

F. Vacuum Relief Valves:

1. Watts Regulator Co. Series 36A or approved equal (hot water heater supply).

G. Pressure & temperature relief valve:

1. Watts Regulator Co. 100 X L; Wilkins TP1100A or equal, ASME rated ANSI (hot water heaters).

H. Pressure Reducing Valves:

1. Watts Regulator Co. U135B or approved equal (1-1/2 inch or 2 inch)

I. Backflow Preventers (reduced pressure type RPZ):

2. See Section 22 41 10

J. Strainers:

1. Strainers shall be placed ahead of each control valve and elsewhere as specified or indicated on the Drawings. Strainers shall be screwed or flanged as specified for valves. Bodies shall be

of the T, S, or Y type designed for not less than 125 lb. working pressure. Screens shall be bronze, Monel, or stainless steel with perforations as follows:

Strainer Size	Perforation Size
3/4 inch to 2 inch inclusive	1/32 inch
Over 2-1/2 inch	1/16 inch

K. Flow Indicators:

1. Flow indicators shall be provided for installation in the sealing water supply pipe to pumps where indicated on the Drawings. Each indicator shall consist of a bronze body with threaded ends and a slight glass with nylon rotor or a tapered glass tube with brass float capable of indicating less than 1 gpm of flow. Indicators shall be manufactured by Jacoby-Tarbox Corp., Yonkers, NY; Eugene Ernst Products Co., Farmingdale, NJ; Schuttle and Koerting Co., Cornwell Heights, PA; or be an acceptable equivalent product.

L. Thermometers and pressure gauges:

1. Thermometers:

a. Furnish and install where indicated on the Drawings and where specified herein separable well type dial thermometers or rectangular thermometers. Mercury filled thermometers are not acceptable.

b. All thermometers shall be installed in such a manner as to cause a minimum of restriction to flow in the pipes and so that they can be easily read from the floor.

c. Dial thermometers shall be 5 inch (minimum in diameter) hermetically sealed, bi-metal dial type with engraved or raised jet black figures, stainless steel stems, and brass separable sockets.

d. Rectangular thermometers shall be spirit (non mercury) filled, red, 9 inch long minimum, with brass weather proofed case and adjustable or non adjustable brass stem. Black figures on white background.

e. The accuracy of all thermometers shall be within one division of the scale range.

f. Thermometers shall be installed where indicated on the Drawings and in the following systems locations:

1) Each hot water system circulating pump discharge piping.

2) Outlet piping of each systems hot water heaters.

g. The scale range for thermometers shall be as follows:

Service	Temperature Range
Hot water supply	50 to 200°F.
Hot water return	50 to 200°F.

h. Dial thermometers shall be 5 inch diameter WIKA Type A5301, L5301 or S5301 as required or equivalent.

i. Rectangular thermometers shall be 9 inch long minimum as supplied by Trerice (Model BX9, spirit red fill) or equal.

M. Pressure gauges:

1. Furnish and install where indicated on the Drawings and where specified herein, bourdon spring type pressure gauges.

2. All pressure gauges shall be installed so as to be easily readable from the floor in a standing position without parallax.

3. Each gauge shall have dull black steel or stainless steel casings with chrome plated or polished stainless steel bezels or rims. The gauges shall have white faces with black filled engraved or raised numerals, and shall have a 6 inch diameter dial face minimum.

4. All gauges on water lines shall be fitted with pressure snubbers.

5. A bronze needle valve shall be installed on the system side of each gauge. Provide test tee between valve and gauge.

6. A pressure gauge shall be installed on the suction and discharge of each water booster pump, hot water circulating pumps. Additional pressure gauges shall be installed where indicated on the Drawings.

7. The scale range of pressure gauges shall be as follows:

Service	Pressure Range
City pressure water (cold, hot, and return systems)	0 to 100 psig
Boosted pressure water (cold, hot, and return systems)	0 to 200 psig

8. Gages to be WIKA Type 232.50 (6” Dia.) or equivalent.

9. Gauges:

   a. Gauges shall be furnished and installed with equipment as indicated on the drawings and shall be complete with all shut-off cocks and extensions necessary to clear insulation and maintain visibility.

N. Drip pan:

1. Provide water tight drip pans with 6 inch deep sides, 16 gauge sheet copper reinforced and properly supported under water and drainage piping running over or near electrical apparatus, such as switchboards, control board, or in electrical equipment rooms, etc., provide pans with 1-1/2 inch drain outlet and piped to spill over floor drains, service sink, or as directed.

2.6 SLEEVES & ESCUTCHEONS

A. Each and every pipe and conduit, regardless of material, which passes through a concrete slab, foundation wall, masonry wall, roof, or other portion of the building structure must pass through a sleeve.

B. Except as hereinafter specified, all sleeves shall be constructed from either electric metallic tubing or light weight steel pipe, and shall be installed flush on both sides of the surface penetrated. Above grade sleeves shall be constructed from 22 gauge galvanized steel and shall be flush on both sides of the surface penetrated. The sleeves shall be sized to allow free passage of the pipe to be inserted, and where the pipe is to be insulated, the sleeves shall be large enough to pass the insulation.

C. Sleeves passing through walls or floors on or below grade or in moist areas shall be constructed of Schedule 40 black steel pipe and shall be designed with 150 lb. black steel welding flange in the center to form a waterproof passage. Paint sleeves with 1 coat of bitumastic inside and outside. After the pipes have been installed in the sleeves, the void space around the pipe shall be caulked with jute twine and fitted with an asphalt

base compound to insure a waterproof penetration. Sleeves provided for piping between floors. Provide pipes passing through membrane waterproof floors with sleeves as described above. Sleeves shall be located in 6 inch high concrete curb and shall be flush with top if finished curb. All other sleeves shall be extended 1 inch above finished floor.

D. Plumbing Contractor shall coordinate the location of all sleeves with the General Contractor. Sleeves passing through floor under a partition wall must be located by figured dimensions in the field.

E. Provide a separate pipe sleeve for each pipe passing through floor, wall, partition, etc. Do not run two (2) or more pipes through one common pipe sleeve.

F. Unless otherwise noted, provide exposed pipe, both bare and covered with chrome plated Beaton & Caldwell 3-A or approved equal cast brass escutcheons where they pass through walls, partitions, floors, or ceilings; on bare pipes, held in place by set screws and on covered pipes by internal spring tension.

G. Where sleeves, hubs, or fittings project slightly from wall, partitions, floor or ceilings, provide special deep type escutcheons to cover each case.

2.7 HANGERS AND SUPPORTS

A. All piping shall be supported from the building structure by means of approved hangers and Supports similar to B-line, Erico, Micro Industries Inc., or equivalent. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction. Chain, perforated strap, bar, or wire hangers are not permitted.

1. Work shall not be supported by or from other trades such as Electrical, HVAC, and any work done under this division. Work, however, may be supported by or from a trapeze or similar type support that may be common for all trades.

2. Branches shall have separate supports and no branch 5 foot-0 inch or longer shall be without support.

3. Do not support piping from ductwork, conduit, or other trades.

4. Rooftop Piping Supports:

a. Roller bearing pipe support with PVC seal and self-lubricating Teflon base, UL rated and ASTM tested. Pillow Block Pipe Stand by Miro Industries. Type 24-R up to 4 inch OD and 48-R over 4 inch up to 8 inch OD or equivalent.

5. There shall be no direct contact between dissimilar metals. Coordinate with hanger manufacturer.

B. Do not hang pipe hangers from bottom chord of roof joists. Hanger must be installed at or near panel point of roof joists. 6 inch and larger pipes running parallel to roof joints must supported by two roof joists. Plumbing Contractor shall furnish and install angle iron bridging between joists of adequate size to securely support pipe hanger. Bridging for pipe hangers must also be supported by the top chord of the roof joist and must be installed at or near panel point. Use approved type brackets to support piping racked along walls. Support piping running just above floor on pipe saddle supports. Pipe hangers shall not penetrate waterproof floor membrane or roof deck. Copper tubing shall be supported by copper plated hangers. Where overhead construction does not permit fastening of hanger rods in required locations, provide additional steel framing as required and approved.

C. Maximum spacing of hangers on runs of pipe having no concentrations of weight shall be as follows:

1. Schedule – hanger spacing in feet/pipe material

Pipe Size	Steel or Steel Alloy	Copper or Brass	Hanger Rod Diameter
1/2 inch	7	5	3/8 inch
3/4 inch	7	5	3/8 inch
1 inch	7	5	3/8 inch
1-1/4 inch	10	6	3/8 inch
1-1/2 inch	10	8	3/8 inch
2 inch	12	8	3/8 inch
2-1/2 inch	12	10	1/2 inch
3 inch	12	10	1/2 inch
3-1/2 inch	12	10	1/2 inch
4 inch	12	10	5/8inch

Pipe Size	Steel or Steel Alloy	Copper or Brass	Hanger Rod Diameter
5 inch	12	10	5/8 inch
6 inch	12	10	3/4 inch
8 inch	12	10	7/8 inch
10 inch	12	10	7/8 inch
12 inch	12	10	7/8 inch

2. For gas piping support, see paragraph 3.05, part L here-in.

D. Plastic piping 1-1/2 inch or less shall be supported at 3 foot intervals; 2 inch and over at 4 foot intervals.

E. Maximum spacing of hangers on soil pipe shall be 5 foot and hangers shall be provided at all changes in direction. For pipes exceeding 5 foot-0 inch length, they shall be placed at intervals equal to the pipe length but not exceeding 10 foot-0 inch. Hangers for No-Hub piping shall be provided at least every other joint except when the developed length between hangers exceeds 4 foot-0 inch they shall be provided at each joint.

F. Where codes having jurisdiction require closer spacing, the hanger spacing shall be as required by code in lieu of the distances specified herein.

G. Provide hangers at a maximum distance of 2 foot from all changes in direction (horizontal and vertical) on both sides of concentrated loads independent of the piping.

H. Friction clamps shall be installed at the base of all plumbing risers and at each floor. Friction clamps shall not be supported from or rest on floor sleeves. 1-1/4 inch and smaller vertical piping shall be supported at 8 foot-0 inch maximum.

I. Hangers in general for all horizontal piping shall be Clevis type hangers. These hangers shall be sized to provide for insulation protectors as hereinafter specified.

J. Hangers for uncovered (non-insulated) copper and brass piping shall be factory applied copper plated steel Clevis hangers. Rods and nuts used with these hangers shall also be factory applied copper plated.

K. Where three or more pipes are running parallel to each other factory-fabricated gang-type hangers with pipe saddle clips or rollers, may be used in lieu of the herein specified Clevis hangers. These hangers shall be sized to provide for insulation protectors as hereinafter specified. Pipe saddle clips shall not be less than 16 gauge metal and shall be copper when installed with non-insulated copper piping.

1. Trapeze-type hangers shall be made up of angles bolted back to back or channels for supporting parallel lines of piping. Trapeze-type hangers shall be supported with suspension rods having double nuts, and securely attached to construction with inserts, or other approved piping attached along walls.

L. Field painting or spraying of hangers, rods, and nuts in lieu of copper plating will not be accepted.

M. All suspended horizontal piping shall be supported from the building by mild steel rod connecting the pipe hanger to inserts, beam clamps, angle brackets, and lag screws as required.

N. All hangers on insulated lines shall be sized to fit the outside diameter of the pipe insulation. Provide pipe covering protection saddles at all hangers on the insulated lines. Provide 16 gauge sheet metal shield, 12 inch long and covering 180 degrees of arc on the covering at all hangers on insulated lines.

O. Remove rust from all ferrous hanger equipment, (hangers, rods, and bolts) dip hangers and supports and paint same with two (2) coats of zinc chromate primer before installation.

P. Piping at all equipment and control valves shall be supported to prevent strains or distortion in the connected equipment and control valves. Piping at equipment shall be supported to allow for removal of equipment, valves, and accessories with a minimum of dismantling and without requiring additional support after these items are removed.

Q. All piping shall be independently supported from building structure and not from the piping, ductwork, or conduit of other trades.

R. All supplementary steel including factory fabricated channels and associated accessories throughout the project for this Section of the Specifications both suspended and floor mounted shall be furnished and installed by the Plumbing Contractor and shall be subject to the approval of the Engineer.

S. Safety retaining clips shall be installed with all beam clamps.

T. Lay exterior underground piping on solid undisturbed ground only, except where crossing another trench or excavation adjacent to building wall or foundation, and there, or on unsuitable ground, support piping on approved foundations of concrete, or brick piers or cradles as directed. Bottoms of trenches shall be tamped hard, graded to secure required pitch, and shaped to give substantial uniform support to lower third of full length of pipe, with minimum recesses excavated for bells and joints.

1. Support and protect underground piping so that it remains in place without settling and without damage during and from backfilling. Replace any piping damaged.

U. Interior underground piping in fill or where firm bearing is not available shall receive added support by the use of approved Clevis type hangers suspended from structural slab fish-plate and secured by nuts and washers above and below fish-plate. Fish-plate shall be imbedded in concrete slab a minimum of 3 inch from bottom of slab. Hangers shall be placed at each hub and a maximum of 5 foot-0 inch on centers on the pipe runs. With the exception of fish-plates, the entire hanger assembly including nuts, shall galvanized steel. All of assembly with exception of fish-plate shall be bitumastic coated. Rod diameters and fish-plate sizes shall be as listed below:

Pipe Size	Rod Diameter	Fish Plate Size
2 inch	3/8 inch	4 inch x 4 inch x 1/4 inch.
2-1/2 inch	1/2 inch	4 inch x 4 inch x 1/4 inch
3 inch	1/2 inch	4 inch x 4 inch x 1/4 inch
4 inch	5/8 inch	4 inch x 4 inch x 1/4 inch
5 inch	5/8 inch	6 inch x 6 inch x 1/4 inch
6 inch	3/4 inch	6 inch x 6 inch x 1/4 inch
8 inch	7/8 inch	6 inch x 6 inch x 1/4 inch
10 inch	7/8 inch	6 inch x 6 inch x 1/4 inch
12 inch	7/8 inch	6 inch x 6 inch x 1/4 inch

V. Seismic Support

1. All plumbing shall be supported in accordance with the seismic requirements of Section 1613 of the New York State Building Code

and the drawings. Shop drawings for the restraining system shall be provided by the contractor and shall include proper seismic analysis. The seismic analysis shall be certified by a professional engineer licensed in the State of New York and under the employment of the manufacturer of the restraining system. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction. Chain, perforated strap, or wire hangers are not permitted. Seismic requirements are defined on the structural drawings.

2. All sections within this division (Division 22) shall comply with the above.

3. Any conflict between these requirements and those stated on the structural drawings, the structural drawings shall prevail.

2.8 CLEANOUTS

A. Cleanouts shall be provided in soil, waste, and storm drainage piping at change in directions, at foot of stacks, or other points so that all portions of the lines will be readily accessible for cleaning or rodding out.

B. The maximum horizontal distance between cleanouts, in piping 4 inch in diameter and smaller, shall be no more than 50 foot apart; in piping 5 inch in diameter and larger they shall be no more than 75 feet apart.

C. Cleanouts shall be of the same size as the pipe installed up to 4 inch in diameter and not less than 4 inch in diameter for piping larger than 4 inch in diameter.

D. Traps not included with fixtures and in accessible locations shall be provided with a brass trap screw protected by the water seal, and will be regarded as a cleanout.

E. Bodies of cleanout ferrules in bell and spigot piping shall be standard pipe sizes conforming in thickness to that required for the pipe and fittings, and shall extend not less than 3/4 inch above the hub of the pipe. The cleanout plug shall be of cast brass and shall be provided with a raised nut 3/4 inch high. Cleanouts in copper waste piping shall be soldered brass cleanout fittings with extra heavy brass screw plugs of the same size as the line. Clearance in threaded waste piping shall be cast iron drainage T pattern 90 degrees branch fitting with extra heavy brass screw plugs of the same size of the pipe.

F. Test tees with brass cleanout plugs shall be installed at the foot of all vertical coil, waste, acid waste, and roof conductor lines and at each floor. Wherever cleanouts on vertical lines occur concealed behind finished

walls, they shall be extended to back of finish wall and a wall plate shall be provided. Test tees for acid waste shall have cleanout plugs of material similar to pipe to avoid galvanic action.

G. Cleanouts shall be installed to clear all mechanical equipment and Owner's fixtures.

H. Cleanouts shall be as manufactured by Zurn or equal. Plumbing Contractor shall furnish Owner with one T-handle for recessed plugs for every five wall and every five floor cleanouts. See drawing schedule for cleanout type.

I. Walls and partitions cleanouts: Zurn Z-1441-A-VP-BP or equivalent, iron caulking ferrule with bronze raised plug covered with chrome plated bronze wall plates.

J. Finished floor cleanouts (not waterproof): Zurn ZANB1456 or equivalent. Provide carpet marker (CM) in carpeted areas.

K. Machinery stock and unfinished rooms cleanouts (waterproofed): Zurn ZN-1400-BP-KC or equivalent. Install 24 inch x 24 inch 16 oz. Copper membrane with anchor flange and clamp collar.

L. Machinery and unfinished rooms cleanouts (not waterproofed): Zurn Z-1400-BP.

M. Above ceiling cleanouts: Zurn ZN 1470-A or equivalent with raised head bronze plug.

2.9 FLOOR DRAINS, AREA DRAINS & TRENCH DRAINS

A. General:

1. Installation of floor drains in areas and locations as called for on Drawings. Floor drains in bathroom shall be equipped with trap primer connections. All floor drains shall have removable strainers, and conform to ASME-A112.3.1. All trench drain shall comply with ASME A112.6.3.

2. Floor drains in toilet rooms or located adjacent to partitions must be coordinated with General Contractor. Dimensions locating floor drains in food service areas must be verified in the field.

3. Type of floor drains listed below are as manufactured by Zurn. Equal drains are acceptable.

4. All floor drains except those which are installed in first floor slab shall be equipped with flashing clamp device and 24 inch x 24 inch 16 oz. copper membrane.

   a. Type A: Zurn-ZN 541-S, in sizes indicated on Drawings with sediment bucket-caulk bottom outlet, cast iron body with polished bronze top in unfinished areas, Mikaloy tops in finished areas.

   b. Type B: Zurn ZN-415-5B or 6B as required, or equivalent cast iron bottom outlet with E5 cast iron 6 inch round hub, complete with 5 inch diameter brass strainer.

   c. Type C, Zurn ZN-415-7I or equivalent, caulked bottom outlet with E1 7 inch diameter bronze top and strainer, set rim flush with finished floor.

5. Trench Drain: Installation of trench drains in locations as called for on drawings. Trench drain listed are as manuifactured by Jay R Smith. Equal drains are acceptable.

   a. Jay R Smith 9667 linear shower drains in lengths indicated on drawings with fabricated 18 Ga type 304 stainless steel body with satin finish and loose set stainless steel wave grate and 2 inch no hub bottom outlet.

B. Trap primer:

1. Install trap primer as detailed on the drawings in all locations required by the latest edition of the Building Code of New York State (BCNYS).

2.10 ROOF AND OVERFLOW DRAIN

A. Zurn ZC-100-CE-R, ZC-100-DP, or approved equal Dura-coated cast iron body with extension, roof sump receiver, and underdeck clamp combination membrane flashing clamp/gravel guard and low silhouette cast iron dome vandal proof top. Sizes, types and locations shall be as indicated on Drawings.

OR

Zurn ZC-163 EW3, or approved equal, roof drain and overflow drain combination. Dura-coated cast iron bodies with combination membrane flashing clamp/gravel guards, double top-set® deck plate and cast iron domes. See drawing schedule.

2.11 ROOF DRAINS (Gutter Cornice)

A. Zurn ZRB-180 ZRB 181, ZRB 182 or approval equal Dura-coated cast iron body vandal proof top, plain bronze dome strainer, and membrane flashing clamp. Size, types and locations shall be as indicated on the Drawings.

2.12 MEMBRANES

A. Provide 16 oz. copper flashing extending at least 10 inch around all drains and cleanout deck plates above first floor and waterproof sleeves in membrane waterproofed floors and flashing sleeves; and securely held by clamping device equal to Zurn Z197.

2.13 INSULATION

A. General:

1. All pipe covering specified herein for piping systems shall be furnished and installed by a competent Pipe Covering Contractor responsible to the Plumbing Contractor. Before covering is applied, all pressure tests shall have been performed and approved. All surfaces to be covered shall have been cleaned prior to covering. Pipe covering and auxiliaries shall be kept dry during storage and application. Adhesives, cements, and coatings shall not be applied when the ambient temperature is below 40 degrees F.

2. Insulation shall be Knauf Earthwool Insulation with factory applied ASJ+SSL, or approved equivalent, supplied in 3 foot lengths, and shall be installed in accordance with manufacturers installation instructions and precautions, and as defined here-in.

3. If there is any conflict between this section and A above, the more stringent requirement shall prevail.

B. Products

1. The jacket shall have a pressure sealing lap adhesive to eliminate the use of staples, adhesives, or bands.

2. All insulation shall have composite (insulation, jacket, or facing, and adhesive used to adhere the facing or jacket to the insulation) fire and smoke hazard rating of NFPA 90A as determined by Underwriters' Laboratories procedure, ASTM E-84-50T, NFPA 255, and UL 723 not exceeding: Flamespread: 25; Smoke developed: 50.

a. Accessories, such as adhesives, mastics, cements, and tapes for fittings shall have the same component rating as listed above.

b. Pipe covering shall be continuous and shall be carefully fitted with side and end joints butted tightly and staggered. Valves, fittings, flanges, and accessories shall have the same thickness of pipe covering as the adjacent pipe. Pipe covering for these items shall be factory molded type, field fabricated or asbestos free cement.

c. Valve bodies and bonnets shall have covering applied up to the packing gland.

d. Pipe covering for flanges shall overlap the adjoining pipe by a minimum of 3 inches on each side.

e. The end joints of each section of the installed pipe covering shall be tightly butted. Where pipe covering ends at equipment of fixtures, end caps on the covering shall be installed.

f. Where vapor barrier mastic is installed on flanges, valves, fittings, roof drain bodies, and strainers, the thickness shall be equal to the covering on the adjoining piping. The cement shall be neatly troweled on. Over the cement, furnish and install an 8 oz canvas jacket, which shall be embedded in a fire retardant vapor proof adhesive with a 3 inch minimum overlap at all seams. The canvas jacket shall be smoothed out during the application to avoid wrinkles and gaps.

g. All piping with a factory and/or field applied canvas jacket over the pipe covering shall be finished with a fire-resistant coating having a vapor transmission of not more than 1.0 perm.

h. Furnish and install at each pipe hanger and or pipe support on covered lines a section of foam glass, cork, or calcium silicate in lieu of the fiberglass covering specified herein. The inserted section shall be of the same thickness as the adjacent pipe covering and finished as specified herein for fittings.

i. Provide non-combustible insulation on all domestic cold water lines, hot water supply, and circulating pipes horizontal

roof leaders, and emergency generator exhaust pipe and drains subject to condensation.

3. Cold & hot water and recirculating lines:

   a. Insulate cold and hot water piping with fiberglass pipe insulation with Fire Retardant Vapor Barrier Jacket (FRJ). Pipe insulation to be sealed with a fire resistive adhesive.

   b. Valves and fittings shall be insulated with Zeston or approved equal, Hi-Lo Temp insulation of thickness equal to adjacent piping and covered with Zeston one piece PVC insulated fitting covers bound with Zeston Z-tape of a width recommended by manufacturer. Valves larger than 3 inch shall be insulated with Zeston Hi-Lo Temp Insulation of thickness equal to adjacent piping and covered with Zeston performed insulated foam valve covers sealed with Zeston Vapor Barrier Mastic Adhesive and Z-tape on exposed edges.

   c. Minimum thickness of insulation shall be 1/2 inch for all cold water piping and hot water piping less than 1-1/2 inch. Minimum thickness of insulation of cold water and hot water piping 1-1/2 inch up to but not including 2 inch shall be 1 inch. Minimum thickness of insulation of cold water and hot water piping 2 inch and over shall be 1-1/2 inch.

   d. The R value shall be 3.7 minimum (K = .27 maximum).

4. Horizontal roof leaders:

   a. Insulate the horizontal roof drain piping with 1 inch thick fiberglass duo-temp insulation same as water piping. Vertical at roof drain, roof drain body, and elbow at the end of the horizontal run are to be insulated.

5. All equipment drains, equipment drains, and all piping subject to condensation shall be insulated with 1 inch thick fiberglass duo-temp insulation for less than 4 inch pipe and 1-1/2 inch for 4 inch and above.

6. Cold water meter:

   a. Shall be insulated with Fiberglass Aerocor with foil facings 1-1/2 inch sealed and tied with jute twine or wire, a smooth coat of asbestos free cement with an open weave glass cloth jacket applied with BF 30-35 adhesive.

7. All pipe insulation exposed to view in mechanical rooms shall be covered with 8 oz. canvas jacket.

2.14 PLUMBING FIXTURES & EQUIPMENT

A. Fixtures shall be best quality regular selection genuine white vitreous china, acid-resisting enameled cast iron, or stainless steel as specified; free from cracks, dents, crazes, chips, twists, discoloration, and other defects. Fixtures shall have manufacturer's guarantee label or trademark indicating first quality. Acid resistant (AR) enameled ware shall bear manufacturer's symbol signifying acid-resisting material. Fixtures, flush valves, toilet seats, etc. shall be as supplied as noted on drawing schedules. All fixtures shall be of the same manufacturer.

B. Exposed pipe, fittings, traps, escutcheons, valves handles, and accessories, both above and below fixtures shall be CP brass (covering tubes not permitted except as noted). Brass tubing shall not be lighter than No. 17 gauge. Water supplies and drainage nipples to wall shall have cast brass escutcheons with set screw. Exposed fixture traps shall be equipped with cleanout plugs. Supply fixtures shall be complete with renewable seats, composition washers, all metal indexed handles, and integral or separate screw driver or lock-shield stops.

C. All materials specified to be chromium plated shall be thoroughly cleaned and polished before plating and plate shall be heavily, thoroughly, and evenly applied; guaranteed not to strip or peel.

D. All fixtures and equipment shall be supported and fastened in satisfactory manner. Where wall hung fixtures are secured to interior masonry walls or partitions they shall be fastened with 1/4 inch through bolts provided with nuts and washers at back. Bolt heads and nuts shall be hexagon chromium plated brass.

E. Where secured to concrete or exterior brick walls, they shall be fastened with brass bolts or machine screws in lead sleeve type expansion shields and shall extend at least 3 inch into solid concrete or brick work, except fixtures specified to be supported on chair carriers.

F. Thoroughly clean fixtures and fittings when directed. Fixtures shall be in perfect condition at completion of job and any fixtures not in perfect condition at completion of job and any fixtures not in perfect condition at the time, due to damage during construction or any other cause, shall be replaced by Contractor at no additional charge. Replace all toilet seats, which are temporarily used during construction.

G. The Plumbing Contractor shall be responsible for providing those portions of the fixtures fittings or trimming which are not provided with the fixtures

but which are required for the complete installation. All fixtures shall be carefully checked to determine which portions must be provided to complete the installation.

1. Where escutcheons are not furnished with plumbing fixtures, the Plumbing Contractor shall supply and install them. Escutcheons must cover penetration opening.

H. Mounting height for all plumbing fixtures shall be established by the Architect. Consult with Architect for the determination of same before installing the plumbing fixtures.

I. Refer to architectural and plumbing drawings for the quantities of fixtures to be furnished under this Section of the Specifications, which shall be deemed to include all plumbing fixtures shown of the types described hereinafter. Final location shall be determined from architectural drawings.

J. The supply lines or fittings for every plumbing fixture shall be installed so as to prevent backflow.

K. Lavatory faucets, sink faucets, shower heads, flush valves (urinal and water closets) and drinking fountains shall meet the waterflow requirements of N.Y.S. Environmental Conservation Law Section 15.0314 with 1995 amendments and as noted in paragraph 2.15A below. If there is any conflict, the more severe requirement shall prevail.

L. The following is a description of the fixtures to be furnished. The Plumbing Contractor will be responsible for quantities required for the job. All fixtures are to be complete with all fittings and accessories required for a complete job. All fixtures to be white unless otherwise noted.

2.15 FIXTURES

A. Lavatories

1. Lavatories shall comply with Section 419 of the Plumbing Code of New York State and as scheduled. Lavatories shall be white vitreous china, front overflow, with 4 inch center faucet holes equal to Zurn Z5344. Lavatories shall be wall hung and shall be supported by carriers equal to Zurn 1200 Series. Exposed piping shall be protected with Zurn Protection Kit, #Z8946-3-NT.

2. Countertop lavatories shall be white oval undercounter sink made from white vitreous china, front overflow, unglazed rim with 17 inch wide, 14 inch front to back and 5-1/2 inch deep bowl. Equal to American Standard 0496.221 as scheduled. Lavatories must

conform to ASME A112.19.1, ASME A112.19.2 or ASME A112.19.3.

3. Handicap lavatories shall be the same as the above except the top rim shall be set in accordance with ADA requirements.

4. Faucets shall comply with Section 412 of the Plumbing Code of New York State. . Faucets to be metering (.35 gpm – 7.5 sec running time (.044 gal per cycle)) type (equal to American Standard 6053.204 as scheduled. Faucet to be vandal resistant, hands free with battery powered sensor and brass sprout.

5. First aid lavatories shall be the same as the above except that faucets shall have 4 inch blade handles and gooseneck spouts, equal to Zurn Z810, 830, 860 series.

B. Urinals

1. Urinals shall be in conformance with Section 424 and Table 604.4 of the Plumbing Code of New York State, for 0.5 gallons per flush (gpf) equal to Sloan SU-1009 series. Flushing shall be accomplished with a pressure assisted device and a quiet action chrome plated flush valve sensor operated as scheduled and in accordance with paragraph 2.15 part D here-in. Urinal shall be wall hung or floor mounted as scheduled, in white vitreous china with extended shields, washdown flushing action with 3/4 inch top spuds. Wall hung urinals shall be supported by carriers equal to Zurn 1200 Series as scheduled.

2. Handicap urinals shall be equal to the one above, except top of rim of wall mounted units shall be above finished floor per ADA requirements. (See Architectural drawings for mounting heights.)

C. Water Closets

1. Water closet shall be in conformance with Section 425 and Table 604.4 of the Plumbing Code of New York State for 1.28 gallons per flush (gpf) (equal to Sloan ST-2454 series). Flushing shall be accomplished with a pressure assisted device and a quiet action chrome plated flushometer valve in accordance with paragraph 2.15 part D here-in. Closet shall have an elongated bowl, and wall hung or floor mounted as scheduled, in white vitreous china with a 1-1/2 inch top spud. Seat shall be white plastic, elongated, open front, less cover, with stainless steel check hinges (equal to Church Model 295CT.). Wall hung water closets shall be supported by carriers equal to Zurn 1200 Series as scheduled.

2. Handicap water closets shall be equal to the one above, except top of seat of wall mounted and floor mounted units shall be above finished floor per ADA requirements. (See Architectural drawings for mounting heights.)

D. Flushometer Valves

1. Flushometer valves shall be ADA compliant, and sensor operated. Flushometer valves shall comply with Section 415 of the Plumbing Code of New York State, battery powered and shall meet the flow rate of 0.5 gpf maximum for urinals and 1.28 gpf maximum for water closets. For spud sizes, see paragraphs 2.15B and 2.15C here-in.

2. The valves shall be equal to Sloan Regal series, as scheduled, and shall contain the following:

a. Polished chrome finish

b. Vacuum breaker

c. Siphon guard protection

d. Vandal resistant stop cap

e. Angle stop

E. Sinks

1. Mop Sink

a. Unless otherwise scheduled or specified, the mop sink basin shall be one piece molded fiberglass and integral stainless steel drain body equal to EL Mustee 63M with the following accessories:

Service Faucet – American Standard 8344.212 Exposed yoke wall mount faucet or equal.

Mop Hanger - Fiat 889-CC or equal.

Stainless Steel Strainer - Fiat 1453-BB or equal.

2. Service Sink

a. Unless otherwise scheduled or specified, the service sink shall be cast iron with a white acid resistant finish, a plain back (no faucet holes), or with 8 inch center faucet holes

equal to Zurn Z5800 series and shall include rim guard, trap (Zurn Z5900 or equal), and 8 inch service faucet (Zurn Z843M1 or equal). Sink to meet ASME 112.19.2 and CSA B45. Faucet to meet ANSI A112.18.1.

F. Drinking Fountains

1. Drinking fountains shall be wall mounted, wall recessed, or floor mounted as shown on the drawings.

2. Drinking fountains shall comply with section 410 of the Plumbing Code of New York State and unit shall be lead free design which is certified to NSF/ANSI 61 & 372 (Lead Free) and meet State and Federal low level requirements.

3. Interior Drinking Fountain:

a. Interior drinking fountains shall be bi level, non-filtered, non-refrigerated stainless steel ADA cooler with bottle filler equal to Elkay EZSTLDDWSSK. Unit must comply with ADA & ICC A177.1 accessibility requirements. Refer to architectural drawings for mounting heights. Unit shall include electronic bottle filler sensor with electronic front and side bubbler push bar activation.

4. Outdoor Drinking Fountain

a. Outdoor drinking fountain shall be bi level non-filtered, non-refrigerated pedestal mounted drinking fountain with bottle filler equal to Elkay LK4420BF1L. Unit must comply with ADA & ICC A177.1 accessibility requirements. Unit shall be constructed from marine-grade 316 stainless steel. Unit shall be constructed with vandal resistant mechanically operated bubbler and mechanically activated bottle filler.

G. Showers

1. Showers shall be in accordance with Section 421 of the Plumbing Code of New York State and meet the requirements of Section 412.1 for multiple showers on a tempered water loop.

2.16 WATER HEATER

A. For Electric Hot Water Heaters, see Section 223300.

B. For Gas-Fired Hot Water Heaters, see Section 223400

PART 3 - CONSTRUCTION METHODS

3.1 SANITARY DRAINAGE SYSTEMS

A. Scope:

1. Complete sanitary drainage systems as shown on Drawings, including all soil and waste mains, branch lines, risers, cleanouts, traps, vent piping system, hanger, supports, and final connections to fixtures and equipment as specified hereafter.

2. All below floor slab sanitary soil, waste, and vent piping unless otherwise noted on drawing, shall be service weight cast iron pipe. Above floor waste and vent pipe shall be service weight cast iron or cast iron no-hub or galvanized standard weight steel pipe with galvanized threaded cast iron drainage fittings and galvanized threaded malleable iron or galvanized cast iron vent fittings for vent piped 2 inch and smaller.

3. Exposed drainage piping fixtures and equipment including sinks shall be chromium plated in toilets and finished areas.

B. General:

1. Horizontal sanitary soil, storm, and drainage piping shall be installed at a uniform grade as required by the Plumbing Code. Vent piping shall be graded to provide venting of the plumbing fixture and freedom from condensation. Changes in direction in drainage piping shall be made by the appropriate use of 45 degrees wyes, half wyes, long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from the horizontal or the vertical, except that long turn tee shall have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Reduction of the size of drainage piping in the direction of flow is prohibited. Connections between copper tubing and cast iron hub shall be made by means of cast bronze sweat joint spigots caulked into hubs. Connections between threaded pipe and cast iron hub shall be by means of a tapped cast iron spigots caulked into hubs. All plumbing vents shall be increased before passing through the roof. Cleanouts shall be installed in sewer, waste, and drain lines where shown on the contract Drawings and as required by the Code and field conditions. Cleanouts shall be provided at the base of each soil and waste stack, and downspouts; at intervals of 50 foot maximum distance in straight runs, at each change in direction, and at the

end of all branches. Cleanouts shall not be located in direct traffic areas. Cleanouts shall be of the same size as the pipe up to 4 inch, no less than 4 inch for pipe up to 6 inch, and no less than 6 inch for pipe over 6 inch. All cleanouts shall be so located as to provide easy rodding. All cleanouts shall be accessible. Extend cleanouts to grade, floor or wall.

2. Each fixture and piece of equipment requiring connections to the soil and waste systems shall be equipped with a code approved trap. The trap shall be placed as near to the fixture as possible and no fixture shall be double trapped. All shower, floor, and drains connected to sanitary sewers shall be trapped. Position drains so that they are readily accessible and easy to maintain.

3. Protect pipe, openings, valves, and fixtures from dirt, foreign objects, and damage during the construction period. Replace damaged piping, valves, fixtures, or other appurtenances without additional cost. After installation, all pipe and valve ends shall be capped securely to prevent entry of dust, dirt, and moisture in the pipe.

4. Vent pipes in roof spaces shall be run as close as possible to the underside of the roof, with horizontal piping pitched down to stacks without forming traps in pipes, using fittings as required. Plumber shall extend vent stacks 2 foot above roof. All flashing of vents will be done by Roofing Contractor.

   a. No union connection shall be allowed on waste or vents.

5. No plumbing fixture, equipment, or pipe connection shall be installed which will provide a cross connection or interconnection between a potable water supply and any source of non-potable water.

3.2 STORM DRAINAGE SYSTEMS

A. Scope:

1. Complete storm drainage system starting at building storm drains, connecting same to the site roof storm sewer systems including all horizontal storm lines, vertical leaders, and final connections to all roof and canopy drains. The Plumbing Contractor is responsible for this.

2. Storm water drainage piping unless otherwise noted shall be service weight cast iron pipe and fittings. No-hub cast iron or galvanized standard weight steel pipe with galvanized threaded cast iron drainage fittings. All piping below floor slab to be of service heavy cast iron.

3. Piping beyond 5 foot outside of the building wall shall be extra strength vitrified clay bell and spigot sewer pipe and fittings extra strength or reinforced concrete bell and spigot or tongue and groove sewer pipe and fittings cement sewer pipe and fittings. The governing code shall be checked and performed by the General Contractor.

B. General:

1. The Roofing Contractor to do all the flashing. Rain water leaders shall be furnished, installed, and connected to roof drains. Horizontal roof leaders shall be installed close to roof steel and given a pitch as indicated on Drawings. Vertical roof leaders shall be installed close to wall and columns and provided with cleanout at base. Run horizontal building storm drain mains below floor slab at grade a minimum of 1/8 inch per foot and all branches lines at grade 1/4 inch per foot.

2. Roof drain: Furnish and install roof drains and marquee and canopy drains in sizes and locations indicated on Drawings. For description and location see plans and schedule on Drawings.

3. Plumbing Contractor shall be responsible for cutting holes in sump pans before setting drains.

3.3 COLD AND HOT WATER DISTRIBUTION SYSTEMS

A. Scope:

1. The Plumbing Contractor shall extend the domestic water service lines from 5 foot outside building into building, including all fittings, valves, strainers, piping, hangers, anchors, guides, drain valves, air vents, vacuum breakers, backflow preventers, water hammer arresters, etc., for complete hot and cold water distribution systems and final connections to all plumbing fixtures and equipment. Valved water service shall be provided for heating and air conditioning equipment as shown on Drawings, specified and as required. Furnish water meter as detailed on Drawings. Water meter shall be installed by Water Company. (Coordinate with the plumbing inspector.) Plumbing Contractor shall pay for water meter tap fee and repairs to roadway.

B. General:

1. All hot and cold water piping above slab to be Type L with standard wrought copper fittings using 95-5 tin antimony solder and non-corrosive flux. Piping below slab and underground water services to be Type K in sizes 2 inch and smaller.

a. Water service lines 3 inch and larger to be cast iron water pipe class 250 cement lines and mechanical or flanged joints.

b. Fittings shall be cement lined and rated for 250#.

2. Do not run piping over depressions in grade. Valve for complete control and drainage of system with drain cocks at low points and at base of valved riser.

3. Install gate valves on all supply mains and branch lines.

4. Each separate fixture and equipment is to have a valved shut-off for both hot and cold water connections as specified or required so that repairs can be made without disturbing any other fixtures.

5. Furnish and install air vents or approved equal at each high point of piping runs and risers, which may become air bound.

6. Vacuum breakers shall be installed on supply lines to water heaters, faucets with hose connections, including wall hydrants. Backflow preventers shall be installed in supply lines to mechanical equipment.

7. Provide insulating bushings, couplings, or unions where brass or copper piping connects to steel piping.

8. Furnish and install balancing valves in the recirculating piping and balance systems so there will be an even temperature drop throughout.

9. Pressure reducing valves shall be installed by the Plumbing Contractor where indicated on the Drawings or when the main pressure entering building exceeds 80 psi.

10. Branch lines from service or main lines may be taken off the top or bottom of main, using such crossover fittings as may be required by structural or installation conditions. All service pipes, fittings, and valves shall be kept a sufficient distance from other work to permit finished covering to be not less than 1-1/2 inch from other work and not less than 1/2 inch between finished coverings on the different services.

11. Pipes shall be run parallel and graded evenly to the drainage points, there shall be 1/2 inch drain valve provided for each low point in the piping, so that all parts of systems can be drawn off. Provide suitable means of thermal expansion for all hot water piping using swing joints, expansion compensators, expansion

loops, and long turn off-sets as required. Piping connections to equipment shall be provided with unions to permit alterations and repairs.

12. All underground copper water piping shall be protected in a PVC casing pipe 2 inch greater than the largest diameter supply line. Piping shall be coated with asphaltum or bitumastic.

13. Access doors: Where cleanouts, valves, or other equipment requiring service occur in furred or chased walls and ceilings, access doors of an acceptable size and type (size and type shown on drawings) shall be installed. Doors shall consist of 14-gauge steel frame and door with invisible hinge, and cam lock fastenings. For plaster walls or ceilings, frames shall have a 2 inch wide lath plaster bond. For masonry walls, the frame shall be set flush with masonry with provisions in the jamb for anchoring. Door shall be solid flush steel for bearing tile or for bearing plaster as required to match adjacent areas. Doors shall be furnished with a coat of gray metal primer.

14. Dissimilar Pipe Materials: Connections to water heaters and connections between ferrous and nonferrous metallic pipe shall be made with dielectric fittings. Connecting joints between plastic and metallic pipe shall be made with transition fitting for the specific purpose.

15. Waterproofing: Waterproofing at floor mounted water closets shall be accomplished by forming a flashing guard from soft tempered cooper.

16. Use of Plumbing Fixtures: The use of new permanent water closets and other new plumbing fixtures during the progress of the work by any personnel, contractor or otherwise, is prohibited.

17. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock shield, and loose key pattern stops shall be furnished and installed with fixtures. Exposed traps and supply pipes for fixtures and equipment shall be connected to the rough piping systems, unless otherwise specified under the item. All exposed fixtures and equipment supply and piping, fittings, valves, stops, traps, escutcheons, washers, nuts, etc., shall be chromium plated with polished finish. Drain lines and hot water lines of fixtures for handicapped personnel usage shall be insulated using white, Truebro Inc. LAV-GUARD® or equivalent. Grout areas where fixture surfaces rest against wall or floor surfaces with clean white plaster of silicone.

18. Fixture Connections: Where space limitations prohibit the use of standard fittings, special short radius fittings shall be provided.

19. Flush Valves: Flush valves shall be secured by anchoring to wall adjacent to valve with an approved metal bracket to prevent movement.

20. Shower Bath Outfits: The area around the water supply piping to the mixing valves shall be made watertight.

21. Fixture Supports: Fixture supports for off the floor lavatories, urinals, water closets, and other fixtures of similar size, design, and use, shall be of the chair carrier type and shall conform to ANSI A112.6.

3.4 DISINFECTION OF DOMESTIC WATER SYSTEM PIPING

A. The Contractor shall disinfect water piping before it is placed in service and shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in the AWWA Standard for Disinfecting Water Mains, Designation C651-99. Chlorination is detailed in AWWA Standard M20. The dosage shall be such as to produce a chlorine residual of not less than 10 ppm after a contact period of no less than twenty-four (24) hours. After treatment, the piping shall be flushed with clean water until the residual chlorine content does not exceed 0.2 ppm. During the disinfection period, care shall be exercised to prevent contamination of water in the street main. After completion of project, a bacterialogical test sample to be sent to a New York State approved lab and is to be part of close-out documents.

3.5 GAS PIPING SYSTEM

A. The Plumbing Contractor shall provide all labor and materials for the installation of a complete system of gas piping to all gas-fired equipment shown on drawings.

B. Gas piping throughout the building shall be Schedule 40 black steel with malleable iron 150# beaded pattern screwed fittings or welded fittings in sizes approved by the local authorities. Install interior piping in ventilated chases. Piping in corridor ceilings to be double walled and vented to the outside. If any portion of the pipe is not black, it shall be painted black to match the remainder of the pipe. See paragraph 2.02 part L & M here-in.

C. All piping on roof shall be welded schedule 40 painted safety yellow steel with malleable iron 150# beaded pattern screwed fittings or welded fittings in sizes approved by the local authorities. Install interior piping in ventilated chases. Piping in corridor ceilings to be double walled and

vented to the outside. If any portion of the pipe is not yellow, it shall be painted yellow to match the remainder of the pipe. Wrap all buried piping in accordance with the local code and utility company's requirements. See paragraph 2.02 part L & M here-in.

D. Gas service lines from exterior gas meter or meter bank to various units shall be furnished and installed by the Plumbing Contractor.

E. The gas distribution systems installations shall include all pipe, fittings, valves, and all accessories and incidentals to conform to the code requirements.

1. All horizontal lines shall grade to risers and from risers to the equipment or appliances. Provide drips in any point in the line where condensate may collect, and are to be installed in such locations that they will be readily accessible. All risers and drops shall be provided with drips at the base consisting of full size tees with 6 inch nipples and caps for drainage. After piping had been checked, all piping receiving gas shall be fully purged.

F. No gas pipe shall be installed in ceiling spaces, which are used as return air plenums for air conditioning equipment. Gas piping in these areas must be installed on roof or a system of pipe within a pipe and supported.

G. The Plumbing Contractor shall make all final connections between each piece of equipment regarding gas and the gas distribution systems.

H. Furnish and install gas shut-off valves at each piece of equipment, appliance, at base of each riser and where indicated on Drawings.

I. For gas valves see Section 224100 paragraph 2.04 part B-4.

J. Gas piping shall be supported in compliance with Section 415 and Table 415.1 of the Gas Code of New York State.

3.6 TESTING

A. General:

1. Labor, materials, instruments, and power required for testing shall be furnished by the Plumbing Contractor. All tests shall be performed in the presence and to the satisfaction of the Plumbing Inspector and such other parties as may have legal jurisdiction. No piping in any location shall be closed up, furred in, or covered before testing. The plumbing system shall be tested in accordance with NAPHCC National Standard Plumbing Code.

2. Test Procedures:

   a. The Contractor shall furnish detailed test procedures for testing the system.

   b. Make tests in stages so ordered by the Engineer to facilitate the work or other trades.

   c. Repair, or if required by the Architect, replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.

   d. Test all fixtures for soundness, stability, or support and satisfactory operation.

   e. Notify the Engineer and Inspectors having jurisdiction at least forty-eight (48) hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.

   f. The Plumbing Contractor shall obtain certificates of approval from the State and all other local governmental agencies. Each certificate of approval shall be delivered to the Engineer before final acceptance.

B. Storm and Sanitary System:

1. Before the installation of fixtures, equipment, tanks and insulation, the entire storm, sanitary, and acid waste drainage piping systems including all vents shall have all necessary openings plugged to permit the entire system to be filled with water to the level of the highest vent stack of each system above the roof where practical. The systems shall hold this water for four hours without a drop in water level. Where a portion of the systems is to be tested, the test shall be conducted in the same manner as described for the entire system, except that a vertical stack 10 foot above the highest horizontal line to be tested may be installed and filled with water to supply the required pressure. The pressure shall be maintained for a minimum of four (4) hours.

C. Cold Water and Hot Water Systems:

1. Upon completion of the roughing-in and before setting fixtures and final connections to all equipment, all water piping systems shall be tested not less than the hydrostatic pressures specified herein and proved tight at these pressures for not less than four hours in order to permit inspection of all joints. Where a portion of the water piping systems is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.

a. Systems operating on city pressure shall be tested to a pressure of 150 psi gauge but not less then 1.5 times the working pressure.

b. All boosted water piping systems shall be tested to a pressure of 250 psi gauge but not less then 1.5 times the working pressure.

D. Gas Piping System:

1. Testing of gas piping shall conform to the requirement of the utility company and authorities having jurisdiction.

2. Gas piping shall be tested to a minimum of 15 psig, but not less than 1-1/2 times the proposed maximum working pressure for 1 hour.

E. Performance Test Reports:

1. Upon completion and testing of the installed system, test reports shall be submitted showing all field tests performed to prove compliance with the specified performance criteria.

3.7 CONNECTIONS TO EQUIPMENT NOT FURNISHED UNDER THIS SECTION OF THE WORK

A. Mechanical Equipment:

1. The Plumbing Contractor shall provide water services to all heating and air conditioning equipment requiring same and shall make all final connections in strict accordance with equipment manufacturer requirements and per State Plumbing Codes. Where final connections are made by the HVAC Contractor, piping shall be terminated at a gate valve approximately 36 inch from the equipment.

3.8 REMOVALS, REPLACEMENTS & ADJUSTMENTS

A. The Plumbing Contractor shall remove, relocate, adjust, or adapt all existing piping, fixtures, and other plumbing equipment or apparatus as required by the Drawings and Specifications, and also as required when such plumbing work is uncovered or when found to interfere in any way with carrying out and completing the work of this Contractor or other Contractors, including Contractors for General Construction, Heating and Ventilating, Sprinkler, and Electrical Work. The work shall include the furnishing of all materials, all necessary extensions, connections, cutting, core drilling, repairing, adapting, and other work incidental thereto, together with such temporary connections as may be required to maintain

service pending completion of the permanent work, and shall be left in good working order and in a condition equal to the adjacent new or existing work.

B. When existing fixtures which are to remain, are disconnected from present systems, or piping that are to be removed, these fixtures shall be reconnected to new plumbing and drainage system as shown on plans or as required.

C. New work shall be installed in sections and made ready for a quick tie-in to existing fixtures and equipment before removing old lines, to obtain the shortest period of non-service possible for each case. The outage times shall coincide with the staging of the work for specific areas of the building as closely as possible. Where new lines are shown running in the same locations previously occupied by exiting lines, which are to be removed, minimize the time substitution and reactivation.

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SECTION 22 41 00

VALVES

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 22 sections.

B. Types of valves specified in this section include the following:

1. Gate Valves
2. Globe Valves
3. Ball Valves
4. Butterfly Valves
5. Check Valves
6. Tempering Valves

C. Valves furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Division 22 sections.

1.3 QUALITY ASSURANCE

A. Valve Identification - Comply with MSS SP-25

B. Valve Types - Provide valve of same type by same manufacturer.

1.4 SUBMITTALS

A. Product Data - Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve in accordance with Section 224000 paragraph 1.11.

B. Maintenance Data - Submit maintenance data and spare parts list for each type of valve. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 VALVES

A. General - Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option. Valves shall be of same make for all these services.

2.2 GATE VALVES

A. Packing - Select valves, equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Select valves designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower. Guides for disc on rising stem valves must be machined for accurate fit.

B. Comply with the following standards:

Cast Iron Valves: MSS SP - 70

Bronze Valves: MSS SP – 80

Cast Steel: 150 psi and higher

API 600, API 598, RP 591

ANSI-B16.34

1. For Domestic Water Service

   a. Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising or non-rising stem, solid wedge: Hammond IB640, Nibco T-111, Milwaukee 148 or equal. (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems: Hammond IB645, Nibco T-113, Milwaukee 105 or equal.)

   b. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge: Hammond IR1140, Nibco F617-0, Milwaukee F2885M or equal.

   c. Solder Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge: Hammond IB635,

Nibco S-111, Stockham B108, Milwaukee 149 or equal**.** (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems: Hammond IB647, Nibco S-113, Milwaukee 115 or equal.)

2. Manufacturer - Subject to compliance with requirements, provide gate valves of one of the following:

   a. HAMMOND VALVE

   b. NIBCO

   c. MILWAUKEE VALVE COMPANY

2.3 GLOBE VALVES

A. Packing - Select valves equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Select valves designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower.

B. Composition Discs - Where required, provide suitable material for intended service.

C. Comply with the following standards:

Cast-Iron Valves: MSS SP - 85

Bronze Valves: MSS SP – 80

Cast Steel: 150 psi and higher

API 600, API 598, RP 591

ANSI-B16.34

1. For Domestic Water Service

   a. Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc: Hammond IB440, Nibco T-211-B, Milwaukee 502 or equal.

   b. Soldered Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc (swivel type): Hammond IB418, Nibco S211-B, Milwaukee 1502 or equal.

   c. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc: Hammond IR116, Nibco F718-B, Milwaukee F2981M or

equal.

2. Manufacturer - Subject to compliance with requirements, provide globe valves of one of the following:

   a. HAMMOND VALVE

   b. NIBCO

   c. MILWAUKEE VALVE COMPANY

2.4 BALL VALVES

A. General – Bronze two piece body. Select with Large port opening, blow-out proof stem, hard chrome plated forged brass ball, adjustable packing nut, rated not less than 600# W.O.G., 150 W.S.P.

B. Comply with the following standards:

Ball Valves: MSS SP - 110

1. For Domestic Water Service

   a. Threaded Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8501, Nibco T-585-70, Milwaukee BA-100, Apollo 70-Series, or equal.

   b. Soldered Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8511, Nibco S-585-70, Milwaukee BA-150, Apollo 70-Series, or equal.

4. For Natural Gas, Gasoline, and Fuel Oil Service

   a. Threaded Ends 3 inch and Smaller: Milwaukee BA-475B, 600# W.O.G., 150 W.S.P., two piece forged brass body, threaded ends, blow out proof stem, TFE seats, TFE packing with adjustable stem packing gland, free floating chrome plated brass ball, 100% factory tested, meets federal spec WW-V-35, type II, class A, style 3 & MSS SP-110. These valves must be approved by CSA, ANSI, and ASME for 1/2 psi, 5 psi, and 125 psi natural gas systems, be approved by FM and UL125 for LP Gas and be approved by UL842 for

flammable liquids-including gasoline and fuel oil.

5. Manufacturer - Subject to compliance with requirements, provide ball valves with one of the following:

   a. HAMMOND VALVE

   b. MILWAUKEE VALVE

   c. NIBCO

   d. APOLLO

2.5 BUTTERFLY VALVES

A. General - Where butterfly valves are used as shutoff for termination, or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8 inch and larger. Valve bodies to have extended necks to provide for 2 inch insulation as needed.

B. Comply with the following standards:

Butterfly Valves: MSS SP - 67

1. For Condensate Water

   a. Wafer Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron body, lever operated, 10-position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, Buna-n seat.

   b. Lug Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron, drilled and tapped lug body, lever operated, 10 position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, Buna-n seat.

   c. Manufacturer - Subject to compliance with requirements, provide butterfly valves with one of the following: Hammond 6200 (Lug Type), Milwaukee MW223E/323E (Wafer) (See drawing.), ML123 (Lug), Nibco WD (Wafer), LD (Lug) or equal.

      1) HAMMOND VALVE

      2) NIBCO

      3) MILWAUKEE VALVE COMPANY

2.6 CHECK VALVES

A. Swing Check Valves

1. General - Construct pressure containing parts of valves as follows:

   Bronze Valves: 125 or 150 psi: ANSI/ASTM B 62

   Iron Body Valves: ANSI/ASTM A-126, Grade B

2. Comply with the following standards for design, workmanship, material and testing:

   Bronze Valves: MSS SP – 80

   Cast Iron Valves: MSS SP – 71

   Cast Steel: 150 psi and higher

   API 600, API 598, RP 591

   ANSI-B16.34

3. Construct valves of pressure casting free of any impregnating materials.

4. Construct disc and hanger as separate pieces. Support hanger pins by removable side plug.

   a. For Domestic Water Service

      1) Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed cap, "T" pattern swing, bronze disc: Hammond IB904, Nibco T-413B, Milwaukee 509 or equal.

      2) Soldered Ends 2 inch and Smaller: Class 125, bronze body, screwed cap, "T" pattern swing, bronze disc: Hammond IB912, Nibco S-413B, Milwaukee 1509 or equal.

      3) Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc: Hammond IR1124, Nibco F918-B, Milwaukee F2974M or equal.

   d. Manufacturer - Subject to compliance with requirements, provide Swing Check valves of one of the following:

1) HAMMOND VALVE

2) NIBCO

3) MILWAUKEE VALVE COMPANY

B. Silent Check Valves

1. General - Provide wafer style, bronze disc, stainless steel spring check valves designed to be installed with gaskets between 2 standard Class 125 flanges. Construct iron body valves with pressure containing parts of valves with materials conforming to ANSI/ASTM A 126, Grade B. Support hanger pin by removable side plug.

a. For Water Service

1) 2 inch and Larger: Class 125, cast iron body, stainless steel trim, bronze disc, bronze trim: Hammond IR9253, Nibco W910, Milwaukee 1400 or equal.

2) Manufacturer - Subject to compliance with requirements, provide wafer check valves of one of the following:

a) HAMMOND VALVE

b) NIBCO

c) MILWAUKEE

2.7 TEMPERING VALVE

A. Contractor shall furnish and install, according to manufacturer's recommended methods of installation, a 3-way Thermostatic Tempering Valve with the following features:

1. All Tempering Valves and component parts, sizes 1/2 inch– 4 inch shall be constructed of bronze and non-ferrous materials. The Tempering Valve shall be hydrostatically tested to 300 pounds per square inch.

2. The Tempering Valve shall be capable of being installed in any position.

3. The Tempering Valve shall have removable internal bore (insert) that is machined separately from the valve body and is field replaceable.

4. The Tempering Valve shall have a mixer, which is machined separately from the valve body, and turbulates the water around the thermostatic element causing a thorough blending of hot and cold water for accurate control.

5. The thermostatic element shall be a liquid filled bellows type that is manufactured of non-ferrous material. It shall be located in the main Tempering Valve body and be field replaceable. The longer length of the thermostatic element gives greater heat transfer surface than the usual shorter thermostats. This longer length distributes the expansion of the bellows over a much larger area, thereby increasing the overall thermostat life. The thermostatic element's length shall be as indicated on chart below:

TEMPERING VALVE SIZE	THERMOSTAT LENGTH
1/2 inch, 3/4 inch	7-1/4 inch
1 inch	11 inch
1-1/4 inch	18 inch
1-1/2 inch, 2 inch	23 inch
2-1/2 inch, 3 inch, 4 inch	27 inch

6. The Tempering Valve shall have a field adjustable temperature range between 90 degrees F and 120 degrees F. A limit stop must be provided and set for 120 degrees F.

7. If another specified temperature range is required, only the thermostatic element needs to be replaced.

8. The Tempering Valve shall be capable of being sized with a 1 P.S.I. pressure drop through the valve without a noticeable change in outlet temperature, provided that the manufacturer's recommended methods of installation are followed.

9. The Tempering Valve shall have a bonnet design that utilizes a teflon base gasket which is installed in such a fashion as to keep the bonnet threads out of the water.

10. The Tempering Valve shall have the ability to maintain temperature with 0.5 GPM flow from the domestic hot water loop.

11. Tempering Valve assembly to be ASSE 1017 certified for public hand washing lavatories and ASSE 1069 certified for multiple showers.

2.9 VALVE FEATURES

A. General - Provide valves with features indicated and where not otherwise indicated, provide proper valve features as outlined in this specification. Comply with ANSI B31.1.

B. Flanged - Valve flanged comply to ANSI B16.10 (cast iron), ANSI B16.5 (steel), ANSI B16.24 (bronze).

C. Threaded - Valve ends complying with ANSI B1.20.1.

D. Butt-Weld - Valve ends complying with ANSI B16.25.

E. Solder Joint - Valve ends complying with ANSI B16.18.

F. Flangeless - Valve bodies manufactured to fit between flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

G. Wafer - Flangeless valves.

H. Trim - Fabricate pressure-containing components of valves, including stems and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing that resist de-zincification.

I. Non-Metallic Disc - Non-metallic material selected for service indicated in accordance with manufacturer's published literature.

J. Renewable Seat - Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

K. Bonnet - Part of gate or globe valve through which stem passes to valve body, and attached to valve body by threads, bolts, union, or welding.

L. Solid Wedge - One-piece tapered disc in gate valve, designed for contact with both sides.

M. Non-Rising Stem (NRS) - Stem and hand wheel designed to rotate without rising when valve is operated from closed to open position.

N. Outside Stem and Yoke (OSY)-Stem designed to rise when valve is operated from closed to open position.

O. Tight Shutoff - Butterfly valve designed for flow regulation, and manufactured to be tight in closed position. Test pressures in accordance with MSS SP-67 as follows: Seat 2-12 inch 220psi. No leakage permitted under test.

P. Low Leakage - Butterfly valve designed for flow regulation and manufactured with minimum leakage tolerance in closed position.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General - Except as otherwise indicated, comply with the following requirements.

1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

2. Install valves with stems pointed up, in the vertical position, unless otherwise shown on drawings. In no case shall stems be pointed downward or in the horizontal position, if unavoidable, consult with engineer prior to installation.

3. Butterfly stems are to be in a horizontal position.

B. Applications Subject to Shock - Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

C. Selection of Valve Ends (Pipe Connections) - Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

1. Tube Size 2 inch and Smaller: Soldered-joint valves.

2. Pipe Size 2 inch and Smaller: One of the following at installer's option:

a. Threaded Valves

b. Grooved-end Valves

3. Pipe Size 2-1/2 inch and Larger: One of the following at installer's option:

a. Threaded End Valves

b. Butt-weld End Valves

c. Flanged End Valves

d. Wafer Type Valves

e. Mechanical Joint End Valves

3.2 INSTALLATION OF CHECK VALVES

A. Swing Check Valves - Install in horizontal position, unless otherwise shown on drawings, with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.

3.3 GUARANTEE

A. Guarantee shall be in accordance with Section 224000 paragraph 1.22.

+ + END OF SECTION + +

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SECTION 22 41 10

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER (RPZ)

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE

A. For installation on potable waterlines to protect against both siphonage and backpressure of contaminated water into the potable water supply.

1.3 WORK INCLUDED

A. Provide and install an RPZ valve in the mechanical room in accordance with this specification, the drawing schedule and the manufacturer's installation instructions.

1.4 REQUIREMENTS

A. Assemblies shall be as supplied by Watts, Model LF909M1QT (2") or approved equivalent as listed in and meeting the requirements of the New York State Environmental Health Manual Technical Reference, item No. PWS-14, and AWWA compliant.

Working Pressure:	175 psi maximum.
Hydrostatic Test Pressure:	350 psi.
Temperature Range:	32 degrees F to 180 degrees F.
End Connections:	Threaded
Shut Off Valves:	Two full port resilient seated ball valves
Test Cocks:	Four resilient sealed ball valves.

B. A differential pressure relief valve is to be supplied. Pressure as defined in the drawing schedule.

C. For further parameters refer to the drawing schedule.

1.5 MATERIALS

A. Main Valve Body Bronze

B. Springs Stainless Steel

C. Ball Valve Handles Nickel Plated

D. Silicone Check Valve Disc

1.6 STORAGE AND HANDLING

A. Store products in shipping containers and maintain a dry location until installation.

1.7 GUARANTEE

A. Guarantee shall be in accordance with Section 224000 paragraph 1.22.

1.8 SUBMITTALS

A. Submittals shall be in accordance with Section 224000 paragraph 1.11.

1.9 MAINTENANCE DATA

A. Submit maintenance data and spare parts list for each type of valve. Include this data in Maintenance Manual. See Section 224000, paragraph 1.20.

+ + END OF SECTION + +

SECTION 23 01 00

GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The Contractor shall, as part of his contract, furnish and install all equipment, materials, wiring accessories, and on-site installation of equipment as required by current standards of good practice.

B. The Contractors in presenting their bids acknowledge they have visited the job site and have familiarized themselves with the extent, nature, and location of the work, general and local conditions, including, but not restricted to, those bearing upon transportation, disposal, handling and storage of materials, and equipment and facilities needed to accomplish the work.

1. Failure by the Contractors to acquaint themselves with the available information will not relieve them from the responsibility for properly estimating the difficulty or expense of performing the work successfully.

2. Visiting the Site: If any existing item is to be removed and replaced in kind, it is the contractors responsibility to bring to the attention of the engineer any existing condition (electrical, mounting, size, etc.) that is not compatible with equipment (scheduled or otherwise) defined on the drawings.

3. Client assumes no responsibility for any conclusions or interpretations made by the Contractors on the basis of the information made available or for any misunderstandings and representations of this work.

4. No additional compensation shall be allowed because of conditions that occur due to each Contractor’s failure to become thoroughly familiar with the site and other work, as previously described for this project.

C. All materials and equipment to be furnished and installed shall be new and of first quality and be free from all defects.

D. All piping, fittings, and necessary related accessories as required to complete the installation shall be as specified or equal in all respects to existing.

E. All work shall be coordinated with associated work under other divisions of this contract.

F. The Contractor shall refer to and be governed by the requirements as set forth in the General Conditions and Special Conditions accompanying these specifications.

G. The HVAC Contractor shall provide the following services:

1. Supports and anchors as required.

2. Disposal of existing diffusers, registers, and grilles being removed

3. Removal or modification to existing ductwork as required.

4. Hydronic heating system with all piping, valves, and other appurtenances

5. Air handling unit with DX and hot water coils and hydronic system interconnections, piping, accessories, controls, insulation, etc

6. Hydronic heat and DX refrigerant system piping, supports, insulation and identification markers, etc.

7. Ductwork and ductwork accessories for all HVAC equipment, exhaust fans, diffusers, registers, grilles, louvers, balancing dampers, exterior louvers and duct insulation, etc.

8. Automatic temperature controls for new equipment and systems; and modifications, repair, replacement, adjustments to existing temperature controls, including all related control wiring.

9. Access doors for concealed valves, dampers and devices.

10. Vibration isolators for all motor-driven apparatus and equipment.

11. Shop drawings.

12. Conformed Construction Drawings.

13. Start-up, testing and balancing of all systems including supply, return, exhaust air systems and water treatment for hydronic systems.

H. The Contractor shall refer to and be governed by the guarantee requirements as set forth in these specifications. See Section 230190.

1. The Mechanical Contractor is to coordinate with the General Contractor for the transportability of new mechanical equipment through existing openings. The Mechanical Contractor is to verify in field the size of existing openings and coordinate the location of a temporary enlarged opening with the General Contractor, if necessary.

I. The HVAC Contractor shall furnish and install all low voltage wiring necessary for the mechanical control systems, and interlocking. All control wiring shall be rated for plenum area use. See Division 26 for wiring requirements/methods for low voltage wiring by this contractor and interface with other trades. Low voltage conduit shall be by the HVAC Contractor. All wiring must meet National Electric Codes and Local Electric codes. The HVAC contractor is responsible for assuring that conduit and wire quantity, size and type are suitable for the equipment supplied. Comply with requirements of Division 26.

J. HVAC Contractor shall prepare, pay for and obtain all permits and approvals as required. All systems shall be installed complete and in working order. Provide all closure documentation and approval of all agencies as required.

K. HVAC Contractor to provide standby service for four (4) days, consisting of two (2) days in the summer and two (2) days in the winter, to insure proper operations of the systems while the facility is in operation.

L. The contractors shall place and store their materials as directed.

M. The contractors shall at all times keep the premises free from accumulations of waste material or rubbish caused by his machines, materials, employees, or work and shall pile in neat piles outside of each building as directed. They shall cooperate with all other trades appurtenant to his work. At the completion of the work, they shall remove all tools, scaffolding, surplus materials, and waste.

N. Contractors shall be responsible for initiating, maintaining and supervising all safety precautions in accordance with O.S.H.A. requirements. If the Contractor shall encounter any apparently hazardous or danger

materials/conditions, he shall notify the Owner immediately. Material Safety Data Sheets (MSDS) shall be submitted for all chemicals and substances prior to usage on either a temporary basis or permanent installation. Sheets shall also be attached to their associated containers.

O. Based on the scope of work, the contractor must be aware of the restrictions in scheduling the work and the progress of the work under the complete Contract.

1. The restrictions apply concerning removals and/or disconnecting existing equipment such as to take it out of service for more than a period of 24 hours without receiving written approval from the Owner. In some cases, interruptions may have to be scheduled during weekends or holidays. All interruptions shall be scheduled at the convenience of the Facility.

2. In general, the buildings under this Contract shall be considered occupied and must remain operational all during the work of this project, and the Contractor must be aware of this restriction when submitting his bid. A schedule of areas in which the Contractor intends to do work is to be submitted thirty (30) days prior to commencement.

1.3 OPERATING AND MAINTENANCE MANUALS

A. Operating Instructions: Provide operating instructions to the Owner with respect to operation functions and maintenance procedures for all equipment and systems installed. The cost of such instruction shall be included in the contract price. Three (3) days shall be a minimum time for instruction. An attendance sign off sheet is required.

B. Maintenance Manuals: At the completion of the project, three (3) complete manuals containing the following shall be turned over to the Architect/Engineer:

1. Complete shop drawings of all equipment.

2. Operation description of all systems.

3. Names, addresses, and telephone numbers of all suppliers of the systems and service agents.

4. Preventive maintenance instructions for all systems.

5. Spare parts list of all system components.

6. All information shall be in one book.

7. See Section 230150.

C. These maintenance manuals will be reviewed by the Architect/Engineer.

D. Any conflict between these requirements and those set forth in Paragraph 1.01A here-in, the more stringent requirements shall prevail.

1.4 AS-BUILT RECORD DRAWINGS

A. As work progresses, and on a weekly basis, the Mechanical Contractor shall keep an accurate record of all deviations in the work as actually installed from work as shown on design drawings.

B. At substantial completion of the work, the Contractor shall transfer all changes made during construction, with new information clouded and noted. Such drawings shall be stamped with the contractor's name, date, and "As Built" in the lower right hand corner. An as-built reproducible or electronic document, and three (3) sets of prints made from said reproducible, shall be forwarded to the Engineer for review prior to final payment.

C. Any conflict between these requirements and those set forth in Paragraph 1.01A here-in, the more stringent requirements shall prevail.

D. A certification statement stating that the drawings do represent the "As Built" condition shall be stamped on the drawings.

E. A full set of drawings including unaffected sheets is to be submitted.

F. All sections in the Division 23 Requirements of this specification shall comply with the above.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 01 10

SPECIAL CONDITIONS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. This Contractor, as well as sub-contractors for his work, must carefully read the “Instructions to Bidders” and study the plans and specifications.

1. It is the intention of these specifications to provide for the furnishing and installing of the equipment complete as shown and specified. Any work or changes, which may be evidently necessary to complete the installation shall be furnished by the Contractor as being included in this Contract.

2. During the course of the work, should any ambiguities or discrepancies be found in the specifications to which the Contractor has failed to call attention to before submission of his bid, then the Engineer shall interpret the intent of the specifications, and the Contractor hereby agrees to abide by the Engineer’s interpretation and agrees to carry out the work in accordance with the decision of the Engineer. It is expressly stipulated that neither the instructions nor the specifications shall take precedence, one over the other, and it is further stipulated that the Engineer may interpret or construe the specifications of the work, and of that question the Engineer shall be the sole judge.

3. This Contractor shall provide and erect all sheds for the storage of his materials and provide temporary office for plans, details, records, etc. He shall furnish all scaffolding and equipment required for the installation of his work.

4. Where no specified kind of quality of material is given, a first class standard article as approved by the Engineer shall be furnished. The specifications and/ or drawings do not undertake to illustrate or set forth every item necessary for the work.

5. Small details not usually shown or specified but necessary for its proper installation and finishing shall be included in the Contractor's estimate, the same as if hereby specified or shown.

6. The Contractor shall submit six (6) copies of each new item, bill of material, drawings, and wiring diagrams for approval prior to the installation of the equipment. These shall be certified factory drawings prepared by the manufacturer specifically for this project. Stock drawings or field drawings pertinent to other projects will not be acceptable.

7. Schedule of Submissions:

Section	Item	Submission	Submitted	Action/Date
230500		PIPING AND ACCESSORIES		
	1.	Heating Water Piping		Product Data
	2.	Condensate Piping		Product Data
	3.	Drain Piping		Product Data
	4.	Gate Valves		Product Data
	5.	Globe Valves		Product Data
	6.	Ball Valves		Product Data
	7.	Check Valves		Product Data
231400		SUPPORT AND ANCHORS		
	1.	Supports		Shop Drawing
	2.	Anchors		Shop Drawing
	3.	Support Framing		Shop Drawing
	4.	Attachment Methods		Shop Drawing
232420		VIBRATION AND NOISE CONTROL		
	1.	System Layout		Shop Drawing
	2.	Isolation		Product Data
	3.	Installation Inst.		Mfgs. Lit.
	4.	Design Loads		Certification
232800		INSULATION		
	1.	Insulation		Product Data
	2.	Jackets		Product Data
	3.	Insulating Cement		Product Data
	4.	Adhesives		Product Data
	5.	Installation Inst.		Mfgs. Lit.

232900		DUCTWORK INSULATION	
	1.	Insulation	Product Data
	2.	Jackets	Product Data
	3.	Adhesives	Product Data
	4.	Insulation Inst.	Mfgs. Lit.
235150		HYDRONIC SPECIALTIES	
	1.	System Layout	Shop Drawing
	2.	Strainers	Product Data
	3.	Flow Indicators	Product Data
238550		AIR HANDLING UNITS WITH COILS	
	1.	Air Handlers	Product Data
	2.	Filters	Product Data
238600		EXHAUST FANS	
	1.	Cabinet Fans	Product Data
	2.	Installation Inst.	Mfgs. Lit.
	3.	Support Locations	Shop Drawings
238900		DUCTWORK	
	1.	System Layout	Shop Drawing
	2.	Support Locations	Shop Drawings
239100		DUCTWORK ACCESSORIES	
	1.	Volume Dampers	Product Data
	2.	Fire/smoke Dampers	Product Data
	3.	Backdraft Dampers	Product Data
	4.	Access Doors	Product Data
239400		AIR OUTLETS AND INLETS	
	1.	Diffusers	Product Data
	2.	Grilles	Product Data
	3.	Louvers	Product Data
239500		LINEAR AND MODULAR SLOT DIFFUSERS	
	1.	Diffusers	Product Data
239550		TEMPERATURE CONTROL SYSTEMS	
	1.	System Layout	Shop Drawing
	2.	Thermostats	Product Data
	3.	Control Valves	Product Data
	4.	Operating Data	Mfgs. Lit.
	5.	System Layout	Shop Drawing

239900 INSPECTION TESTING AND BALANCING

1. Balancing Report Certification

8. Equivalents: where, in these specifications, certain kinds, types, brands, or manufacturers of materials are named, they shall be regarded as the required standard of quality. Where two or more are named, these are presumed to be equal, and the contractor may select one of those items. If the contractor desires to use any kind, type, brand, or manufacturer of material other than those named in the specification, he shall indicate in writing, ten (10) working days, prior to contract award, what kind, type, brand, or manufacturer is included in the base bid for the specified items, and submit information describing in specific detail where it differs from the quality, performance and size required by the base specifications, and why a substitution is requested. The engineer will be the sole judge as to acceptability. A copy of this information is to be included in all subsequent equipment submittals. Failure to do so is cause for rejection. This requirement applies to all sections within this division.

+ + END OF SECTION + +

SECTION 23 01 20

WORK INCLUDED

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. The work under this section shall include all labor, materials, equipment, and performance of all operations in connection with the providing, installing, and testing of new equipment completely in accordance with the applicable drawings, specifications, and governing code authorities. The work shown here is not intended to provide a completed and detailed installation, but the Contractor shall prepare final drawings for this purpose. The following list of items is to be used as a guide by the Contractor and shall not be considered as limiting the scope of work.

1. Provide complete tests on all systems to demonstrate full compliance with specifications and drawings.

2. Provide all shop drawings, as-built drawings, sketches, wiring and piping diagrams with manufacturer's bulletins, etc., to properly document the job.

3. Secure all permits and inspections.

4. Do all cutting and patching required.

5. Contractor shall visit the site and review the scope of work under this contract prior to bidding. All bids shall reflect the real price. All clarifications on intent shall be made prior to bid opening date.

6. Provide and install, complete in all respects, all heating, ventilating, and air conditioning equipment and connections to new services where shown for a complete and ready installation.

7. Provide and install all controls, switches, and low voltage wiring to new equipment.

8. Contractor shall submit three (3) sets of operating manuals for each type of mechanical equipment.

9. Removal of all demolished materials and disposed of off site in a legal fashion.

1.3 DEMOLITION / MODIFICATION:

A. During demolition/modification, the Contractor is to ensure that all floor drains are covered to ensure that no debris or contaminated fluids are discharged into the drainage system. The Contractor will also be responsible to protect all adjacent services, i.e. floors, walls and ceilings and if damaged or stained to restore to a satisfactory condition determined by the Architect.

B. The Contractor will be responsible for the complete demolition and removal of the existing areas as shown on the drawings. The Electrical Contractor is to disconnect power to existing equipment to be removed or relocated and make safe.

C. See Section 231750.1-Demolition.

+ + END OF SECTION + +

SECTION 23 01 40

CODES, STANDARDS, AND PERMITS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The entire installation shall be made in accordance with State rules and regulations and shall also conform with the Standards of the National Board of Fire Underwriters for this installation and the local Board of Fire Underwriters having jurisdiction. The installation shall also comply with air pollution requirements of the State of New York and Industrial Code Rule 4 of the State of New York Department of Labor, Board of Standards and Appeals, the Energy Conservation Code of New York State, and all other ordinances having jurisdiction.

B. The Contractor shall submit to all authorities having jurisdiction all required applications and shall secure all necessary permits, tests, and inspections required for final approval.

C. Certain standard and staple materials are described by reference to standard specifications. These standards are as follows:

ASA-B9	Safety Code for Mechanical Refrigeration
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWWA	American Water Works Association
CS	Commercial Standard
FS	Federal Specification
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation

SMACNA	Sheet Metal and Air conditioning Contractors Association
USASI	United States of America Standards Institute
UL	Underwriters, Laboratories
N.Y.	State Uniform Fire Prevention and Building Code dated January 1, 1989
A.A.B.C.	Associated Air Balance Council
N.E.B.B.	National Environmental Balancing Bureau

D. All new equipment shall bear U.L. label and conform to the latest edition of the National Electric Code.

E. Other codes and standards listed in all subsequent sections herein also apply.

+ + END OF SECTION + +

SECTION 23 01 50

MAINTENANCE INSTRUCTIONS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. In addition to the requirements outlined in the "General Requirements", the following information shall be incorporated:

1. Manufacturer's mechanical equipment parts list of all functional components including repair kit listings for all types of equipment installed under this contract.

2. Step by step instructions for each system including methodologies for testing operation.

3. Maintenance schedule for each type of equipment including cleaning.

4. Possible breakdowns and repairs for each type of equipment.

5. List of nearest local suppliers for all equipment.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 01 60

TEST AND INSTRUCTIONS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. All new equipment and piping shall be checked, started, and run by the contractor for a period of not less than four (4) seven (7) hour days to instruct owner's representatives as to proper operation and maintenance. (2 days in heating season, 2 days in cooling season.) An attendance sign off sheet is required.

B. Start-up and adjustment shall include the following specific requirements:

1. Bleed and fill entire heating system upon completion of all work.

C. The systems shall be tested at such time as requested to demonstrate the ability to perform as specified and to shown that they are free from grounds, shorts, open circuits, or other defects.

D. Defective equipment shall be replaced and faulty wiring corrected to the satisfaction of the authorities having jurisdiction.

E. The Contractor shall furnish all required instruments and equipment for conducting the required tests.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 01 80

MOTORS AND ELECTRICAL WORK

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. Internal electrical control devices that operate starters, controllers, etc. shall be furnished, installed, and wired under Division 23. Such devices shall be included but not necessarily limited to, devices connected to ducts, damper switches, float switches, electric thermostats, safety devices, limit switches, relays, push button controllers, selector switches, pilot lights, extra interlock contacts, etc.

B. Integral equipment starters shall be provided by the Contractor completely mounted and wired to load and internal controls and shall be wired to incoming line and outgoing control connections. Should integral equipment starters or control panels be shipped separately, the Contractor shall be responsible for the proper installation and connections from equipment to same.

C. All control transformers, control devices, starters, and control wiring furnished shall be properly protected with fuse cutouts and fuses or circuit breakers to conform to the National Electric Code, latest edition.

D. Each piece of equipment shall be provided with permanent type laminated, black finish, white core, phenolic nameplate. Nameplates are to indicate the name and number of the unit, voltage, and any interlock reference. Each starter furnished by the Contractor shall be provided with a permanent type laminated, black finish, white care phenolic nameplate. Nameplate shall indicate the name of the unit controlled and the voltage rating. Nameplate shall be secured with adhesives. Plastic tape type labels will not be accepted.

E. All packaged equipment shall be provided with disconnect means.

F. All wiring furnished and installed by the Contractor shall be in strict accordance with the latest edition of the National Electrical Code and all State and Municipal Agencies having jurisdiction. Except as specified otherwise, minimum size wire shall be #14 AWG (control) and #12 AWG

(power) and shall be run in rigid galvanized steel conduit except as noted hereinafter. All wire shall be Type THWN 2 (90°C). All conduit connections to motors shall be made with short lengths of neoprene jacketed galvanized flexible metallic conduit (Sealtight). All electrical work to conform to Division 26 Specifications.

G. The Contractor shall furnish all labor and material required for the installation of the systems. A brief description of the work is as follows:

1. Furnish all electrical controls and wiring for the new equipment.

2. Contractor shall apply final finish to insure uniformity.

3. All cutting, patching, and painting as required.

4. All controls for units as hereinbefore specified and disconnect switches.

5. Testing of all wiring.

H. The Contractor shall submit each new item, bill of material, drawings, and wiring diagrams for approval prior to the installation of the equipment. These shall be certified factory drawings prepared by the manufacturer specifically for this project. Stock drawings or field drawings pertinent to other projects will not be acceptable.

I. All electrical work by this Contractor shall be coordinated with the Electrical Contractor, and conform to the Latest (Approved) Edition of the National Electric Code and Division 26 specifications.

J. Mechanical Contractor shall obtain an electrical approval certificate for all electrical work, in and related to the contract work, performed by himself or his sub-contractors in and related to the contract before final payment. Certificate will need to come from a company licensed with the New York State Department of State and whose inspectors are certified by the Department of State, Code Division.

K. All equipment and electrical work shall be installed on self-supporting brackets/hangers, and shall not be hung or supported from another trade's equipment (e.g. plumbing, mechanical, electrical, etc.)

+ + END OF SECTION + +

SECTION 23 01 90

GUARANTEE

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. The Contractor shall guarantee the complete new installation to be free from defects in workmanship and materials for a period of no less than two years unless otherwise specified after the installation has been completed and accepted by the owner, and make all necessary repairs, replacement, and adjustments required, and shall replace, repair, and service equipment which fails during the guarantee period.

B. Labor and material required to fulfill the requirements of this guarantee shall be furnished by this contractor at no additional cost.

C. All sections within this division shall comply with the above.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 02 00

CUTTING AND PATCHING

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. All cutting required to facilitate the proper installation of all work to be installed under Division 23 shall be done by the Division 23 Contractor. All cutting shall be done in the manner specified and/or directed and approved by the Architect and only after permission of the Architect is obtained. The installation of sleeves, chases, etc. in concrete walls, floors, ceilings, and roofs as well as the cutting of concrete walls, floors, ceilings, and roofs shall be done by core drilling.

B. All penetrations through non-fire and fire rated walls and assemblies shall be sealed with 3M-Fire Barrier Caulk #CP25WB and/or 3M-Fire Barrier #FS-195 + wrap/strip or, an approved equal, meeting the requirements of ASTM-E-814 and ANSI/UL 1479, as shown on the drawings.

C. All cutting and patching shall be coordinated with the General Contractor and all other trades.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 05 00

PIPING AND ACCESSORIES

1.3 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.1 REQUIREMENTS

A. The contractor shall modify existing piping where required.

B. Pipe shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing, properly clearing all windows, doors, and other openings. Pipe shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Changes in direction shall be made with fittings.

C. Horizontal runs of pipe shall be securely supported. Suspended pipe shall be held by adjustable, clevis type pipe hangers, having bolted hinged loops and turnbuckles, or by other approved devices. Supports for pipes shall be in accordance with Section 231400.

D. Instrumentation connections 3/4 inch and smaller on all systems shall be provided by welding threaded 2000# forged steel half couplings to the pipe.

E. All pipe to be welded shall be cut off clean and beveled. All welding shot shall be removed.

F. Composition of welding electrodes shall be in accordance with manufacturer's recommendations.

G. Pipe welding shall comply with the provisions of the latest revisions of the applicable code, as noted herein, and requirements of state and local city codes.

H. Before any pipe welding is performed, submit a copy of the welding procedures specifications together with proof of its qualification as outlined and required by the most recent issue of the code having jurisdiction.

I. Before any operator performs any pipe welding, the contractor shall submit the operator's qualification record in conformance with provisions of the code having jurisdiction, showing that the operator was tested and certified under the Procedure Specification as before mentioned.

J. Assume responsibility for the quality of welding done and repair or replace any work not in accordance with these specifications.

K. In addition, all pipe welding procedures and procedures for qualification of pipe welding operators shall comply with the requirements of the American Welding Society. All welded joints shall be radiographed at the Contractor's expense.

L. Contractor shall provide and install all necessary devices to absorb piping movement (compensators, anchors, supports, expansion, etc.)

1.4 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Provide reducers and/or expanders as required for connections.

E. After completion, fill, clean, and treat systems.

1.5 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.

B. Install piping to conserve building space, and not interfere with use of space and other work. Run all piping concealed.

C. Group piping whenever practical at common elevations.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 231400.

E. Provide clearance for installation of insulation, and access to valves and fittings.

F. Provide access where valves and fittings are not exposed.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding, and a minimum of six (6) inches on either side of weld.

I. Prepare pipe, fittings, supports, and accessories for finish painting.

J. Install valves with stems upright or horizontal, not inverted.

1.6 APPLICATION

A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure that the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are provided.

B. Use grooved mechanical couplings and fasteners only in accessible locations.

C. Install unions downstream of valves and at equipment or apparatus connections.

D. Use non-conducting dielectric connections whenever joining dissimilar metals.

E. Provide pipe hangers and supports in accordance with ASTM B31.9 and MSS SP69 unless indicated otherwise. (See Section 230580.)

F. Install gate or ball male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

G. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

H. Install globe or ball valves for throttling, bypass, or manual flow control services.

I. Provide spring loaded check valves on discharge of water pumps. Pipe to nearest drain.

J. Use plug cocks for throttling service. Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.

K. Provide 3/4 inch gate drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest drain.

+ + END OF SECTION + +

SECTION 23 05 10

BASIC MATERIALS AND METHODS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section

1.2 PIPE

A. Galvanized Welded Mild Steel Pipe per USAI **-** B 36.20.

1. Black

2. Safety yellow.

B. Copper Pipe:

1. Threadless, Type "L", standard pipe size.

2. Tubing: seamless, hard drawn, or annealed, **USASI** - H23.3.

C. Other materials and methods not listed herein are to be in accordance with their respective sections. If there is a conflict between this section and said respective section, the respective section shall prevail.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 05 80

PIPE HANGERS, BASES, AND SUPPORTS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. Furnish and install sufficient hangers, support clips, inserts, and mounting devices to support all piping installed under this Division in perfect alignment without sagging or interference and to permit free expansion and contraction.

B. Hangers shall be Clevis type (with copper bottom support for uninsulated brass pipe or copper tubing) having suspension rod and locknut. See Section 231400 paragraph 2.02.

C. Pipe hanger rod diameter shall be as noted in Section 231400.

D. The maximum spacing between supports shall be as noted in Section 231400.

E. Hangers shall be installed outside of piping insulation with a semi-cylindrical shield set between the hanger and insulation. See Section 231400 paragraph 2.02.

F. Support vertical piping at floor level by heavy iron extension pipe clamps having bolts on each side and ends having equal bearing on structure. Provide approved materials between iron supports and copper or brass piping to prevent galvanic reaction between metals. Support base of vertical piping by hanger placed on horizontal branch close to riser or base fitting set on foundation.

G. For insulated cold lines and for insulated non-ferrous piping, install hangers outside insulation and provide 12 gauge semi-cylindrical protection shields a minimum of 12 inch long, to prevent crushing the insulation.

H. Provide spring hangers where piping is subject to vibration movement or to prevent lifting due to expansion.

I. Cast iron pipe shall be supported at every joint and at a maximum of 5 foot-0 inch between supports.

J. For additional supports and anchors, see Section 231400.

+ + END OF SECTION + +

SECTION 23 06 00

PIPE FITTINGS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. Pipe fittings 2-1/2 inch and larger shall be welded. Welding shall be as per ANSI B16.5.

B. Pipe fittings 2 inch and smaller shall be threaded, crimped, brazed, or soldered using lead-free solder and non-acid flux.

C. Welded fittings shall conform to class of pipe on which installed and should have beveled ends for butt welding. Elbows shall be long radius unless otherwise indicated. Tees shall be full size or reducing as required having interior surfaces smoothly contoured. All fittings shall conform with Federal Specification WWP-521.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 07 19

HVAC PIPING INSULATION

1.1 QUALITY ASSURANCE

A. Surface-Burning Characteristics: Flame-spread index of 25, and smoke-developed index of 50 for insulation installed indoors 75, and smoke-developed index of 150 for insulation installed outdoors, according to ASTM E 84.

B. Mockup of each type of pipe insulation and finish.

1.2 FIELD QUALITY CONTROL

A. Field Inspections: By Contractor-engaged agency.

1.3 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F mineral-fiber, preformed pipe insulation, Type I

B. Refrigerant Suction and Hot-Gas Piping: flexible elastomeric or mineral-fiber, preformed pipe, Type I

C. Refrigerant Suction and Hot-Gas Flexible Tubing: Flexible elastomeric]

1.4 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping: flexible elastomeric or mineral-fiber, preformed pipe insulation, Type I

B. Refrigerant Suction and Hot-Gas Flexible Tubing: Flexible elastomeric

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 10 00

VALVES

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 23 sections.

B. Types of valves specified in this section include the following:

1. Gate Valves
2. Globe Valves
3. Ball Valves
4. Butterfly Valves
5. Check Valves

C. Valves furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Division 23 sections.

1.3 QUALITY ASSURANCE

A. Valve Identification - Comply with MSS SP-25

B. Valve Types - Provide valve of same type by same manufacturer.

1.4 SUBMITTALS

A. Product Data - Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve.

B. Maintenance Data - Submit maintenance data and spare parts list for each type of valve. Include this data in Maintenance Manual.

C. Submittals shall be in accordance with Section 230110.

PART 2 - PRODUCTS

2.1 VALVES

A. General - Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option. Valves shall be of same make for all these services.

2.2 MANUFACTURERS

A. The following manufacturers shall be considered the standard basis of quality and are generally acceptable as equivalent for the purposes of this specification. Submittals shall not be restricted to the manufacturers listed below.

B. Manufacturer - Subject to compliance with requirements, provide valves of one of the following:

1. Hammond Valve

2. Nibco

3. Milwaukee Vale Company

4. Apollo Valves

2.3 GATE VALVES

A. Packing - Select valves, equipped with packing suitable for intended service. Under no circumstances is asbestos packing acceptable. Select valves designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower. Guides for disc on rising stem valves must be machined for accurate fit.

B. Comply with the following standards:

Cast Iron Valves: MSS SP – 70

Bronze Valves: MSS SP – 80

Cast Steel: 150 psi and higher
API 600, API 598, RPI 591
ANSI-B16.34

C. For Domestic Water Service

1. Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge: Hammond IB 640, Nibco T-111, Milwaukee 148 or equal. (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems: Hammond IB645, Nibco T-113, Milwaukee 105 or equal.)

2. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge: Hammond IR1140, Nibco F617-0, Milwaukee F2885M or equal.

3. Solder Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge: Hammond IB635, Nibco S-111, Stockham B108, Milwaukee 149 or equal. (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems: Hammond IB647, Nibco S-113, Milwaukee 115 or equal.)

D. For HVAC Hot and Chilled Water Service

1. Threaded Ends 2 inch and Smaller: Class 125, bronze body, union bonnet, rising stem, solid wedge: Hammond IB617, Nibco T-124/134, Milwaukee 1152 or equal.

2. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge: Hammond IR1140, Nibco F617-0, Milwaukee F2885M or equal.

3. Solder Ends 2 inch and Smaller: Class 150, bronze body, union bonnet, rising stem, solid wedge: Hammond IB648, Nibco S134, Milwaukee 1169 or equal.

2.3 GLOBE VALVES

A. Packing - Select valves equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Select valves designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower.

B. Composition Discs - Where required, provide suitable material for intended service.

C. Comply with the following standards:

Cast-Iron Valves: MSS SP – 85

Bronze Valves: MSS SP – 80

Cast Steel: 150 psi and higher
API 600, API 598, RP 591
ANSI-B16.34

1. For Domestic Water Service

a. Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc: Hammond IB440, Nibco T-211-B, Milwaukee 502 or equal.

b. Soldered Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc (swivel type): Hammond IB418, Nibco S211-B, Milwaukee 1502 or equal.

c. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc: Hammond IR116, Nibco F718-B, Milwaukee F2981M or equal.

2. For HVAC Hot and Chilled Water Service

a. Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc: Hammond IB440, Nibco T-211-B, Milwaukee 502 or equal.

b. Soldered Ends 2 inch and Smaller: Class 125, bronze body, screwed bonnet, rising stem, bronze disc (swivel type): Hammond IB418, Nibco S211-B, Milwaukee 1502 or equal.

c. Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc: Hammond IR116, Nibco F718-B, Milwaukee F2981M or equal.

2.4 BALL VALVES

A. General – Bronze two piece body. Select with Large port opening, blow-

out proof stem, hard chrome plated forged brass ball, adjustable packing nut, rated not less than 600# W.O.G., 150 W.S.P.

B. Comply with the following standards:

Ball Valves: MSS SP – 110

1. For Domestic Water Service

a. Threaded Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable),blow-out proof stem: Hammond 8501, Nibco T-585-70, Milwaukee BA-100, Apollo 70-Series, or equal.

b. Soldered Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8511, Nibco S-585-70, Milwaukee BA-150, Apollo 70-Series, or equal.

2. For HVAC Hot and Chilled Water Service

a. Threaded Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P. bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8501, Nibco T-585-70, Milwaukee BA-100, Apollo 70-Series, or equal.

b. Soldered Ends 3 inch and Smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8511, Nibco S-585-70, Milwaukee BA-150, Apollo 70-Series, or equal.

2.5 BUTTERFLY VALVES

A. General - Where butterfly valves are used as shutoff for termination, or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8 inch and larger. Valve bodies to have extended necks to provide for 2-1/4 inch insulation as needed.

B. Comply with the following standards:

Butterfly Valves: MSS SP - 67

1. For HVAC Hot and Chilled Water Service

   a. Wafer Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron body, lever operated, 10-position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, EPDM seat.

   b. Lug Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron, drilled and tapped lug body, lever operated, 10-position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, EPDM seat.

2. For Condensate Water

   a. Wafer Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron body, lever operated, 10-position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, Buna-n seat.

   b. Lug Type 2 inch and Larger: Rated Working Pressure of 200 psi on sizes 2 inch-12 inch, cast iron, drilled and tapped lug body, lever operated, 10 position throttling handle, memory plate, bronze disc, type 416 stainless steel stem, Buna-n seat.

2.6 CHECK VALVES

A. Swing Check Valves

1. General - Construct pressure containing parts of Valves as follows:

   Bronze Valves: 125 or 150 psi: ANSI/ASTM B 62

   Iron Body Valves: ANSI/ASTM A-126, Grade B

2. Comply with the following standards for design, workmanship, material and testing:

   Bronze Valves: MSS SP – 80

Cast Iron Valves: MSS SP – 71

Cast Steel: 150 psi and higher
API 600, API 598, RP 591
ANSI-B16.34

3. Construct valves of pressure casting free of any impregnating materials.

4. Construct disc and hanger as separate pieces. Support hanger pins by removable side plug.

   a. For Domestic Water Service

      1) Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed cap, "T" pattern swing, bronze disc: Hammond IB904, Nibco T-413B, Milwaukee 509 or equal.

      2) Soldered Ends 2 inch and Smaller: Class 125, bronze body, screwed cap, "T" pattern swing, bronze disc: Hammond IB912, Nibco S-413B, Milwaukee 1509 or equal.

      3) Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc: Hammond IR1124, Nibco F918-B, Milwaukee F2974M or equal.

   b. For HVAC Hot and Chilled Water Service

      1) Threaded Ends 2 inch and Smaller: Class 125, bronze body, screwed cap, "T" pattern swing, Teflon disc: Hammond IB940, Nibco T-413Y, Milwaukee 509T or equal.

      2) Soldered Ends 2 inch and Smaller: Class 150, bronze body, screwed cap, "T" pattern swing, Teflon disc: Hammond IB945, Nibco S-433-Y, Milwaukee 510-T or equal.

      3) Flanged Ends 2-1/2 inch and Larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc: Hammond IR1124, Nibco F918-B, Milwaukee F2974M or equal.

B. Silent Check Valves

1. General - Provide wafer style, bronze disc, stainless steel spring check valves designed to be installed with gaskets between 2 standard Class 125 flanges. Construct iron body valves with pressure containing parts of valves with materials conforming to ANSI/ASTM A 126, Grade B. Support hanger pin by removable side plug.

a. For Water Service

1) 2 inch and Larger: Class 125, cast iron body, stainless steel trim, bronze disc, bronze trim: Hammond IR9253, Nibco W910, Milwaukee 1400 or equal.

2.8 VALVE FEATURES

A. General - Provide valves with features indicated, and where not otherwise indicated, provide proper valve features as outlined in this specification. Comply with ANSI B31.1.

B. Flanged - Valve flanged to comply with ANSI B16.10 (cast iron), ANSI B16.5(steel), ANSI B16.24 (bronze).

C. Threaded - Valve ends to comply with ANSI B1.20.1.

D. Butt-Weld - Valve ends to comply with ANSI B16.25.

E. Solder Joint - Valve ends to comply with ANSI B16.18.

F. Flangeless - Valve bodies manufactured to fit between flanges to comply with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

G. Wafer - Flangeless valves.

H. Trim - Fabricate pressure-containing components of valves, including stems and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing that resist de-zincification.

I. Non-Metallic Disc - Non-metallic material selected for service indicated in accordance with manufacturer's published literature.

J. Renewable Seat - Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

K. Bonnet - Part of gate or globe valve through which stem passes to valve

body, and attached to valve body by threads, bolts, union, or welding.

L. Solid Wedge - One-piece tapered disc in gate valve, designed for contact with both sides.

M. Non Rising Stem (NRS) - Stem and hand wheel designed to rotate without rising when valve is operated from closed to open position.

N. Outside Stem and Yoke (OS&Y)-Stem designed to rise when valve is operated from closed to open position.

O. Tight Shutoff - Butterfly valve designed for flow regulation, and manufactured to be tight in closed position. Test pressures in accordance with MSS SP-67 as follows: Seat 2-12 inch 220psi. No leakage permitted under test.

P. Low Leakage - Butterfly valve designed for flow regulation and manufactured with minimum leakage tolerance in closed position.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General - Except as otherwise indicated, comply with the following requirements.

1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward. Do not install valves with stems in the horizontal plane unless absolutely unavoidable. Consult with engineer prior to installation.

3. Butterfly stems are to be in a horizontal position.

B. Applications Subject to Shock - Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.

C. Selection of Valve Ends (Pipe Connections) - Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

1. Tube Size 2 inch and Smaller: Soldered-joint valves.

2. Pipe Size 2 inch and Smaller: One of the following at installer's option:

   a. Threaded Valves

   b. Grooved-end Valves

3. Pipe Size 2-1/2 inch and Larger: One of the following at installer's option:

   a. Threaded End Valves

   b. Butt-weld End Valves

   c. Flanged End Valves

   d. Wafer Type Valves

   e. Mechanical Joint End Valves

3.2 INSTALLATION OF CHECK VALVES

A. Swing Check Valves - Install in horizontal position, unless otherwise shown on drawings, with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.

+ + END OF SECTION + +

SECTION 23 10 10

AUTOMATIC FLOW LIMITER CONTROL VALVES

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section

1.2 REQUIREMENTS

A. Flow limited valves shall be installed on all hydronic heating and cooling terminal units as scheduled on the plans. All flow limiter valves shall be of the Isolator Series as manufactured by Griswold Controls. Circuit setters are not flow limiters and will not be accepted as equals.

B. Automatic flow limiter valve cartridges shall automatically control flow water rates with +/-5% accuracy over an operating pressure differential range of at least 14 times the minimum required for control. Multiple operating pressure ranges shall be available with the minimum range requiring less than 3 PSID to actuate the mechanism.

C. Valve internal control mechanism shall consist of a stainless steel one-piece cartridge with segmented port design and full travel linear coil spring.

D. Manufacturer shall be able to provide certified independent laboratory tests verifying accuracy of performance.

E. All flow limiter valve cartridges shall be warranted by the manufacturer for five years from date of sale.

F. Isolator series valves (models IY & R), sizes 1/2 inch through 2 inch, shall have an ASTM brass alloy body, rated at no less 400 psi @ 250 degrees F. Available flow rates shall be from 0.33 GPM to 44.0 GPM.

G. The IY and R series valves from 1/2 inch to 2 inch shall be constructed in a one piece body to include a handle ball valve, a flow control cartridge assembly, dual pressure or pressure/temperature test ports for verifying accuracy of flow performance for all sizes, and a union end which will accept various pipe fitting configurations. The model IY valve shall also include a removable 20 stainless steel mesh strainer. The strainer body shall be Y-type and be provided with a blow down valve.

H. The valve body design shall allow inspection or removal of cartridge or strainer without disturbing piping connections.

I. The valve shall come fully assembled and be permanently marked to show direction of flow and shall have a body tag to indicate flow rate and model number.

J. A portable meter kit shall be provided that has a range of –(minus) 14.7 psi to +(plus)150 psi, and end connections compatible with the pressure / temperature test ports on the flow limiter valve body.

+ + END OF SECTION + +

SECTION 23 14 00

SUPPORTS AND ANCHORS

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Pipe, duct, and equipment hangers, supports, and associated anchors.

B. Equipment bases and supports.

C. Sleeves and seals.

1.3 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

A. Furnish hanger and support inserts and sleeves to General Contractor for placement into formwork.

1.4 RELATED WORK

A. Section 230580, Pipe Hangers, Bases, and Supports

B. Section 232800, Insulation.

C. Section 232900, Ductwork Insulation

D. Section 238600, Exhaust Fans

E. Section 238900, Ductwork

1.5 SUBMITTALS

A. Submit shop drawings in accordance with Section 230110.

B. Indicate hanger and support framing and attachment methods.

PART 2 – PRODUCTS

2.1 MANUFACTURERS PIPE HANGERS & SUPPORTS

A. B-line or equal. See paragraph 3.01 here-in.

2.2 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 inch to 1-1/2 inch: Carbon steel, adjustable swivel, split ring. B-line ***Fig. 3170*** or equal

B. Hangers for Pipe Sizes 2 to 4 inch and Cold Pipe Sizes 6 inch and over: Carbon steel, adjustable, clevis. B-Line ***Fig. 3100*** or equal.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D. Wall Support for Pipe Sizes to 3 inch: Cast iron hook. B-Line ***Fig. 3191*** or equal.

E. Wall Support for Pipe Sizes 4 inch and over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inch and over. B-Line ***Fig B591*** or equal.

F. Vertical Support: Steel riser clamp. B-Line ***Fig. 3373*** or equal.

G. Copper Pipe Support: Carbon steel ring, adjustable, copper plated. B-Line ***Fig. 3170CT*** or equal.

H. Shield for Insulated Piping 2 inch and smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inch long at pipe support. B-Line ***Fig. B3151*** or equal.

I. Shield for Insulated Piping 2-1/2 inch and larger (Except Cold Water Piping): Pipe covering protective saddles. B-Line ***Fig 3160*** or equal.

J. Shields for Cold Water Piping 2-1/2 inch and larger: Hard block non-conducting saddles in 90 degree segments, 12 inch minimum length, block thickness same as insulation thickness. B-Line ***Fig. 3169*** or equal.

K. Cast Iron pipe shall be supported at every joint and at a maximum of 5 feet between supports.

2.3 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, threaded one end, or continuous threaded (minimum size 3/8 inch diameter, see paragraph 3.01 herein), as required.

2.4 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods. B-Line Phillips Concrete Fasteners.

2.5 EQUIPMENT CURBS

A. By equipment manufacturer, when available, or fabricate curbs of manufacturer approved design and material. All curbs shall be a minimum of 12 inch in height unless otherwise specified. Top of curb (i.e. mounting surface) shall be level.

B. Equipment rails or pedestals shall be acceptable for equipment installed on flat roofs and do not require roof penetrations inside the footprint of the equipment.

2.6 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gauge galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel. All pipe sleeves shall be 2 standard sizes larger than the pipe being used.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL listed.

D. Sleeves for Ductwork: Form with galvanized steel.

E. Stuffing or Fire Stopping Insulation: Glass fiber type, non-combustible, cover with fire barrier caulk.

F. Caulking and Sealants

1. All penetrations (See paragraph 3.05 herein) thru non-fire and fire rated walls and assemblies shall be sealed with 3M-Fire Barrier

Caulk # CP25WB and/or 3M-Fire Barrier # FS-195 plus wrap/strip or, an approved equal, meeting the requirements of ASTM-E-814 and ANSI/UL1479, as shown on the drawings.

2.7 FLASHING

A. Metal Flashing: 26 gauge galvanized steel.

B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

C. Caps; Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.8 FABRICATION

A. Size sleeves large enough to allow from movement due to expansion and contraction, two standard sizes larger than the pipe passing through. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Provide copper plated hangers and supports for copper piping.

2.9 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 – EXECUTION

3.1 PIPE HANGERS AND SUPPORTS

A. All piping shall be supported from the building structure by means of approved hangers and supports similar to B-line, Erico, Micro Industries Inc, or equivalent. Piping shall be supported to maintain required grading pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction. Chain, perforated strap, bar, or wire hangers are not permitted.

1. Work shall not be supported by or from other trades such as Electrical, HVAC, and any work done under this division. Work, however, may be supported by or from a trapeze or similar type support that may be common for all trades.

2. There shall be no direct contact between dissimilar metals. Coordinate with hanger manufacturer.

B. Support horizontal piping as follows:

1. Schedule – hanger spacing in feet/pipe material

Pipe Size	Steel or Alloy	Copper or Brass	Hanger Rod Diameter
1/2 inch	7	5	3/8 inch
3/4 inch	7	5	3/8 inch
1 inch	7	5	3/8 inch
1-1/4 inch	10	6	3/8 inch
1-1/2 inch	10	8	3/8 inch
2 inch	12	8	3/8 inch
2-1/2 inch	12	10	1/2 inch
3 inch	12	10	1/2 inch
3-1/2 inch	12	10	1/2 inch
4 inch	12	10	5/8 inch
5 inch	12	10	5/8 inch
6 inch	12	10	3/4 inch
8 inch	12	10	7/8 inch
10 inch	12	10	7/8 inch
12 inch	12	10	7/8 inch

C. Plastic piping 1-1/2 inch or less shall be supported at 3 foot intervals, 2 inch and over at 4 foot intervals.

D. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

E. Place a hanger within 12 inch of each horizontal elbow.

F. Use hangers with 1-1/2 inch minimum vertical adjustment.

G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

H. Where several pipes can be installed in parallel and at same elevation, provide multiple supports or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Piping shall not be hung from other piping, ducts, conduits, equipment or items installed by other trades. Hanger rods shall not pierce ductwork.

K. Provide protection shields and saddles at supports with insulated or covered piping. B-Line Fig***. B 3151*** (cold pipe) and B-Line ***Fig. 3160*** (hot pipe).

L. At no time will piggy backing of supports be permitted.

M. Where codes having jurisdiction requiring closer spacing, the hanger spacing shall be as required by code in lieu of the distances required herein.

3.2 INSERTS

A. Provide inserts to General Contractor for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. B-Line ***Fig. B3019***.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch. Use B-Line ***B3019*** prior to concrete pour. Use B-Line ***B3085*** after concrete setting.

D. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.3 ROOFTOP PIPING SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. SUPPORT SPACING
1/2 inch to 1-1/4 inch	6 foot-0 inch

B. Place a support within 12 inch of each horizontal or vertical elbow.

C. Where several pipes can be installed in parallel and at same elevation, a single support designed for multiple pipes may be used.

3.4 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of type specified.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors in concrete for attachment to vibration isolation components. (B-Line B3212).

3.5 PENETRATIONS

A. Set sleeves in position in formwork. Provide reinforcing around sleeves. Core drill as required when slabs are in place.

B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth with fire resistant caulk and provide floor plate.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between sleeve and pipe or duct and adjacent work with fire stopping insulation and fire stopping caulk seal. See paragraph 2.07 herein. Provide close fitting metal collar or escutcheons covers at both sides of penetration.

D. Install chrome plate steel or stainless steel escutcheons with set screws at finished surfaces. Where piping is insulated the escutcheons shall be outside the insulation.

E. Joints, seams or penetrations in the building envelope, that are sources of air leakage, shall be sealed with durable caulking materials, closed with gasketing systems, taped or covered with moisture vapor-permeable house-wrap. Sealing materials spanning joints between dissimilar construction materials shall allow for differential expansion and contraction of the construction materials. This includes sealing around tubs and showers, at the attic and crawl space panels, at recessed lights and around all plumbing and electrical penetrations. These are openings located in the building envelope between conditioned space and unconditioned space or between the conditioned space and the outside.

3.6 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer’s instructions for sound control.

C. Provide manufacturers curbs for mechanical roof installations 12 inch minimum high above roofing surface unless otherwise noted. See paragraph 2.06 A herein. Flexible sheet flash and counter flash with sheet metal; seal watertight.

3.7 SEISMIC RESTRAINT

A. Seismic restraint shall conform to the requirements of section 1621 of the New York State Building Code and the drawings. Shop drawings for the restraining system shall be provided by the manufacturer and shall include seismic analysis certified by a professional engineer licensed by the State of New York and under the employment of the manufacturer of the restraining system. Seismic requirements are defined on the structural drawings and are repeated here for convenience:

Seismic Category	B
Occupancy Group	III
Importance Factor (I_e)	1.25

B. Any conflict between these requirements and those stated on the structural drawings, the structural drawings shall prevail.

C. All sections within this division shall comply with the above.

+ + END OF SECTION + +

SECTION 23 17 50

PRELIMINARY WORK

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The work under this section shall include all labor, materials, equipment, and performance of all operations in connection with the provision and installation of the new piping systems completely in accordance with the applicable drawings, specifications, and governing code authorities. The work shown here is not intended to provide a complete and detailed installation, but the Contractor shall prepare final drawings for this purpose. The following list of items is to be used as a guide to the Contractor and shall not be considered as limiting the scope of work.

1. Dispose of, away from the site, all debris resulting from the work of this section.

2. Contractor shall be totally responsible for repair and/or replacement of any surface, equipment, or structures damaged during the course of work under this contract.

3. Obtain all permits and inspections.

4. Provide all shop drawings, as-built drawings, sketches, etc. with manufacturers bulletin, etc. to properly document the job.

5. Contractor shall be totally responsible for daily site clean-up, removal of equipment, and clean-up of areas adjacent to work under this Contract.

6. Contractor to protect existing drains during construction to insure no oil products or any foreign matter are washed into the storm or sanitary sewage system.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 17 50.1

DEMOLITION

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section as if fully repeated herein.

1.2 WORK INCLUDED

A. Demolish and remove designated equipment and accessories.

B. Temporarily remove and replace windows, doors and door frames as required for delivery of equipment.

C. Do all necessary cutting and patching.

D. Temporary partitions to protect existing operations.

1.3 SUBMITTALS

A. Comply with the requirements of Section 230110.

B. Copies of all required permits and license.

C. Demolition procedures and operational procedures.

1.4 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas.

1. Maintain protected egress and access at all times.

B. Provide, erect, and maintain temporary barriers and security devices required.

PART 2 – PRODUCTS –Not Used

PART 3 – EXECUTION

3.1 INSPECTION

A. Visit job site and examine all conditions, which might affect the proper and timely completion of this Work.

B. Notify the Architect of any questionable areas, which may require special design constructions for shoring, bracing or structural support.

3.2 PREPARATION

A. Determine scope of project.

1. Review Drawings of all trades for this Project.

2. Coordinate contract limit lines with Owner and General Contractor.

B. Review path of travel, dumpster locations and hours of operation with Owner and General Contractor.

C. Determine locations, maintenance and construction responsibility for dust-tight partitioning.

D. Notify the Architect forty-eight (48) hours in advance of any structural demolition.

E. Erect and maintain temporary partitions to prevent spread of dust, fumes, noise, and smoke to provide for Owner occupancy.

F. Protect existing items, which are not indicated to be altered.

G. Contractor to protect existing drains during construction to ensure no oil products or any foreign matter are washed into the drainage system.

3.3 DEMOLITION

A. Demolish in an orderly and careful manner. Protect existing supporting structural members and finish.

B. Except where noted otherwise, immediately remove demolished materials from site, and dispose of in a legal fashion.

C. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect in accordance with requirements of the General Conditions.

D. Patch and cap all supply line, return, and flue openings affected by equipment being demolished.

E. Neatly cut anchors flush with slab as required.

F. All copper material shall be reclaimed from demolition and turned over to the district/owner.

3.4 CLEANING

A. Comply with Section 23 01 50.

B. Remove debris daily from job site.

1. Burning of materials on site will not be permitted.

C. Upon completion of demolition work, remove all remaining debris and broom clean work areas. Dispose of all materials in a neat and orderly manner.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 24 20

VIBRATION AND NOISE CONTROL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. All work and equipment installed by the Mechanical Contractor shall operate without objectionable noise or vibration. Isolators shall be selected for the highest efficiencies obtainable and provide a minimum of 97% efficiency. Isolators and bases shall be selected for large deflections. Unit manufacturer to select loading points.

B. Should operation of the equipment produce noise, vibration, or transmission of these effects through the structure any of which is, in the decision of the Engineer, objectionable, the contractor shall make such changes in the piping or equipment as may be necessary to reduce these effects to an acceptable level. This shall be done at the Mechanical Contractor's expense.

C. Eliminate all vibration from the operation of all equipment so that their operation will not be distracting. Support apparatus on engineered, factory made vibration isolation bases on hangers, utilizing combination springs and rubber. Submission for approval shall show points and methods of support.

1.3 REFERENCES

A. ASHRAE Applications Handbook, Chapter 42, “Sound Control”, latest edition.

1.4 QUALITY ASSURANCE

A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 230110.

B. Indicate inertia bases on shop drawings.

C. Indicate vibration isolator locations on shop drawings with static and dynamic load on each.

D. Submit manufacturer's installation instructions under provisions of Section 230110.

1.6 CERTIFICATES

A. Submit manufacturer's certificate under provisions of Sections 15011 that isolators are properly installed and properly adjusted to meet or exceed specified requirements.

PART 2 -PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

A. Mason Industries

B. Korfund

C. Vibration Eliminator Company

2.2 MOUNTINGS

A. Type A: Double defection neoprene mountings shall have a minimum static deflection of 0.35 inch. All metals surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom so they need not be bolted to the floor. Bolt holes shall be provided for these areas where bolting is required. On equipment such as small vents sets and close-coupled pumps, steel rails shall be used above the mounting to compensate for the overhang. Mountings shall be type **ND** or rails type **DNR** as manufactured by Mason Industries, Inc.

B. Type B: Spring type isolators shall be free standing and laterally stable without any housing and complete with 1/4 inch neoprene acoustical friction pads between baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameter shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional; travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height. Mountings

shall be type **SLF** or **SLFH** (for mounting to steel dunnage) as manufactured by Mason Industries, Inc.

C. Type C: Spring mountings, shall include vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection and cooling tower mounts shall be located between the supporting steel and roof or the grillage and dunnage. The installed and operating heights shall be the same. A minimum clearance of 1/2 inch shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operations. Mountings used out doors shall be hot dipped galvanized. Mountings shall be **SLR** as manufactured by Mason Industries, Inc.

2.3 HANGERS

A. Type D: Vibration isolator hangers shall contain a steel spring and 0.3 inch deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Spring diameters and hanger box lower hold sizes shall be large enough to permit the hanger rod to swing thru a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% or the rated deflection. Hangers shall be type **30N** as manufactured by Mason Industries, Inc.

2.4 BASES

A. Type G: Vibration isolator manufacturer shall furnish integral structural steel bases. Bases shall be rectangular in shape for all equipment other than certrifugal refrigeration machines and pump bases which may be “T” or “L” shaped. Pump bases for split case pumps shall include supports for suction and discharge base ells. All perimeter members shall be beams with a minimum depth equal to $1/10^{th}$ of the longest dimensions of the base. Beam depth need not exceed 14 inch provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1 inch. Bases shall be type **WF** as manufactured by Mason Industries, Inc.

B. Type K: Rectangular structural beam or channel concrete forms for floating foundations. Bases for split case pumps shall be large enough to provide support for suction and discharge base ells. The base depth need not exceed 12 inch unless specifically recommended by the base manufacturer for mass or rigidity. In general, bases shall be a minimum of $1/12^{th}$ of the longest dimension of the base, but not less than 6 inch. Forms shall include minimum concrete reinforcement consisting of half

bars or angles welded in place on 6 inch centers running both ways in a layer 1-1/2 inch above the bottom, or additional steel as is required by the structural conditions. Forms shall be furnished with drilled steel members with sleeves welded below the holes to receive equipment anchor bolts where anchor bolts fall in concrete locations. Heights saving brackets shall be employed in all mounting locations to maintain a 1 inch clearance below the base. Base shall be Type **K** as manufactured by Mason Industries, Inc.

2.5 FABRICATION

A. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

B. Color code spring mounts.

C. Select springs to operate at 2/3 maximum compression strain, with 1/4 inch ribbed neoprene pads.

2.6 INSTALLATION

A. Install vibration isolators for motor driven equipment in accordance with the manufacturer's recommendations and all governing codes and regulations.

B. Set steel bases for 1 inch clearance between housekeeping pad and base. Set concrete inertia base for 2 inch clearance. Adjust equipment level.

C. Isolate all piping 2 inch and over located in mechanical equipment rooms for a minimum of 50 foot or 100 pipe diameters, whichever is greater, from connection to vibrating mechanical or electrical equipment, and boiler breeching outside of shafts. Isolate all piping and boiler breeching in machine rooms; piping where exposed on roof; and piping and boiler breeching within 50 foot or 100 diameters, whichever is greater, connected to rotating equipment from the building structure by means of noise and vibration isolation hangers, **Type D**.

D. Vertical riser pipe supports shall utilize Type C isolators. Vertical riser guides, if required, shall avoid direct contact of piping with building. Pipe anchors, where required, shall utilize resilient pipe anchors, Mason Industries **Type ADA**, or equivalent, to avoid direct contact of piping with building.

E. The isolation manufacturer shall supply all unit isolators, complete rails, fan and motor bases and structural steel forms for concrete inertia blocks,

where called for and shall be responsible for the selection of all vibration eliminators and shall guarantee to meet the requirements of these Specifications.

F. "Outdoor isolators, steel parts other than galvanized springs and cadmium plate springs shall be suitably coated to resist corrosion. Isolators shall be equipped with limit stops to resist wind velocity.

G. Coordinate work with other trades to avoid rigid contact with the building.

H. Install equipment with flexibility in wiring connections.

2.7 SCHEDULE

ISOLATED EQUIPMENT	ISOLATED BASE	
	Type	Thickness
Suspended Air Handlers	Type D	-
Suspended Fans	Type D	-
Piping	Type D	-
Roof Mounted HVAC Equip (Curbs)	See Section 15140, Para. 2.06	

+ + END OF SECTION + +

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SECTION 23 25 00

CHEMICAL WATER TREATMENT

PART 1. GENERAL

1.1 SECTION INCLUDES

A. This Section includes chemical treatment systems for the following:

1. Hot-water closed heating systems.

2. Hot Water closed heating system with glycol.

1.2 SCOPE OF WORK

A. Provide, for the full construction period, complete water treatment equipment, associated piping, chemicals and service for systems as specified and/or shown on the drawings. Equipment, chemicals and service shall be provided by the independent water treatment company. That company shall supervise the installation of the chemical feed equipment, chemical cleaning of the systems and testing. Provide all necessary wiring to an adequate source of electric power, and all required interwiring.

B. Dosage and Control

1. All chemical programs must be selected for the building's water supply, and must be adjusted so that when applied at the concentrations of active chemicals and cycles of concentration recommended by the Supplier, the programs will meet the performance requirements as specified herein.

C. It is responsibility of the Supplier to obtain and become familiar with all necessary building technical plant and operating information. Appointments must be made with facility management and engineering personnel for this purpose.

D. records of all water treatment activities shall be maintained by the water treatment company and made available to the building operations personnel representing the owner. These records shall consist of all communications and test records from the water treatment company, all chemical additions, all fill and drain cycles, cleanings, additions to the piping system and any other pertinent data, starting at the first filling of the system.

E. The water treatment company shall include with service all required chemicals for testing, initial cleaning, startup treatments, test equipment

and all chemicals required for the two year period during which service is rendered.

F. All service visits shall be confirmed in writing to the Owner so that complete record of service activities is available for examination by the Owner and engineer.

G. The water treatment company selected shall be responsible for insuring that all pipe systems and equipment for which they are responsible remain clean and free from all corrosion during all testing or filling and draining operations.

Under no circumstances shall raw, untreated water be introduced into these pipes and equipment or be allowed to remain in place anytime during construction. All hydronic testing shall only be with treated water at all times.

Upon completion of all building construction operations associated with the piping system in question, the system shall be cleaned by the water treatment company using appropriate chemicals which are nonaggressive to the materials in that pipe system, but which will clean surface rust, oil, grease and silt from the steel piping and other contaminants associated with the piping fabrication process.

Chemicals for initial treatment of the water must be on-hand before cleaning is started, so that these chemicals can be added to the initial water fill after cleaning is complete. Under no circumstances shall the cleaned system be filled with untreated water or allowed to stand empty between cleaning and initial fill.

The start-up chemical treatment program shall be, at a minimum, 3-4 times the dosage of the maintenance chemical treatment program.

The cleaning operation shall be completed when agreed upon representative pipe lengths which have been in place during the entire building process have been satisfactorily cleaned as established by all interested parties.

H. At no time shall the Mechanical Contractor add water to a system without that water containing a corrosion inhibiting treatment chemical. The addition of minimal amounts of untreated water to an already treated system is allowed.

I. Hydrostatic Testing Corrosion Inhibitor

1. If sections of system must be hydrostatically tested prior to cleanout, appropriate inhibitor shall be added to the test water at sufficient level to totally passivate metal and provide protective film on pipe surfaces to prevent corrosion prior to cleanout and treatment. Mechanical

Contractor shall be responsible to coordinate this treatment with the water treatment contractor.

2. At no time shall water be added to a system without that water containing a corrosion inhibiting treatment chemical.

J. All materials installed in the system such as pumps, pipe, fittings, dielectrics, relays, solenoid valves, flow switches, etc. shall have a pressure rating equal to or greater than the maximum calculated pressure expected at the installed locations.

1.3 MICROBIOLOGICAL CONTROL

A. The Supplier must provide a specific microbiological control program. Both oxidizing and non-oxidizing biocides are acceptable, along with biodispersants and other control measures. The program must list specific biocides with application dosages and frequency, and must include all of the information specified herein. Acquired immunity to one biocide must be considered.

1.4 CHEMICAL PROGRAMS

A. All chemicals provided for use in the open condenser water and all closed water systems, and for testing purposes, must meet all applicable EPA and OSHA requirement as well as all applicable federal, state and local regulations. In addition, all chemicals must meet the following criteria:

1. Toxicity

a. Chemicals must be non-toxic to personnel and safe to handle when usual precautions are observed.

2. Disposal and Cleanup

a. At use concentrations in the systems, all chemicals must be acceptable in the building's sewer system. The supplier must provide clear directions for cleanup of accidental chemicals spills, including necessary safety precautions, and must ensure that sufficient supplies and equipment required for cleanup of chemical spills are on hand for emergency use.

B. Furnish chemicals recommended by water treatment system company for treating water to meet specified xwater quality. Provide only chemicals that are compatible with piping materials, seals and all accessories.

1.5 PERFORMANCE

A. All chemical programs recommended for use in the building water systems must meet or exceed the following performance guidelines.

1. Water Systems

	Open Systems	Closed Systems
Corrosion on mild steel	Less than 2.0 mpy	Less than 1.0 mpy
Pitting attack on mild steel	None	None
Corrosion on copper alloys	Less than 0.2 mpy	Less than 0.1 mpy
Scaling and deposition	None	None
Microbiological fouling	No visible deposits No health hazards Planktonic counts Less than 1 x 104/ml	No visible deposits No health Hazards Planktonic counts Less than 1 x 103/ml

B. Corrosion and Deposit Control

1. The supplier must provide a specific corrosion, scale and deposit control program for mild steel, copper alloys and any other metals present in the system. Corrosion inhibitors for each metal to be protected must be specifically identified.

1.6 CHEMICAL TREATMENT - WATER SYSTEM - DESCRIPTION

A. Chemical Treatment - Cleaning and Degreasing

1. The selected water treatment company shall provide a supervised program of cleaning and degreasing chemicals to be used in the specified system prior to startup. New piping, and connected equipment shall be cleaned by circulating an alkaline product as specified by the equipment manufacturer or the water treatment company. Follow the cleaning procedure as specified in this section of the specification. All cleaning shall be in accordance with the National Association of Corrosion Engineers Recommended practice - NACE RP0182-95.

2. After cleaning is completed, the equipment shall be dumped, flushed with clean water and drained again and filled with water containing

the correct corrosion inhibitors as supplied by the water treatment company. The initial chemical dose shall be twice the normal operating dose.

1.7 QUALITY ASSURANCE

A. Supplier Qualifications: A recognized chemical water treatment supplier with warehousing facilities in the Project's vicinity and that is or employs an experienced consultant, available at reasonable times during the course of the Work to consult with Contractor, Architect, and Owner about water treatment.

B. Water Treatment Suppliers must have at least five years of experience applying and servicing water treatment programs in similar type and sized buildings in the area the building is located.

C. The water treatment company shall be regularly engaged in this type of work and service. It shall have on its staff a graduate chemical engineer with experience in water treatment Further, this firm shall include the start-up of chemical treatment; instruct the Owner's operating personnel in the performance of control tests and their interpretation and to supervise, through periodic visits, the progress of the water treatment program. Such service shall be provided during construction and for two years after the Owner's acceptance for the facilities.

D. Water Treatment Suppliers must have a laboratory that is equipped and staffed to analyze water and deposit samples in accordance with standard methods. Water treatment supplier must have trained service personnel available to provide year-round service support to the building and respond to any emergency calls.

E. Chemical Standards: Meet state and local pollution-control regulations.

F. Comply with NFPA 70 for components and installation.

G. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

PART 2. PRODUCTS

2.1 BIDDERS AND MANUFACTURERS

A. The following vendors will be reviewed for approval providing they meet all of the performance requirements of the specifications.

1. Betz Industrial

2. Ashland Chemical Company, Drew Industrial Division

3. Diversey Water Management.

4. Nalco Chemical Company

5. The Metro Group

PART 3. EXECUTION

3.1 INSTALLATION

A. Install treatment equipment level and plumb, according to manufacturer's written instructions, rough-in drawings, the original design, and referenced standards.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. The following are specific connection requirements:

1. Install piping adjacent to equipment to allow servicing and maintenance.

2. Piping: Conform to applicable requirements of Division 23

B. Electrical: Conform to applicable requirements of Division 26

1. Provide all necessary wiring to an adequate source of electric power and all required interwiring.

2. Install electrical devices furnished with boiler but not specified to be factory mounted.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Provide the services of a qualified independent testing agency to perform field quality-control testing.

3.4 ADJUSTING

A. Sample boiler water after boiler startup for a period of 1 weeks and prepare certified test report for each required water performance characteristic. Where applicable, comply with ASTM D 3370 and the following standards:

1. Silica: ASTM D 859.

2. Steam System: ASTM D 1066.

3. Acidity and Alkalinity: ASTM D 1067

4. Iron: ASTM D 1068.

5. Water Hardness: ASTM D 1126.

6. Particulate and Dissolved Matter: ASTM D 1888.

B. Sample system water for each system at 1-week intervals after startup for a period of 5 weeks and prepare certified test report for each required water performance characteristic.

3.5 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed parts and finish. Remove burrs, dirt, and construction debris; repair damaged finishes, including chips, scratches, and abrasions.

B. At no time shall the Mechanical Contractor add water to a system without a corrosion inhibitor treatment. The addition of minimal quantities of untreated water to a satisfactorily treated system is allowed.

C. Ensure that system is operational, filled, started, and vented prior to cleaning. Place terminal control valves in OPEN position during cleaning. Use water meter to record capacity in each system.

D. Add cleaning chemicals as recommended by manufacturer.

1. Hot-Water Heating System: Apply heat while circulating, slowly raising system to design temperature; maintain for a minimum of 12 hours. Remove heat and allow to cool; drain and refill with clean treated water. Circulate for 6 hours at design temperature, then drain. Refill with clean treated water and repeat until system cleaner is removed.

2. Open System: Flush with clean treated water for a minimum of one hour. Drain completely and refill.

3.6 COMMISSIONING

A. Startup Services: Provide the services of a factory-authorized service representative to provide startup service and to demonstrate and train Owner's maintenance personnel as specified below.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Startup Procedures: During boiler system startup, operate boiler water treatment system (after charging with specified chemicals) to maintain required steady-state characteristics of feedwater.

3.7 REPORTING REQUIREMENTS

A. In addition to the regular service reports specified above. The Supplier shall prepare a quarterly report for building management. This report shall contain a summary of routine test results, corrosion coupon and microbiological tests results, projects, accomplished during the preceding quarter, and specific action recommendations to correct any abnormal conditions in the water systems. The analytical data should be presented in graphical form for easy visualization and recognition of trends. Annual review meetings may also be scheduled by building management as desired.

3.8 DEMONSTRATION

A. Provide services of supplier's technical representative for a full day to instruct Owner's personnel in operation, maintenance, and testing procedures of water treatment systems.

B. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

C. Review data in the operation and maintenance manuals.

D. Schedule training with Owner, through the Architect, with at least 7 days' advance notice.

+ + END OF SECTION + +

SECTION 23 28 00

INSULATION

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section

1.2 REQUIREMENTS

A. Insulation shall be Knauf Earthwool Insulation, or approved equivalent, supplied in 3 foot lengths, and shall be installed in accordance with manufacturers installation instructions, including all recommendations and precautions, and as defined here-in.

B. It there is any conflict between this section and A above, the more stringent requirement shall prevail.

C. It is mandatory that all insulation be applied in a neat and workmanlike manner. Contractor shall be required to remove and replace all insulation not applied in strict accordance with manufacturer's specifications.

D. Insulation shall be applied to clean dry surfaces. Piping shall be tested before insulation is applied or joints shall be left uncovered until tests have been performed. Submit insulation samples for approval.

E. All insulation on indoor work shall have composite (insulation, jacket, or facing, and adhesive used to adhere jacket or facing to the insulation) fire and smoke Hazard Ratings as tested by procedure ASTM E-84, NFPA 255 and UL 723 not exceeding Flame Spread of 25, Fuel Contributed of 50 and Smoke Developed of 50. Accessories such as adhesives, mastics, cements, tapes, and cloths for fittings shall have component ratings listed above.

F. Insulation shall be continuous through wall and ceiling openings and sleeves.

G. Specified mastics, adhesives, and coatings shall be applied in strict accordance with manufacturer's instructions, including recommended coverage.

1.3 WORK INCLUDED

A. Include all labor, materials, tools, equipment, and services required to furnish, deliver, and install all work under this article as required by drawings and as specified.

1.4 SUBMITTALS

A. Submittals shall be in accordance with Section 230110 paragraph 8.

PART 2 - MATERIALS

2.1 INSULATION

A. All cold water piping and floor drain piping receiving condensate from air conditioning units shall be covered with a 1 inch thick glass fiber insulation with factory applied ASJ+SSL. The butt joint shall be sealed with the factory supplied self-sealing butt strip.

B. All hot water supply and return lines for heating shall be covered with glass fiber insulation with ASJ+SSL.

INSULATION THICKNESS TABLE (R=3.7 minimum; K=.27 Maximum)

Fluid	Operating Temperature (ºF)	PIPE SIZE IN INCHES	
		1-1/2 & Below	bove 1-1/2
Hot Water Supply	180º	1-1/2	2
Hot Water Return	160º	1-1/2	2
Chilled Water or Refrigerant	40º-60º	1	1-1/2
Steam	212º	2-1/2	3
Condensate	----	1	2

The above table is derived from Table 803.3.7 of the Energy Conservation Code of New York State.

C. The ASJ longitudinal seam shall be sealed with Benjamin Foster 8575. The butt joint shall be sealed with factory supplied self sealing butt strip.

D. Valves and fittings shall be covered with fiberglass molded pipe fitting insulation at least the same thickness of the pipe covering. Molded fittings

shall be as manufactured by Hamfab, Speedline, or Engineer approved equal. Sections shall be secured with 18 gauge soft copper wire.

E. Molded valves and fitting insulation shall be surface finished as follows:

1. Hot water fittings--concealed and exposed: cover with a coat of insulating cement, then embed a 20 x 20 weave white glass reinforcing cloth and second coat shall overlap adjacent covering by at least two inch.

2. Cold water fittings--concealed and exposed: Cover with a coat of insulating cement, then embed a 20 x 20 weave white glass reinforcing cloth between two (2) 1/16 inch coats of Benjamin Foster 30-35. The glass cloth and second coat shall overlap adjacent covering by at least 2 inch.

F. All sealers, solvents, tapes, adhesives, and mastics used in conjunction with the installation of all insulation specified under this Article of the specifications shall possess the maximum possible fire-safe qualities available and shall be of a type as approved under NBFU No. 90A standard.

G. Insulation on pipes shall be protected from hangers by metal shields and a half section of Kaylo pipe covering of proper thickness inserted between pipe and shield. Hangers shall not pierce insulation.

H. All piping subject to freezing shall be covered same as cold water, except insulation is to be 3 inch thick. See paragraph 1.02 part A here-in.

I. All hangers, etc., shall be set in position before work or insulation is started. If necessary to remove or displace hangers, etc. to properly install insulation, such accessories shall be restored to their original position and alignment at the completion of the work.

J. Should any insulation be damaged while in storage or after application by leaks, rain, floods, dampness, dew, or construction operation, it shall be removed and replaced to the entire satisfaction of the Engineer without charge.

K. A sample of each type of insulation, jacket, and canvas finish shall be submitted for approval prior to installation.

L. If shown on drawing, boiler and boiler breaching insulation shall be 1-1/2 inch thick calcium silicate block firmly held in place on 9 inch centers with 16 gauge soft annealed galvanized wire or with 1/2 inch x 0.015 inch galvanized steel bands. Point up all joints and voids of insulation with

mineral wool cement. Entire insulation shall be covered with 1 inch galvanized wire netting fastened to welded studs or banding and drawn down tight and 1/2 inch thick silica cement applied over wire netting in two coats with 25 percent by weight Portland cement added to last coat then finished hard and smooth. All edges shall be protected with metal corner beads. Insulation blocks on breaching shall be applied over 1 inch ribbed air space wire. Connecting nipples on manifold headers on boiler shall be left uncovered in accordance with manufacturer's instructions. In areas where it is deemed impossible to utilize 1-1/2 inch thick calcium silicate block, it shall be brought to the attention of the engineer. The engineer shall be the sole judge as to the use of an alternate material.

M. All duct insulation shall be in accordance with Section 232900.

N. Any pipe penetrations in fire rated areas shall be accomplished using 3M fire barrier products in sheets, strips, or caulk that meets ASTM, UL, and FM standards, in accordance with Section 231400 paragraph 2.07 F.

+ + END OF SECTION + +

SECTION 23 29 00

DUCTWORK INSULATION

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Furnish all labor, equipment, materials and accessories, and perform all operations required, for the correct fabrication and installation of thermal insulation applied in accordance with applicable project specifications and drawings, subject to the terms and conditions of the contract.

B. Ductwork insulation.

C. Insulation jackets.

1.3 RELATED WORK

A. Section 23 14 00, Supports and Anchors

B. Section 23 89 00, Ductwork.

C. Section 23 91 00, Ductwork Accessories.

1.4 REFERENCES

A. ANSI/ASTM C553 – Mineral Fiber Blanket and Felt Insulation.

B. ANSI/ASTM C612 – Mineral Fiber Block and Board Thermal Insulation.

C. ASTM E84 – Surface Burning Characteristics of Building Materials.

D. NFPA 255 – Surface Burning Characteristics of Building Materials.

E. UL 723 – Surface Burning Characteristics of Building Materials.

F. UL 181-Pressure Sensitive Tape

1.5 QUALITY ASSURANCE

A. Applicator: Company specializing in ductwork insulation application with three years minimum experience. Insulation materials and accessories shall be installed in a workmanlike manner by skilled and experienced workers who are regularly engaged in commercial insulation work.

B. Insulation materials and accessories furnished and installed hereunder shall, where required, be accompanied by manufacturer's current submittal or data sheets showing compliance with applicable specifications.

C. Materials: UL listed; flame spread/fuel contributed/smoke developed rating of 25/50/50 in accordance with NFPA 255, UL 723.

1.6 SUBMITTALS

A. Submit product data in accordance with Section 230110.

B. Include product description, list of materials and thickness for each service, and locations.

C. Submit manufacturer's installation instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation.

1.8 DELIVERY AND STORAGE OF MATERIALS

A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.

B. The contractor shall use whatever accepted means to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use accepted means necessary to protect the work and materials of other trades.

C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation when fully dried out before installation will provide installed

performance that is equivalent in all respects to new, completely dry insulation.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - INSULATION

A. Johns Manville.

B. Knauf.

C. Owens Corning.

2.2 MATERIALS

A. Type A: Flexible glass fiber; ANSI/ASTM C612; commercial grade; ‘k’ value of 0.29 maximum at 75 degrees F; foil scrim facing for air conditioning ducts. Vapor barrier shall be legibly printed by the manufacturer to show nominal thickness, R-valve and type of insulation. Knauf Duct Wrap with Commercial Foil Skrim (FCK) .75PCF.

B. Type B: Rigid glass fiber; ANSI/ASTM C612, Class 1; “k” value of 0.24 maximum at 75 degrees F; 0.002 inch foil scrim facing for air conditioning ducts. Knauf Air Duct.

C. Interior duct insulation is not acceptable.

D. R-Value identification marks are to be in maximum intervals of 10 feet.

2.3 ACCESSORIES

A. Adhesives: UL approved waterproof fire-retardant type.

B. Indoor Jacket: 6 oz./sq. yd. canvas. Presized glass cloth, minimum 7.8 oz./sq. yd.

C. Outdoor Jacket: Coated glass fiber sheet, 30 lb./sq. yd.

D. Lagging Adhesive: Fire resistive to NFPA 255, UL 723.

E. Impale Anchors: Galvanized steel, 12 gage, self-adhesive pad.

F. Joint Tape: Glass fiber cloth, open mesh, UL 181A or UL181B.

G. Tie Wire: Corrosion resistant, Annealed steel, 16 gauge.

PART 3 – EXECUTION

3.1 SITE INSPECTION

A. Before starting the work under this section, carefully inspect the site and installed work of the other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

B. Verify that all materials and accessories can be installed in accordance with the project drawings and specifications and material manufacturer's recommendations.

C. Verify, by inspecting product labeling, submittal data, and/or certifications which may accompany the shipments, that all materials and accessories to be installed on the project comply with the applicable specifications and standards and meet specified thermal and physical properties.

3.2 PREPARATION

A. Install materials after ductwork has been tested and approved.

B. Ensure that all surfaces over which insulation is to be installed are clean and dry.

C. Ensure that insulation is clean, dry, and in good mechanical condition with all factory applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.

3.3 INSTALLATION

A. General:

1. Before installing insulation, ensure that all seams and joints in the ductwork have been sealed.

2. Install materials in accordance with manufacturer's instructions, recommendations and all governing codes and regulations.

3. Install insulation materials with smooth and even surfaces. Butt joints firmly together to ensure complete and tight fit over surfaces to be covered.

4. Maintain the integrity of factory applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage. All staples used on cooling or dual temperature ductwork insulation

shall be coated with suitable sealant to maintain vapor barrier integrity.

5. All insulation exposed to the weather shall contain a protective finish or jacketing as recommended by the insulation manufacturer.

6. All supply and return ductwork conveying interior air that passes through unconditioned spaces shall be insulated to a minimum of R-8 and be sealed by exterior vapor barrier with a continuous sealed seam.

7. All supply and return ductwork conveying interior air that passes through conditioned spaces shall be insulated to a minimum of R-3.5 and be sealed by exterior vapor barrier with a continuous sealed seam.

8. Insulation shall be installed in a manner that permits inspection of the manufacturer's R-value identification mark.

B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.

C. Exterior Insulation (Type A or Type B) Application:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.

2. Secure insulation without vapor barrier with staples, tape, or wires.

3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive or pressure sensitive tape matching the facing. Tapes shall be listed and labeled in accordance with UL 181A or UL 181B. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

4. Where ducts are 24 inch in width or greater, mechanical fasteners spaced at 18 inch centers are required on the bottom of the duct to prevent the insulation from sagging.

D. Plenum Application:

1. Secure insulation to exterior surface of plenum in accordance with paragraph C above.

2. R values of insulation shall be in accordance with paragraph 3.03 part A-6, A-7, and A-10. herein.

E. Continue insulation with vapor barrier through penetrations as shown on the drawings.

F. All insulation of access doors shall be set in sheet metal double pan construction.

3.4 FIELD QUALITY ASSURANCE

A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with the requirements herein to cover and protect insulation materials during installation.

3.5 PROTECTION

A. Replace damaged insulation, which cannot be satisfactorily repaired, as determined by the Engineer, including insulation with vapor barrier damage and moisture saturated insulation.

+ + END OF SECTION + +

SECTION 23 48 00

AIR COMPRESSOR

1.1 GENERAL

A. This specification covers a self-contained tank or base mounted compressor package consisting of the compressor(s), motor(s), V-belt drives(s), and totally enclosed beltguard(s). Receiver shall be ASME coded, and suitable piping on tank-mounted unit shall be provided between compressor, controls, and receiver.

1.2 MANUFACTURER

A. Performance specifications based on Quincy model QP-5, part number 351CS80VCB or approved equal.

1.3 PERFORMANCE

A. Unit shall deliver a minimum of 17 SCFM at 100 PSIG at normal ambient inlet conditions.

1.4 COMPRESSOR

A. Compressor shall be a pressure-lubricated, single-acting, dual-stage, two-cylinder, air-cooled, reciprocating type.

B. Crankcase and cylinders shall be made of class-3000 cast iron with integral cooling fins

C. Crankshaft and connecting rods shall have rifle-drilled oil passages to ensure positive oil pressure lubrication to the rod wrist pins and main bearings. Crankshaft main bearings shall be ball type.

D. Stainless steel reed-type valves with bumpers.

E. Two-piece connecting rods. High pressure piston assembly shall utilize a needle bearing and stainless steel wrist pin for connection to piston head.

F. Pistons will include triple compression rings and separate oil ring assembly with dual oil rings and ring expander.

G. Crankshaft-driven, positive displacement gear-type oil pump with oil pressure gauge and spin-on oil filter.

H. Cast iron fan-type flywheel with integral v-groove belt drive.

I. Finned tube insterstage cooler located in cooling air stream

J. Interstage pressure relief valve.

K. Inlet air filter/silencer assembly.

1.5 REGULATION

A. Compressor regulation shall be automatic start/stop control based on tank pressure.

B. Maximum (stop) pressure shall be set to 100 PSIG. Minimum (start) pressure shall be set to 75 PSIG.

1.6 MOTORS

A. One (1) 5 horsepower, 208 volt, 1 phase, electric motor(s) shall be NEMA "T" frame, squirrel-cage induction-type with an open drip-proof enclosure and turn at approximately 940 RPM.

1.7 RECEIVERS

A. The 80 gallon receiver shall include ASME coded safety valves, ball type manual drain, pressure gauge, and manual ball type shut-off valve at receiver outlet.

1.8 GUARANTEE

A. Guarantee shall be for 2 years in accordance with Section 230190.

+ + END OF SECTION + +

SECTION 23 50 00

HEATING, VENTILATING, AND AIR CONDITIONING

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

B. The specifications in accordance with the Table of Contents are intended to supplement the applicable drawings. The drawings and specifications provide for a complete detailed installation. The contractor shall also prepare final drawings for ductwork, piping, controls, etc. These drawings must be submitted for approval and then be included as a supplement to the Instruction Manuals. The work, as defined, is generally in compliance with all code requirements. The Contractor shall be required to coordinate the final installation with the local codes governing the installation and other trades under this contract.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 51 50

HYDRONIC SPECIALTIES

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Air vents.

B. Strainers.

C. Flexible connections.

1.3 RELATED WORK

A. Section 230500, Piping and Accessories.

1.4 REFERENCES

A. ANSI/ASME – Boilers and Pressure Vessels Code.

B. Energy Conservation Construction Code of New York State.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME Boilers and Pressure Vessels Code. Section 8D for manufacture of tanks.

B. Energy Conservation Construction Code of New York State.

1.6 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.7 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 230110.

B. Submit shop drawings and product data for manufactured products and assemblies required for this project.

C. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

D. Submit inspection certificates for pressure vessels from authority having jurisdiction.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data in accordance with Section 230110.

B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with a minimum three (3) years documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site.

B. Store and protect products.

C. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

D. Provide temporary protective coating on cast iron and steel valves.

PART 2 – PRODUCTS

2.1 AIR VENTS

A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

B. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

C. Acceptable Manufacturers:

1. Sarco

2. Taco

2.2 STRAINERS

A. Size 2 inch and under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

B. Size 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

C. Acceptable Manufacturers:

1. Armstrong

2. Sarco

3. Taco

2.3 ACCEPTABLE MANUFACTURERS – FLEXIBLE CONNECTIONS

A. Contractor shall provide a corrugated flexible connection at each hot water heating pump to accommodate any misalignment and minimize vibration. The flexible connection shall be furnished with steel flanges rated at 150 PSI ASA maximum pressure and 500 degrees F maximum temperature.

B. Acceptable Manufacturers

1. Dayton

2. Hyspan

3. Metraflex

PART 3 –EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions, recommendations and all governing codes and regulations to permit intended performance.

B. Support tanks inside building from building structure, in accordance with manufacturer's instructions.

C. Where large air quantities can accumulate, provide enlarged air collection standpipes.

D. Provide manual air vents at system high points and as indicated.

E. For automatic air vents in ceiling spaces or concealed locations, provide vent tubing to nearest drain. Vent to be easily accessible for maintenance.

F. Provide air separator on suction side of system circulation pump and connect to expansion tank.

G. Provide valved drain and hose connection on strainer blow down connection.

H. Provide balancing valves on water inlet to terminal heating units such as unit heaters and fan coil unit.

I. Provide balancing valves and radiator valves on water outlet and water inlet, respectively to baseboard radiation.

J. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.

K. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

L. Pipe relief valve outlet to nearest floor drain.

M. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

N. Provide valved drain and hose connection on coils and equipment.

O. Provide drain valves at all system low points.

P. Provide dielectric fittings at connections of all dissimilar metals.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 63 13

AIR-COOLED REFRIGERANT CONDENSERS

1.1 COMPONENTS

A. Factory-assembled and -tested units.

1. Refrigerant: R-410A.

2. Condenser Coil: Copper tube, aluminum or steel-fin coil with liquid subcooler.

3. Condenser Fans and Drives: Direct drive, propeller

4. Casing: Galvanized or zinc-coated steel or Aluminum

1.2 SOURCE QUALITY CONTROL

A. Rate according to ARI 460.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 80 80

REGISTERS, GRILLES, AND DIFFUSERS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. The contractor shall provide and install grilles, registers, and diffusers as indicated on the drawings. Grilles, registers, and diffusers within two (2) feet of floor shall be heavy duty type. All other outlets shall be standard duty. Approved manufacturers are Tuttle and Bailey, Titus, Anemostat, Waterloo, and Independent Register Company.

B. Provide all necessary accessories as required for proper draftless diffusion of air. Include blank off plates, where shown or required.

C. Diffusers, registers, and grilles located in the ceiling shall be factory finished with a baked-on white enamel. Steel registers and grilles located on wall shall be factory finished with a bake-on alumitone enamel. Aluminum registers, grilles, and diffusers located on walls shall be etched and have a clear enamel finish.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 81 29

VARIABLE-REFRIGERANT-FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes complete VRF HVAC system(s) including the following components to make a complete operating system(s) according to requirements indicated:

1. Indoor, exposed, wall-mounted units.
2. Indoor, suspended, ceiling-mounted units.
3. Indoor, energy recovery ventilator.
4. Heat recovery control units.
5. System controls.
6. System refrigerant and oil.
7. System condensate drain piping.
8. System refrigerant piping.
9. Metal hangers and supports.
10. Metal framing systems.
11. Fastener systems.
12. Pipe stands.
13. Miscellaneous support materials.
14. Piping and tubing insulation.
15. System control cable and raceways.

1.2 WARRANTY

A. Direct-expansion (DX) VRF HVAC system(s) with variable capacity in response to varying cooling and heating loads. System shall consist of multiple indoor units, outdoor unit(s), piping, controls, and electrical power

to make complete operating system(s) complying with requirements indicated.

1. Two-pipe system design.

2. System(s) operation, air-conditioning, heat pump, as indicated on Drawings.

3. Each system with one refrigerant circuit shared by all indoor units connected to system.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. AHRI Compliance: System and equipment performance certified according to AHRI 1230 and products listed in AHRI directory].

D. ASHRAE Compliance:

1. ASHRAE 15: For safety code for mechanical refrigeration..

2. ASHRAE 62.1: For indoor air quality.

3. ASHRAE 135: For control network protocol with remote communication.

4. ASHRAE/IES 90.1 Compliance: For system and component energy efficiency.

E. UL Compliance: Comply with UL 1995.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer as defined in Section 014000 "Quality Requirements," to design complete and operational VRF HVAC system(s) complying with requirements indicated.

1. Provide system refrigerant calculations.

a. Refrigerant concentration limits shall be within allowable limits of ASHRAE 15 and governing codes.

b. Indicate compliance with manufacturer's maximum vertical and horizontal travel distances. Prepare a comparison table for each system showing calculated distances compared to manufacturer's maximum allowed distances.

2. Include a mechanical ventilation system and gas detection system as required to comply with ASHRAE 15 and governing codes.

3. System Refrigerant Piping and Tubing:

   a. Arrangement: Arrange piping to interconnect indoor units and outdoor unit(s) in compliance with manufacturer requirements and requirements indicated.

   b. Routing: Conceal piping above ceilings and behind walls to maximum extent possible.

   c. Sizing: Size piping system, using a software program acceptable to manufacturer, to provide performance requirements indicated. Consider requirements to accommodate future change requirements.

4. System Controls:

   a. Network arrangement.

   b. Network interface with other building systems.

   c. Product selection.

   d. Sizing.

B. Service Access:

1. Provide and document service access requirements.

2. Locate equipment, system isolation valves, and other system components that require service and inspection in easily accessible locations. Avoid locations that are difficult to access if possible.

3. Where serviceable components are installed behind walls and above inaccessible ceilings, provide finished assembly with access doors or panels to gain access. Properly size the openings to allow for service, removal, and replacement.

4. If less than full and unrestricted access is provided, locate components within an 18-inch reach of the finished assembly.

5. Where ladder access is required to service elevated components, provide an installation that provides for sufficient access within ladder manufacturer's written instructions for use.

6. Comply with OSHA regulations.

C. System Design and Installation Requirements:

1. Design and install systems indicated according to manufacturer's recommendations and written instructions.

2. Where manufacturer's requirements differ from requirements indicated, contact Architect for direction. The most stringent requirements should apply unless otherwise directed in writing by Architect.

D. Isolation of Equipment: Provide isolation valves to isolate each indoor unit and outdoor unit for service, removal, and replacement without interrupting system operation.

E. System Capacity Ratio: The sum of connected capacity of all indoor units shall be within the following range of outdoor-unit rated capacity:

1. Not less than 90 percent.

2. Not more than 130 percent.

3. Range acceptable to manufacturer.

F. System Turndown: Stable operation down to 20 percent of outdoor-unit capacity.

G. System Auto Refrigerant Charge: Each system shall have an automatic refrigerant charge function to ensure the proper amount of refrigerant is installed in system.

H. Outdoor Conditions:

1. Suitable for outdoor ambient conditions encountered.

a. Design equipment and supports to withstand wind loads of governing code

b. Design equipment and supports to withstand snow and ice loads of governing code

c. Provide corrosion-resistant coating for components and supports where located in coastal or industrial climates that are known to be harmful to materials and finishes.

2. Maximum System Operating Outdoor Temperature: See Drawings

Minimum System Operating Outdoor Temperature: See Drawings

I. Seismic Performance: VRF HVAC system(s) shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event.

2. Component Importance Factor: 1.5

J. Sound Performance: Sound levels generated by operating HVAC equipment shall be within requirements indicated.

1. Indoor: "2019 ASHRAE HANDBOOK- HVAC Applications

2. Outdoor: Within ordinance of governing authorities

K. Thermal Movements: Allow for controlled thermal movements from ambient, surface, and system temperature changes.

L. Capacities and Characteristics: As indicated on Drawings.

1.4 INDOOR, EXPOSED, WALL-MOUNTED UNITS

A. Description: Factory-assembled and tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1.5 INDOOR, SUSPENDED, CEILING-MOUNTED UNITS

A. Description: Factory-assembled and tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1.6 INDOOR, ENERGY RECOVERY VENTILATOR

A. Description: Factory-assembled and tested complete unit with components, wiring, and controls required for mating to ductwork, power, and controls field connections.

1.7 OUTDOOR, AIR-SOURCE HEAT-PUMP UNITS

A. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1. Specially designed for use in systems with either all heating or all cooling demands, but not for use in systems with simultaneous heating and cooling.

2. Systems shall consist of one unit, or multiple unit modules that are designed by variable refrigerant system manufacturer for field interconnection to make a single refrigeration circuit that connects multiple indoor units.

3. All units installed shall be from the same product development generation.

1.8 SYSTEM CONTROLS

A. General Requirements:

1. Network: Indoor units and outdoor units shall include integral controls and connect through a manufacturer-selected control network.

2. Network Communication Protocol: open control communication between interconnected units.

1.9 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect factory-assembled equipment.

+ + END OF SECTION + +

SECTION 23 82 19

FAN COIL UNITS

PART 1 - GENERAL

1.1 PRODUCTS

A. Ductless Fan Coil Units:

1. Fan Coil Unit Configurations: Face split.

a. Number of Heating Coils: One

b. Number of Cooling Coils: One

2. Coil section insulation.

3. Main and Auxiliary Drain Pans: Insulated galvanized steel with plastic liner.

4. Chassis: Galvanized steel where exposed to moisture**,** with baked-enamel finish and removable access panel

5. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color as selected by Architect

6. Outdoor-air wall box.

7. Filters: Washable foam Pleated, cotton polyester.

8. Indoor Refrigerant Coils: Stainless-steel tube, with aluminum or stainless-steel fins.

9. Fan and Motor Board: Removable.

a. Fan: Forward curved, double width, centrifugal; directly connected to motor.

b. Motor: Permanently lubricated, multispeed; resiliently mounted.

c. Wiring Termination: Plug connection.

B. Ducted Fan Coil Units:

1. Fan Coil Unit Configurations: Row Face split.

a. Number of Heating Coils: One

b. Number of Cooling Coils: One

2. Coil Section Insulation: 1/2-inch

3. Main and Auxiliary Drain Pans: Stainless steel

4. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color.

   a. Sheet metal supply- and return-air and mixing plenums.

   b. Dampers: Galvanized steel.

5. Filters.

6. Indoor Refrigerant Coils: Copper tube, with aluminum fins.

7. Fan and Motor Board: Removable.

   a. Fan: Forward curved, double width, centrifugal; [**direct driven**] [**belt driven**].

   b. Motor: Permanently lubricated, multispeed; resiliently mounted.

+ + END OF SECTION + +

SECTION 23 83 51

UNIT HEATERS (ELECTRIC)

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The contactor shall furnish and install Unit Heaters as supplied by Modine, Berko, Dayton, or equal as shown and as scheduled on the drawings, with required mounting components and accessories.

PART 2 – PRODUCTS

2.1 CABINET

A. Unit cabinet shall be constructed of 18-16 gauge zinc coated steel with baked on polyester powder coat finish as standard.

B. Mounting brackets shall be supplied with all cabinets to provide necessary adjustment to correct unit alignment during installation to untrue or non-square walls, studs, joists and surfaces.

2.2 UNIT MOUNTING

A. The unit shall be mounted to the ceiling structure using manufacturer-approved hangers or equivalent methods, via manufacturer-provided wall bracket accessory, or as indicated on drawings.

B. All mounting hardware shall be provided with protection from corrosion. Manufacturer supplied brackets shall be provided with baked-on polyester finish to match unit. All hardware, hanger rods, cross members, clamps etc. shall be galvanized or provided with field applied zinc-based primer and paint.

2.3 ELEMENT

A. Elements are to be finned steel tubes with highest quality nickel-chromium resistance wire embedded in compacted efficient dielectric to ensure

proper heat transfer. Steel fins are to be machine crimped and brazed to the tube for effective transfer of heat.

2.4 ELECTRICAL

A. Primary internal wiring and testing shall be conducted at the factory. Units are to be UL and CSA approved. All units are to be shipped with wiring diagrams.

2.5 MOTORS AND FANS

A. Motor and blower assembly shall be direct drive, removable, and resiliently mounted on a rigid heavy gauge steel frame for quiet operation and long life. The motors shall be totally enclosed type with integral thermal overload protection, with voltage the same as the heater primary voltage.

2.6 FOR MODEL NUMBERS AND PARAMETERS SEE DRAWING SCHEDULE.

2.7 CONTROLS

A. Thermostat: Provide wall mounted, line voltage thermostat control. Thermostat shall be rated for 1/4HP loads at 240VAC.

B. Overheat control: Unit shall be supplied with factory installed, automatic reset overheat control.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with the manufacturers instructions and the drawings.

3.2 SUBMITTALS

A. Submittals shall be in accordance with Section 230110.

3.3 GUARANTEE

A. Guarantee shall be for 2 years except heater elements shall be guaranteed for 5 years in accordance with Section 230190.

3.4 OPERATION AND MAINTENANCE MANUAL

A. Operation and Maintenance Manual shall be in accordance with Section 230100 paragraph 1.03

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 83 52

CABINET CONVECTORS

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The contactor shall furnish and install Cabinet Convection Heaters (Sterling or approved equal) as shown on plans, with required mounting components and accessories.

B. Units are to conform to ISO 9001:2000 and certified to UL1995 and CSA C22.2 No. 236-95

PART 2 – PRODUCTS

2.1 CABINETS

A. All cabinets shall be of the type as shown on the drawings. Cabinets shall be manufactured from 16 gauge, epoxy powder coated, cold rolled steel panels throughout (14 gauge front panel or full cabinet optional). Cabinet parts shall be cleaned and phosphatized before painting. Cabinets shall have end pockets on both sides of the internal cabinet for installation of control valves.

B. The cabinet shall be provided with the manufacturers standard finish, except color to be by Architect.

C. Adjustable rear mounting brackets shall be supplied with all cabinets to provide necessary adjustment to correct unit alignment during installation to untrue or non-square walls, studs, joists and surfaces.

D. Front panels shall be one piece with rigid, tabbed bottom for easy installation and removal. Front panels shall be secured in place with tamper-resistant, quarter-turn fasteners.

2.2 RECESSED UNITS

A. A wall and/or ceiling seal assembly shall be provided with all recessed units. This assembly is to provide a finished appearance to the wall and/or ceiling. The finish shall match the finish noted above.

2.3 COILS

A. Hydronic coils shall be constructed of 1/2 inch O.D. seamless tubing with mechanically bonded aluminum fins at 12 fins per inch. The entire coil assembly shall be factory tested to 350 psig air pressure while submerged in water. The coil assembly shall have a maximum working pressure of 300 psig. Coil connections shall be as noted on the drawings. Manual air vents shall be provided.

B. For number of coils see drawing schedule.

2.4 FOR MODEL NUMBERS AND PARAMETERS SEE DRAWING SCHEDULE.

2.5 CONTROLS

A. Units to be thermostatically controlled.

2.6 SUBMITTALS

A. Submittals shall be in accordance with Section 230110.

2.7 GUARANTEE

A. Guarantee shall be for 2 years in accordance with Section 230190.

2.8 OPERATION AND MAINTENANCE MANUAL

A. Operation and Maintenance Manual shall be in accordance with Section 230100 paragraph 1.03

+ + END OF SECTION + +

SECTION 23 84 51

INDOOR HEAT RECOVERY UNITS

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

B. Unit shall be a packaged static plate sensible heat recovery ventilator as manufactured by Energy Wall.

C. Units shall be Energy Wall model U-HRV-600LL as scheduled, or equal.

PART 2 - PRODUCTS

2.1 CONSTRUCTION

A. Fixed-plate sensible-only energy exchange element. Energy-exchange module shall be of fixed-plate counter-flow construction, with no moving parts. Exchanger shall be constructed of impermeable polypropylene material which prevents moisture, gases or other airborne contaminants from being transferred between air streams.

B. Unit shall have single-point power connection and integral non-fused disconnect.

C. Collar components shall be provided suitable for connection of ductwork.

D. Access doors shall provide easy access to serviceable internal components. Panel shall be gasketed to provide air-tight seal.

E. Energy-exchange element shall be protected by a MERV8 rated 2” nominal pleated, disposable filters.

F. Blower motors shall be ECM type and field configurable for direction and location of intake or discharge connections at the unit.

2.2 PERFORMANCE

A. Energy Transfer: heat exchanger shall be capable of transferring sensible energy only between air streams.

B. Continuous Ventilation

1. Unit shall have the capacity to operate continuously without the need for bypass, recirculation, preheaters, or defrost cycles under normal operating conditions.

C. Positive Air stream Separation

1. Exhaust and fresh airstreams shall at all times travel in separate passages, and airstreams shall not mix.

2.3 CONTROLS

A. Unit shall be provided with low voltage dry contact for enable/disable control via timeclock for continuous operation during occupied hours.

2.4 SUBMITTALS

A. Submittals shall be in accordance with Section 230110.

2.5 GUARANTEE

A. Guarantee shall be for 2 years in accordance with Section 230190.

2.6 OPERATING AND MAINTENANCE MANUAL

A. Operating and Maintenance Manual shall be in accordance with Section 230100 paragraph 1.03.

+ + END OF SECTION + +

SECTION 23 85 50

AIR HANDLING UNITS WITH COILS

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and General Requirements, apply to the work specified in this Section.

1.2 SYSTEM DESCRIPTION

A. Indoor suspension-mounted air-handling unit designed to provide air to a conditioned space as required to meet specified performance requirements for ventilation, heating, cooling, filtration, and distribution. Unit shall be assembled for horizontal draw-thru or blow-thru applications, as shown on the drawings, and shall be arranged to discharge conditioned air as shown on the drawings. Units shall be supplied by the specified manufacturer.

B. Air Handlers shall be American Ventus series “AVS” or approved equal.

C. Unit(s) must be UL or ETL and CSA or ETL, Canada, approved to ensure compliance with electrical codes.

1.3 QUALITY ASSURANCE

A. Unit performance shall be in accordance with ARI Standard 430 for Central Air-Handling Units.

B. Insulation and insulation adhesive shall comply with NFPA 90A requirements for flame spread and smoke generation.

C. Coils shall be certified in accordance with ARI Standard 410.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be stored and handled in accordance with the unit manufacturer’s instructions.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. General:

1. Unit shall be factory-assembled, indoor, suspension-mounted air handler. Unit shall consist of a fan and coil section with a factory-installed direct expansion and hydronic heating coil section, filter section, mixing box or combination filter-mixing box, and draw-through supply fan as indicated on the equipment schedule.

2. Units shall ship in one piece, fully assembled.

B. Unit Cabinet:

1. Unit chassis shall be constructed of laminated polyurethane panels set in a frame made of extruded aluminum posts. Unit base shall be constructed of formed galvanized steel profiles.

2. Chassis shall be supplied and have the following characteristics:

   a. All insulation shall be UL listed and shall meet NFPA-90A flame spread and smoke generation requirements.

   b. Casing panels shall be polyurethane foam within a formed 20-gauge galvanized steel outer jacket.

   c. Casing construction shall consist of thermal break panels to prevent condensation from accumulating on the outer walls.

3. Access doors shall be of double wall construction and shall be installed on hinges for all outward opening applications. Multiple handles (no more than four) shall be provided to assure positive closure. Operating pressure of unit shall always ensure that the door compresses the gasket seal. Doors shall open against system pressure.

C. Unit Base:

1. Unit shall include an integral base rail capable of supporting the unit from factory supplied hanging points.

D. Fan Section:

1. Fans shall be plenum mounted plug type utilizing direct drive TEFC motors of the size and voltage indicated on drawing schedules.

2. Each unit shall have one supply fan wheel and scroll. Fans shall be single inlet with backward-curved radial impeller blades formed of composite material. All fans shall be AMCA Class 2 rated.

3. Fan wheels shall be keyed to the shaft and shall be designed for continuous operation at the maximum rated fan speed and motor horsepower. Fan wheels and shafts shall be selected to operate at 25% below the first critical speed, and shall be statically and dynamically balanced as an assembly at the factory.

4. Fan shafts shall be solid steel, turned, ground, polished, and coated with rust-preventive oil. Access doors shall be provided so that the fan shaft may be removed without the removal of casing panels and to facilitate the air balancing of the system.

5. Motor shall be totally enclosed, fan-cooled (TEFC) type , with size and electrical characteristics as shown on the equipment schedule. Motors shall be mounted on a horizontal flat surface and shall not be supported by the fan or its structural members. Each motor shall bear a factory certification run test label to verify compliance.

   a. Motors shall be high efficiency (minimum 90% efficiency for greater than 3 hp).

6. Fans shall be controlled by factory mounted and wired Variable Frequency Drive controllers. Supply voltage and phases shall be as indicated on drawings schedules.

E. Coil Sections:

1. All coils must be easily re-moveable from the side of units. Drain pan shall be insulated double-wall stain-less steel, sloped toward drain fitting. Drain fitting shall be flush with bottom pan for side discharge, FPT connection and shall comply with ASHRAE Standard 62 recommendations. A maximum of one drain shall be supplied for each cooling coil section. Moisture shall not carry over past the coil.

2. All coils shall be leak tested at 450-psig air pressure while submerged in water. Coil performance shall be certified in accordance with ARI Standard 410 and UL 1995.

3. Direct Expansion (DX) coils shall be aluminum plate fins bonded to copper tubes by mechanical expansion. Coils shall have sweat, braze or welded connection sockets. Working pressure shall be no less than 500 psig at 100 F. All aluminum-fin coils shall have a wet-table finish to minimize water blowoff. Coils shall be drainable and shall have non-trapping circuits.

4. Hot water coils shall be aluminum plate fin type copper tubes by mechanical expansion. Coils shall have steel headers with MPT or victaulic connections. Working pressures shall be no less than 200 psig at 400 F. Headers shall have drain and vent connections external to unit.

5. Tube wall thicknesses shall not be less than 0.016 inch. Tube diameter on all water and refrigerant coils shall be 1/2-inch OD to ensure high thermal performance with lower total flow and reduced pumping requirements.

F. Filter Sections:

1. Each filter section shall be designed and constructed to house the specific type of filter shown on the equipment schedule. A double-walled hinged access door of the type described in paragraph ***2.01.B.3*** herein shall be provided on the side of the section.

2. Filter tracks in flat filter sections shall be constructed from extruded aluminum to ensure rigidity and tight tolerances. Tracks must be field adjustable without tools and designed to accept standard-size filters with 1-inch, 2-inch, or 4-inch widths.

G. Damper Sections:

1. Mixing boxes and combination filter-mixing boxes shall have parallel blades, interconnecting outside-air and return-air dampers. All mixing boxes and filter-mixing boxes shall have a double-walled hinged access door as specified.

2. All damper shall be licensed to bear the AMCA seal, and be rated based on testing procedures in accordance with AMCA Publication 511.

H. Electrical

1. Unit shall be provided with a factory installed and wired power and control cabinet which shall serve as a single point of access for all

field provided power connections. Cabinet shall be integral to the unit and contain, at a minimum:

a. Main service disconnect

b. Surge protection

c. VFD controllers

d. Power distribution block

e. Circuit breaker protection for all factory installed devices

f. Transformers/ancillary power supplies for low voltage circuits

2. Unit shall require only one field-supplied power connection.

I. Controls

1. Unit shall be provided with a factory installed, wired and configured controls. Controller shall be capable of coordinating the operation of all motor drives, dampers and control valves to maintain operational setpoints with optimal efficiency.

2. Controller shall be installed into a dedicated control box integral to the unit.

3. Control Devices: Unit shall be furnished with the following control inputs and outputs as a minimum:

a. Room/Zone air temperature sensor

b. Room/Zone air humidity sensor

c. Outdoor air temperature sensor

d. Discharge air temperature sensor

e. Discharge air humidity sensor

f. Low limit thermostat switch

g. Filter differential pressure

h. Fan differential pressure

i. 3-way hydronic control valve actuator(s) (one per coil)

j. Damper actuator (one per damper)

4. Each Unit shall be supplied with a field-installed remote thermostatic controller that provides full access to all unit features, setpoints and diagnostics information typically available to the end user or service technician. Refer to specification Section 239550 for additional control requirements and sequence of operation.

2. 2 SUBMITTALS

A. Submittals shall be in accordance with Section 230110.

2. 3 GUARANTEE

A. Guarantee shall be for 2 years in accordance with Section 230190.

2. 4 OPERATION AND MAINTENANCE MANUAL

A. Operation and Maintenance Manual shall be in accordance with Section 230100 paragraph 1.03.

+ + END OF SECTION + +

SECTION 23 86 00

EXHAUST FANS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. Furnish and install fans of sizes shown on the drawings. Fans shall be complete with motors of the size called for on the drawings.

B. Automatic backdraft damper shall be located within duct connector and shall have cushioned stops to prevent clatter. Blower shall be removable and have a centrifugal blower type wheel. All motors to be lifetime lubricated type, mounted with neoprene torsion mounts to isolate vibration. Motors to be thermally protected.

C. Ductwork from each area served may adjoin into one common duct for a single roof penetration.

D. The manufacturer shall guarantee the fan to deliver the full quantity of air specified under the conditions stipulated without excessive vibration and with low noise level. Fans to have AMCA certified ratings based on tests made in accordance with AMCA Standard 210 and bear the UL label.

E. Bathroom fan control shall be through programmable occupied period timer, interlocked with air handler to operate during occupied periods.

1.3 WORK INCLUDES

A. In-Line Centrifugal Fans.

1.4 RELATED WORK

A. Section 238900, Ductwork

B. Section 239100, Duct Accessories

1.5 REFERENCES

A. AMCA 99 – Standards Handbook

B. AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes.

C. AMCA 300 – Test Code for Sound Rating Air Moving Devices.

D. AMCA 301 – Method of Publishing Sound Ratings Air Moving Devices.

E. SMACNA – Low Pressure Duct Construction Standard.

1.6 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. Fabrication: Conform to AMCA 99.

1.7 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 230110.

B. Provide product data.

C. Provide fan curves with specified operating point clearly plotted.

D. Submit sound power levels for both fan inlet and outlet at rated capacity.

E. Submit manufacturer’s installation instructions.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. American Coolair

B. Broan

C. Greenheck

2.2 IN-LINE CENTRIFUGAL FANS

A. Centrifugal inline duct fans shall be of the centrifugal belt driven type. The wheel and spun venturi shall be a centrifugal design of non-sparking construction and dynamically balanced. The wheel shall overlap the inlet venturi and have backward inclined median airfoil blades. The complete drive assembly, including the motor and the wheel, shall be mounted on vibration isolators. Motor and drives shall be factory mounted. All fans shall be test run prior to shipment.

B. Motors shall be isolated from the exhaust airstream, mounted external to the cabinet. Motors shall be of the heavy duty type with permanently lubricated, sealed ball bearings and be readily accessible for maintenance. The wheel shaft shall be ground, polished, coated with a rust inhibitive finish and mounted in heavy duty, permanently sealed pillowblock ball bearings. Drive belts shall be oil-resistant, non-static. Sheaves shall be fully machined cast iron, keyed and securely attached to the shafts. Variable pitch motor sheaves shall be standard.

C. The motor shall be factory wired to the disconnect junction box and a disconnect switch shall be supplied. Wheel, shaft, bearings, motor and drive components shall be readily accessible for inspection, repair or replacement without disturbing inlet or outlet ductwork.

D. Backdraft Damper: Gravity activated, aluminum multiple blade construction, felt edged with nylon bearings.

E. Provide mounting brackets vibration isolation duct collars and hangers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions, recommendations and all governing codes and regulations.

3.2 GUARANTEE

A. Guarantee shall be for a minimum 2 years in accordance with Section 230110.

3.3 OPERATION AND MAINTENANCE MANUAL

A. Operation and Maintenance Manual shall be in accordance with Section 230100.

+ + END OF SECTION + +

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SECTION 23 88 00

AIR DISTRIBUTION

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. Construct all apparatus of materials suitable for the conditions encountered during operation.

B. Where corrosion can occur, as determined by the engineer, appropriate corrosion-resistant materials and assembly methods must be used including isolation of dissimilar metals against galvanic interaction.

C. All factory applied acoustical and thermal insulation, including facing and adhesives, it to be fire-resistant and to conform to requirements of NBFU and State codes.

D. Where in contact with the air stream, protect insulation against erosion or flaking by a factory applied plastic or mat facing.

E. Locate and arrange motors, eliminators, filters, heating coils, and other components and accessories so that they are accessible for repair, maintenance, and replacement.

F. Mount grease fitting directly on bearings unless the latter are not readily accessible. Where equipment bearings are not visible or are inaccessible, provide easily accessible extensions to bearing lubrication fittings.

G. Thoroughly clean the entire system before installing filters or operating the fans.

H. On systems containing filters, install filters and permanently seal the filter frames airtight before operating the fans. The contractor, at his own expense, shall replace all dirty filters before turning over the system to the owner, and furnish the owner with one complete set of replacement filters for all banks. Seal all outlets around the edges to prevent air leakage.

I. Bracing and supports indicated are the minimum acceptable. Install additional bracing or supports to eliminate any distortion or vibration when the systems are operating or under tests.

J. Install ducts, castings, and hangers plumb and level, with joints square and devoid of sharp edges.

K. Unless otherwise specified, construct all ductwork, including angles, bars, and other bracing's, hangers, supports, and accessories of galvanized steel, all in accordance with schedules in the latest ASHRAE Guide.

L. Diffusers, grilles, registers, and transfers shall be sized and located as shown on the drawings.

+ + END OF SECTION + +

SECTION 23 89 00

DUCTWORK

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SQUARE/RECTANGULAR DUCTWORK

A. Construct ductwork and casings in accordance with the mechanical code of N.Y.S. and with appropriate portions of the Low Velocity and Duct Construction standard of the Sheet Metal and Air Conditioning Contractor's National Association. Ducts shall be constructed of galvanized steel sheets in accordance with ASTM-A525. Zinc coating shall not be less than 1.25 ounces per square foot. Elbows shall be long radius or vaned. Seams and joints shall be tightly secured to stiffen the duct and to prevent air leakage. Leakage shall be less than five (5) percent of a fan scheduled capacity. Tape all transverse seams in supply ducts. Every effort shall be made by the Contractor to reduce leakage to the 5% maximum. contractor shall submit detailed ,drawings showing the proposed construction, including joints, bracing, dimensions, and hanger types. Fabrication shall not start until the details are approved. All leaks shall be sealed to maintain the above minimum requirements.

B. Ducts shall be suspended by means of galvanized steel straps, minimum 1 inch x 16 gauge and be securely fastened to the structure and equipment. Ducts shall not be suspended from corrugated flooring or roofing.

C. Square 90° ductwork turns are to be avoided wherever possible but, if used, shall come equipped with 90° turning vanes of galvanized steel with all mounting equipment, etc. for a proper installation.

D. Flexible aluminum ductwork is not acceptable.

E. Ductwork for the kitchen exhaust to be 10 gauge welded liquid tight metal duct.

F. Ductwork in new gymnasiums and existing gymnasiums to be round spiral non-flexible galvanized ductwork.

G. All ductwork conveying interior air, that passes through an unheated space, shall be insulated to a MINIMUM of R6, and be sealed by exterior

vapor barrier with a continuously sealed seam and shall include classroom and bathroom exhaust. All other duct insulation shall be in accordance with Section 232900.

1.3 ROUND DUCTWORK

A. General

1. The contractor may, at his option, convert any or all rectangular ductwork to round, provided that the project space limitations are properly addressed, the overall system design static pressure is not exceeded, and the insulation requirements are met.

2. All round supply, return and exhaust ductwork shall be spiral formed type, “SR” as manufactured by Lindab, Inc (800) 797-7476 or approved equal. The duct system shall consist of fittings that are factory fitted with a sealing gasket and spiral duct which, when installed according to the manufacturer’s instructions, will seal the duct joints without the use of duct sealer.

B. Materials

1. Unless otherwise noted, all duct and fittings shall be a minimum of G-90 galvanized steel in accordance with ASTM A-653 and A-924.

C. Construction

1. Unless otherwise noted, all duct and fittings shall be constructed per SMACNA’s Duct Construction Standards (+10 in W.G.) shown in the following table:

Diameter (inches)	Galvanized Spiral Duct	Galvanized Fittings
3 – 14	26	24
16 – 26	24	22
28 – 36	22	20
38 – 50	20	20

D. Fittings

1. All fitting ends shall come factory equipped with a double lipped, U-profile, EPDM rubber gasket. Gasket shall be manufactured to gauge and flexibility so as to insure that system will meet all of the performance criteria set forth in the manufacturer’s literature. Gasket shall be classified by Underwriter’s Laboratories to conform

to ASTM E-84-91a and NFPA 90A flame spread and smoke developed ratings of 25/50.

2. All fitting ends shall be calibrated to manufacturer's published dimensional tolerance standard and associated spiral duct.

3. All fitting ends from 3 inch to 24 inch diameter shall have rolled over edges for added strength and rigidity.

4. All elbows from 3 inch to 12 inch diameter shall be 2 piece die stamped and continuously stitch welded. All elbows 14 inch diameter and larger shall be standing seam gorelock construction and internally sealed.

5. The radius of all 90° and 45° elbows shall be 1.5 times the elbow diameter, unless otherwise noted on the drawings.

6. All fittings that are of either spot welded or button punched construction shall be internally sealed. When contract documents require divided flow fittings, only full body fittings will be accepted. The use of duct taps is unacceptable except for retrofit installations.

7. All volume dampers shall be type DRU, DSU or DTU or approved equal. Damper shall be fitting sized to slip into spiral duct. Damper shall have the following features:

   a. Locking quadrant with blade position indicator.

   b. 2 inch sheet metal insulation stand-off

   c. Integral shaft/blade assembly

   d. Shaft mounted, load bearing sintered bronze bushings

   e. Gasketed shaft penetrations to minimize leakage

E. Spiral Duct

1. Spiral duct shall be calibrated to manufacturer's published dimensional tolerance standard.

2. All spiral duct 14 inch diameter. and larger shall be corrugated for added strength and rigidity.

3. Spiral seam slippage shall be prevented by means of a flat seam and a mechanically formed indentation evenly spaced along the spiral seam.

F. Performance

1. Duct system performance shall meet SMACNA's Leakage Class 3 requirements at the system design static pressure as indicated on the contract documents not to exceed –20 in W.G. or +12 in W.G.

G. Open Ended Ductwork

1. All open ended ductwork must be closed at all times after installation.

H. Submittals

1. Submittals are to be in accordance with Section 23 01 10.

+ + END OF SECTION + +

SECTION 23 91 00

DUCTWORK ACCESSORIES

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Volume control dampers.

B. Fire dampers.

C. Smoke dampers.

D. Combination Fire/Smoke dampers with transformers as required.

E. Backdraft dampers.

F. Air turning devices.

G. Flexible duct connections.

H. Duct access doors.

I. Duct test holes.

J. Combustion air louvers

1.3 REFERENCES

A. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.

B. SMACNA – Low Pressure Duct Construction Standards.

C. UL 33 – Heat Responsive Links for Fire-Protection Service.

D. UL 555 – Fire Dampers and Ceiling Dampers.

1.4 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 230110.

B. Provide shop drawings for shop fabricated assemblies indicated, including volume control dampers duct access.

C. Submit manufacturer's installation instructions for fire dampers.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – VOLUME CONTROL DAMPER

A. Air Balance, Inc.

B. Arlan Model OBD LL

C. Ruskin

2.2 VOLUME CONTROL DAMPERS

A. Fabricate low leakage dampers in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. Fabricate splitter dampers of material same gauge as duct to 24 inch size in either direction, and two gauges heavier for sizes over 24 inch.

C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/4 inch diameter rod in self aligning, universal joint action flanged bushing with set screw.

D. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inch.

E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

F. Except in round ductwork 12 inch and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

G. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.3 ACCEPTABLE MANUFACTURERS –FIRE DAMPERS

A. Air Balance, Inc.

B. Arlan Model UL10.

C. Ruskin IBD.

2.4 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Fabricate ceiling firestop flaps of galvanized steel, 22 gauge frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side, with locking clip.

C. Fabricate ceiling dampers of galvanized steel, 22 gauge frame, stainless steel closure spring, and light weight, heat retardant non-asbestos fabric blanket closure. Ruskin CFD.

D. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide closure springs and latches for horizontal installations. Configure with blades out of air stream. Ruskin IBD

E. Fabricate multiple blade fire dampers with 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

F. Fusible links, UL 33, shall separate at 160 degrees F. Provide adjustable link straps for combination fire/balancing dampers.

2.5 ACCEPTABLE MANUFACTURERS – SMOKE DAMPERS

A. Air Balance, Inc.

B. Arlan Model UL10AG.

C. Ruskin SD.

2.6 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Motorized Smoke Dampers: Blade type, normally open with power on, closed automatically when power is interrupted, UL-listed and labeled damper and damper operator. Operator to be located out of air stream.

2.7 ACCEPTABLE MANUFACTURERS – SMOKE DAMPERS

A. Air Balance, Inc.

B. Arlan Model OBD & UL 10A.

C. Ruskin SD.

2.8 COMBINATION FIRE AND SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Provide factory sleeve for each damper. Install damper operator on exterior of sleeve and link to damper operating shaft.

C. Fabricate with multiple blades of 18 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

D. Operators shall be spring return electrically held open type suitable to operate at 120 V AC, 60 cycle. Operators shall be UL listed and labeled. Provide end switches to indicate damper position.

2.9 BACKDRAFT DAMPERS – Arlan Model BDD or equal.

A. Gravity backdraft dampers, size 18 x 18 inch or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.

B. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of 16 gauge galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degrees stop, steel ball bearings, and plated steel pivot pin: adjustment device to permit setting from varying differential static pressure.

2.10 AIR TURNING DEVICES

A. Multi-blade device with blades aligned in short dimension; galvanized steel or aluminum construction; with individually adjustable blades, and mounting straps.

2.11 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 36 oz. per sq. yd. approximately 2 inch, crimped into metal edging strip.

2.12 DUCT ACCESS DOORS- Arlan Fire Limit Model 50A insulated, Ruskin AD or equal.

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

D. Access doors smaller than 12 inch square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inch square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inch.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.13 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, recommendations and all governing codes and regulations.

B. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.

C. Provide balancing dampers on medium and high pressure systems where indicated.

D. Provide fire, smoke and combination fire/smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required

perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

E. Demonstrate re-setting of fire, smoke and combination fire/smoke dampers to authorities having jurisdiction and Owner's representative.

F. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated, except for kitchen exhaust fans.

G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

H. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

I. Provide duct test holes where indicated and required for testing and balancing purposes.

J. Guarantee: Guarantee shall be for 2 years in accordance with Section 230190.

+ + END OF SECTION + +

SECTION 23 94 00

AIR OUTLETS AND INLETS

PART 1 – GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Diffusers.

B. Ceiling, wall and floor registers/grilles.

C. Louvers.

1.3 RELATED WORK

A. Door louvers.

B. Metal wall louvers.

1.4 REFERENCES

A. ADC 1062 – Certification, Rating and Test Manual.

B. AMCA 500 – Test Method for Louvers, Dampers and Shutters.

C. ANSI/NFPA 90A – Installation of Air Conditioning and Ventilating Systems.

D. ARI 650 – Air Outlets and Inlets.

E. ASHRAE 70 – Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

F. SMACNA – Low Pressure Duct Construction Standard.

1.5 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate performance of louvers in accordance with AMCA 500.

1.6 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

1.7 SUBMITTALS

A. Submit product data under provisions of Section 230110.

B. Provide product data for items required for this project.

C. Submit schedule of outlets indicating type, size location, application, and noise level.

D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.

E. Submit manufacturer's installation instructions under provisions of Section 230110.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – CEILING DIFFUSERS

A. Titus or approved equal

2.2 RECTANGULAR OR SQUARE CEILING DIFFUSERS

A. Rectangular or square diffuser, removable core type, to discharge air in 360 degrees pattern with multi-pattern as indicated; by Titus or as approved.

B. Provide surface mount, snap-in, inverted T-bar, spline type frame, as required to mount in ceiling. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabricate of aluminum with baked enamel white finish.

D. Provide radial opposed blade damper and equalizing grid with damper adjustable from diffuser face.

2.3 ACCEPTABLE MANUFACTURERS – CEILING REGISTERS/GRILLES

A. Titus or approved equal

2.4 CEILING SUPPLY REGISTERS/GRILLES – CURVED BLADE

A. Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection; Model manufactured by Titus or as approved.

B. Fabricate 3/4 inch margin frame with concealed mounting and gasket.

C. Fabricate aluminum extrusions with factory white finish.

D. Provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.5 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Streamlined blades, depth of which exceeds 3/4 inch spacing, fixed blades, horizontal face; Model manufactured by Titus or as approved.

B. Fabricate 1-1/4 inch margin frame with countersunk screw mounting.

C. Fabricate of aluminum extrusions, with factory baked enamel white finish.

D. Where not individually connected to a ducted return, provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.6 ACCEPTABLE MANUFACTURERS – WALL REGISTERS/GRILLES

A. Titus or approved equal.

2.7 WALL SUPPLY REGISTERS/GRILLES

A. Streamlined and individually adjustable blades, depth of which exceeds 3/4 inch maximum spacing with adjustable blades, vertical face, double deflection; Model manufactured by Titus or as approved.

B. Fabricate 1-1/4 inch margin frame with concealed mounting and gasket.

C. Fabricate of aluminum extrusions with 0.050 inch frames, with factory baked enamel white finish.

D. Provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.8 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Streamlined blades, depth of which exceeds 3/4 inch spacing, with fixed blades, horizontal face; Model manufactured by Titus or as approved.

B. Fabricate 1-1/4 inch margin frame with screw mounting.

C. Fabricate of aluminum extrusions, with factory baked enamel white finish.

D. Where not individually connected to a ducted return, provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.

2.9 ACCEPTABLE MANUFACTURERS – LOUVERS

A. Ruskin or approved equal

2.10 LOUVERS

A. Provide 4 inch deep storm resistant louvers with blades on 45 degree slope with center baffle and return bend, heavy channel frame, bird screen; Model manufactured by Ruskin or as approved.

B. Fabricate of extruded aluminum, welded assembly, with factory clear anodized finish.

C. Louvers shall come equipped with a bird screen.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturer's instructions, recommendations and all governing codes and regulations.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement. Refer to Section 09900.

C. Install diffusers to ductwork with air-tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers. Regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. All diffusers (and component parts), registers and grilles shall have a factory applied baked white enamel finish on all surfaces.

+ + END OF SECTION + +

SECTION 23 95 00

LINEAR AND MODULAR SLOT DIFFUSERS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. Provide all materials and equipment required for a complete installation of all linear and modular slot air distribution systems as shown on the architectural and mechanical drawings and/or indicated In the architectural or mechanical specifications. The systems shall be complete in every respect and shall include all required appurtenances. Mechanical contractor shall furnish and install plenums, hoods, blank-offs and associated steel metal components including all duct connections thereto.

B. Provide all continuous linear slot and modular slot diffusers as shown on the drawings. The slot diffusers shall integrate into the ceiling system. Where curved linear slot diffusers are indicated, they shall be stretched formed to the exact radii required. Rolled or segmented linear slot diffusers will not be accepted.

C. The linear slot diffusers shall have a single slot unless shown otherwise and shall be capable of being used for supply air, return air, exhaust air or any combination there of.

D. For hard ceilings, provide clips that are integral with the linear slot diffusers allowing the diffusers to be secured directly to the ceiling framing without the requirement for hanger supports. Provide spline clips to secure joints and ceiling tees to the diffusers.

E. Provide ends and corners as required. Ends shall be butt type, field installed, or mitered picture frame type factory installed, as indicated herein or shown on the drawings. Corners shall be mitered one-piece unit.

1.3 EQUIPMENT DESCRIPTION

A. Pattern controllers shall be one-piece extruded aluminum, 24 inches long maximum, positioned between spring loaded spacers. Pattern controllers shall allow the airstream to be directed flat against the ceiling in either

direction or downward as well as allowing throw reduction every two feet along the entire length of the linear slot diffusers. The airstream shall be maintained at the ceiling plane and shall not dump when volume is reduced. Only extruded aluminum pattern controllers are acceptable. Where shown or noted pattern controllers shall be designed to allow the airstream to be jetted into the occupied space and be adjustable to vector the airstream as required.

B. Material shall be minimum wall thickness 0.062 inches extruded aluminum. Spring steel retainers shall be used under the spacers to hold the slot diffusers assembly tightly together and allow the slot diffusers to be disassembled easily for field trimming. Materials other than extruded aluminum and spring steel with not be accepted.

C. Flanges exposed to view shall be painted factory standard white. All other surfaces shall be painted flat black. Provide paint samples if requested.

D. Model numbers are indicated on the plan schedules.

E. All slot diffuses shall be manufactured by the same manufacturer of the plenums and hoods. No exceptions will be allowed. Plenum lengths and entry collar sizes shall be as indicated on the plan schedules.

F. Plenums shall be minimum 24-gauge galvanized steel and lined inside with black matte fiberglass insulation. Hoods shall be 51 percent free area and constructed of 24-gauge perforated sheet metal painted flat black.

G. Where shown on the drawings or otherwise indicated, provide a friction type volume damper located in the entry collar of the supply air plenum, accessible through the slot diffuser.

1.4 REQUIREMENTS

A. Air test and balance of linear and modular slot diffusers systems shall be by this section and be in accordance with the testing and balancing portion section of the specifications. Position all FlowBar pattern controllers in their normal operation positions and perform all air testing and balancing of all slot diffuser systems in full accordance with manufacturer’s recommendations.

B. All slot diffusers shall be performance tested with air plenums as a composite assembly in full accordance with ASHRAE, and/or ARI standards. If requested, the contractor shall provide for a visit by the mechanical consulting engineer to the product testing laboratory to verify performance data and testing procedures. All cost associated thereto shall be provide at the expense of the contractor.

C. Diffusers shall be selected to achieve a throw to room length ratio which meets the requirements of the ASHRAE 2001 Fundamentals Handbook, Chapter 32, Table 4, at both maximum design flow rate, and for VAV systems, at the minimum flow rate expected during partial occupancy. Diffusers shall be selected to achieve a minimum of 70 percent ADPI over the range for expected loads in the space. The diffusers' reported performance shall be based on texts conducted in accordance with ASHRAE Standard 70-2006. ADPI performance on at least one unit size of the selected diffuser shall have been tested in accordance with ASHRAE Standard 113-1990, to validate conformance and applicability to the ASHRAE table.

D. Titus FlowBar system is the basis of the specification. Comparable products may be submitted as a substitution provided they are in full compliance with all sections of this specification and meet performance requirement. The contractor should note that if the substitution adds costs to any other sections of this specification, or causes the architect and/or engineer to incur redesign cost, the contractor shall be fully responsible for the reimbursement of all these costs.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 23 95 50

TEMPERATURE CONTROL SYSTEMS

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

B. Listing as an acceptable manufacturer does not relieve that manufacturer from furnishing products and software that comply with all of the provisions of these specifications.

1.2 SCOPE OF WORK

A. Furnish and install Digital Automatic Temperature Controls as specified herein. Installation shall be complete in all respects and include all labor, materials, wiring, engineering, programming and services required for a complete operational system. The installed system shall conform to the requirements of this specification, the drawings and operate in accordance with the sequence of operation. All controls to be direct digital.

B. Install and wire all electrical components of the control system in accordance with the latest NEC and /or as amended and revised by local governing codes. All electrical conduit and wire to be provided by a licensed electrical subcontractor.

C. All wiring shall be installed in EMT. Electrical boxes and EMT for all sensors to be installed on new walls shall be concealed within the wall. Wiring for sensors in existing finished areas that cannot be concealed shall be in wire mold (coordinate color with Architect). Plenum rated cable will be acceptable in hung ceilings only. All electrical work will conform to the requirements of Division 26 specifications.

D. Provide a two (2) year guarantee on the material and labor for the complete system installed under this contract. This guarantee shall include all labor and material to assure the proper operation of the system. During the first year of warranty, any defective material or workmanship shall be corrected at no expense to the Owner. The guarantee period shall commence upon acceptance of the system by the owner in accordance with Section 230190.

E. The control system shall not be installed until the contractor’s submittal drawings have been approved. Submittal drawings shall include:

1. Descriptive technical literature and specification cuts on all controllers, devices, sensors and actuators.

2. Control schematics and diagrams of all systems.

3. Wiring diagrams showing all cable tie downs with terminal numbers.

F. Upon project completion furnish to the owner three (3) copies of an operations manual including operating instructions, as-built control drawings, specification sheets, sequence of operation and maintenance requirements.

G. Provide training to personnel designated by the owner, to include operation, adjustment and maintenance of the installed system. Instruction shall be on the specific system installed rather than a general training course. Contractor shall allow for a minimum of sixteen (16) hours of training and submit proof of training, which shall be submitted with close out documents.

1.3 PRODUCTS

A. Programmable Thermostat

1. Thermostat shall be HMI Advanced UPC by VTS Group or approved equal. Thermostat control shall permit full access to unit operational parameters for field adjustments and troubleshooting. Advanced functionality shall be password protected to prevent unauthorized or unintentional altering of settings.

2. Each Unit shall be furnished with a programmable digital thermostat with the following features as a minimum:

a. Current temperature and mode display

b. Setpoint temperature display

c. Time and Date display

d. 7-Day Programmable Day/Night Setpoints

e. Heating/Cooling setpoint deadband of no less than 5°F

f. Temporary setpoint override

g. Manual Heat/Cool/Fan override

h. Filter status indication

i. Error/Alarm code indication

j. Temperature and humidity sensing (internal or remote)

k. Power from associated control unit

l. RS485 serial communications

m. Max cable length: 3600 ft

n. Protection class: NEMA 2

B. Temperature and Humidity Sensors

1. Units shall be fitted with duct temperature sensors to monitor outdoor air and discharge air conditions.

2. Temperature Sensors shall have the following functionality, at a minimum:

a. Measurement range: -40°F to +158°F

b. Operating Humidity: 5% to 100% RH

c. Protection class: IP54

d. Output type: Resistive (10K NTC thermistor)

e. Maximum cable length: 300 feet

3. Humidity Sensors shall be microprocessor based and have the following functionality and features, at a minimum:

a. Measurement range: 5% to 100% RH

b. 24V power supply (AC or DC)

c. Analog output (0-10 VDC / 0-20 mA)

d. Modbus RTU (RS485) capable

e. Self calibrating

C. Differential Pressure Sensors

1. Units shall be fitted with differential pressure sensors to monitor filter status and fan performance.

2. Differential Pressure Sensors shall have the following functionality, at a minimum:

a. Measurement range: 0.12 to 1.20 in WG

b. Operational range: -4°F to +140°F

c. Output: Dry contact, Normally Open/Normally Closed

d. Contact rating: 250VAC, 3 Amp

e. Protection class: NEMA 3

D. Low Limit Thermostat Switch

1. Units shall be fitted with a low limit thermostatic switch to protect coils and other internal components from excessively low temperatures.

2. Unit controller shall perform the following sequence of operation upon activation of the low limit thermostatic switch:

a. Stop AHU fan(s)

b. Fully close outdoor air damper(s)

c. Fully open hydronic heating coil control valve (maximum flow)

d. Indicate alarm condition at unit controller

Unit shall remain in low temperature alarm state until temperature increases above minimum operating temperature, as sensed by the low limit thermostatic switch.

If the low temperature alarm state is triggered three times within a 60-minute period, the alarm state shall become permanent and require manual reset at the unit controller.

3. Low Limit Thermostatic Switch shall have the following functionality, at a minimum:

a. Measurement Range: -0.4°F to +59°F

b. Switching threshold: +41°F (adjustable)

c. Hysteresis: 1.7-12K

d. Output: Dry contact, Normally Open/Normally Closed

e. Contact rating: 230VAC / 30VDC

f. Protection Class: NEMA 3

E. Three-Way hydronic control valve

1. Each hydronic coil in each unit shall be fitted with a three-way control valve with electric actuator to modulate the heating or cooling capacity of the coil as required by the unit controller based on current sensed conditions and zone setpoint.

2. Three-way hydronic control valve actuators shall be factory supplied and shall have the following functionality and features, at a minimum;

   a. Regulation range: 0% to 100%

   b. Supply voltage: 24V AC/VDC

   c. Input: Analog 0-10 VDC

   d. Rotation angle: 0° to 90°

   e. Protection class: NEMA 2

3. Three-way hydronic control valve body shall be factory supplied and shall have the following functionality and features, at a minimum;

   a. Characteristic: Equal percentage/proportional

   b. Differential pressure: 50PSIG (typical)

   c. Fluid temperature range: 0°F to 250°F

F. Air Damper Actuator

1. Each damper in each unit shall be fitted with an electric air damper actuator for control of return air / outdoor air modulation and unit isolation.

2. Air Damper Actuators shall be factory supplied and shall have the following functionality and features, at a minimum;

   a. Regulation range: 0% to 100%

   b. Supply voltage: 24VAC

   c. Input: Analog 0-10VDC

   d. Rotation angle: 0° to 90°

   e. Torque rating: 90 inch-pounds max

f. Actuation time: 90 seconds (10 seconds full close with spring return)

g. Max damper area per actuator: 43 ft2

h. Protection class: NEMA 2

3. Where the total area of damper to be controlled exceeds the maximum recommended area of the actuator, the damper shall be evenly subdivided into sections equal to or less than the maximum area with each section controlled by a dedicated actuators operated in parallel.

PART 2 - SEQUENCES OF OPERATION

2.1 HEATING MODE SEQUENCE OF OPERATION

A. Unit Off / Shutdown

1. Outdoor air damper closed

2. Three-Way control valves fully closed (100% bypass)

3. Fan off

4. Associated Heat Recovery Ventilator (If present) disabled

B. Warm-up / Precondition

1. Outdoor air damper closed

a) If outdoor conditions are favorable, outdoor air damper shall open and excess outdoor air shall be used to provide free cooling

2. Three-Way control valves fully open (0% bypass)

3. Fan on full

4. Associated Heat Recovery Ventilator (If present) disabled

a) If outdoor conditions are favorable, associated Heat Recovery Ventilator shall be enabled outdoor air damper shall open to provide free cooling

C. Day Cycle / Occupied mode

1. Outdoor air damper modulates to minimum occupied setpoint

a) If outdoor conditions are favorable, excess outdoor air shall be used to provide free cooling

2. Three-way control valves modulate to maintain discharge air temperature and humidity based on unoccupied mode set point .

3. Fan on 100%

4. Associated Heat Recovery Ventilator (If present) enabled with bypass damper closed

a) If outdoor conditions are favorable, associated Heat Recovery Ventilator shall be enabled outdoor air damper shall open to provide free cooling

D. Night Cycle / Unoccupied mode

1. Outdoor air damper closed

a) If outdoor conditions are favorable, excess outdoor air shall be used to provide free cooling

2. Three-way control valves modulate to maintain discharge air temperature and humidity based on unoccupied mode set point.

3. Fan on 50%

4. Associated Heat Recovery Ventilator (If present) disabled

a) If outdoor conditions are favorable, associated Heat Recovery Ventilator shall be enabled outdoor air damper shall open to provide free cooling

+ + END OF SECTION + +

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SECTION 23 99 00

INSPECTION TESTING, AND BALANCING

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 REQUIREMENTS

A. All tests shall be conducted in the presence of a representative of the Owner and/or the Architect, by a qualified vendor specializing in balancing of air, systems.

B. The H.V.A.C. systems shall be adjusted, balanced, and set so as to provide the temperature and air volumes required and as shown on the drawings.

C. The Contractor shall demonstrate that all air distribution systems and apparatus fulfill the requirements of the specifications and shall operate the equipment for a sufficient time to properly adjust the controls and conscientiously instruct the owner's representatives in the care and operation of the systems.

D. The Contractor shall obtain and pay for all required inspections and permits required by state ordinances and by the NBFU and provide all required testing equipment. All equipment shall be properly calibrated.

E. The Contractor shall refer to ASHRAE handbook, “Testing, Adjusting, and Balancing" A.A.B.C. and N.E.B.B. required testing procedures.

F. Balance all systems to design ratings, record pressure drop readings across all major systems, and make flow and pressure measurements.

G. Record all measurements, complete all flow diagrams, and submit complete to the Architect.

1.3 SCOPE

A. This section outlines the minimum recommended test and inspection procedures to be followed in the inspection of any H.V.A.C. plant prior to acceptance and subsequent operation. in addition, the areas of responsibility are defined such that all tests and inspections are conducted

in a manner to assure that the system meets the requirements of all applicable codes.

1.4 PRELIMINARY PROCEDURES

A. It shall be the responsibility of the Contractor to complete the following work prior to conducting tests:

1. Installation of the system(s) and all applicable controls and accessories as outlined in the specifications and/or drawings.

2. Ensure all wiring is permanently affixed. Temporary wiring and/or connections will not be permitted during testing.

B. It shall be the responsibility of the Contractor, under the direction of the Architect, to perform electrical continuity tests only to ascertain that the field wiring is correct from the H.V.A.C. equipment control panel terminal strip to the H.V.A.C. equipment controls.

1.5 TESTS

A. Test all electrical components, including starters and heaters; overload equipment, scanner system, all controls, valves, and safety equipment.

B. Test all circulation air portions of the air distribution system(s).

C. Provide a list of all components that have been satisfactorily tested. Notify the Architect, in writing, a week in advance of this test so as to permit his attendance.

+ + END OF SECTION + +

SECTION 23 99 60

CLEANING AND TESTING

PART 1 - GENERAL

1.1 GENERAL

A. The General Provisions of the Contract, including General and Supplementary General Conditions and Division 1 General Requirements, apply to the work specified in this Section.

1.2 WORK INCLUDED

A. Clean and test all equipment as indicated herein and in accordance with all codes.

B. Test all air systems and hydronic systems as indicated in Section 239900.

1.3 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Perform field testing of piping in complete accordance with the local agencies having jurisdiction and as specified.

1.4 JOB CONDITIONS

A. Protection: During test work, protect controls, gauges and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gauges for field testing of systems.

B. Scheduling and Sequencing:

1. Transmit written notification of proposed date and time of operational tests to the Owner's representative at least five (5) days in advance of such tests.

2. Perform cleaning and testing work in the presence of the Owner's representative.

3. Pressure test piping inside buildings, at the roughing-in-stage of installation, before any pipe is enclosed by construction work, and at other times as directed. Perform test operations in sections as required and directed. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Test Instruments: Type and kind as required for the particular system under test.

B. Test Media (air, water): As specified for the particular piping or system under test.

PART 3 – EXECUTION

3.1 PRELIMINARY WORK

A. Thoroughly clean all piping and tubing prior to installation. During installation, exercise extreme care so as to prevent foreign matter from entering system. Prevent, if possible, and remove any stoppages or obstructions from piping and systems.

B. Thoroughly clean all compressed air, control air piping prior to pressure or vacuum testing.

3.2 CLEANING

A. After final assembly and connection, each unit will be thoroughly cleaned internally to ensure all dust, debris, transit bolts/temporary braces and packing materials.

3.3 PRESSURE TESTS – PIPING

A. This Contractor will be responsible for furnishing all equipment, piping, labor, staging, fittings, valves hoses and all other material as may be directed or required to perform tests.

B. Piping shall be absolutely tight under test and shall not show any loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Take down piping which is not tight under test; remake joints and repeat test to the satisfaction of the Engineer/Architect.

C. Hot water and cold water piping: Before final connections are made, perform hydrostatic test at 1-1/2 times maximum working pressure, but in no case less than 150 psig, for one hour.

3.4 SYSTEMS – CLEANING AND OPERATIONAL TESTING

A. General: Perform cleaning and operational tests as specified, so as to demonstrate the satisfactory overall performance of the systems. Conduct operational testing after all pressure testing, cleaning and balancing of systems and equipment have been performed. Prior to the performance of the operational test, operate the system with all automatic controls functioning; make all necessary adjustments and conduct all miscellaneous tests. After all adjustments and miscellaneous tests are completed, operate the system for a minimum of 120 consecutive hours under regular operating conditions, or for a longer period if necessary, to establish compliance with the drawings and the specifications. In the event difficulties are encountered, repeat the operating test as required until satisfactory operating conditions have been established.

B. Testing shall include determination and adjustment to provide for no less than the following:

1. Control operating tests shall include adjustment and checkout of all limits, interlock, switches, operating controls, water line control devices, motor starters, relays, linkages, modulations motors, dampers, and all other controls and instruments.

C. The Contractor shall guarantee the entire installation a period of two (2) years from the date of Owner acceptance and date of final certificate of payment. He shall maintain all apparatus in satisfactory operating condition, and, as conditions may warrant, he may be required to extend such emergency service by the manufacturer for the period of guarantee without additional costs to the Owner. The Contractor shall note that such service contract as absorbed by the unit manufacturer as specified above shall in no way absolve him from any and all legitimate responsibility for, materials furnished to this Contact, either before or after final acceptance by the Owner. See Section 230190.

+ + END OF SECTION + +

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to complete the electrical work as shown and specified. The scope of work includes the following:

1. Electrical demolition of equipment, conduit, wiring, lighting fixtures, etc.

2. Maintenance of operation of existing systems as required herein.

3. Furnish and install power distribution equipment, such as panelboards and dry-type transformers. The work includes replacement of the switchboards, dry-type transformer and panelboards in the Bathhouse Electrical Room.

4. Furnish and install power, control and instrumentation connections to all new mechanical, HVAC and miscellaneous equipment in the bathhouse, pool equipment room, vendor spaces, modified areas in the event space, tunnel and pool deck area.

5. Replace existing lighting systems, receptacles and associated electrical equipment in the bathhouse, vendor spaces, modified areas in the event space, tunnel and pool deck area.

6. Replace existing exterior site lighting system in the pool deck area.

7. Furnish and install pole mounted lighting system and underwater lighting system for the pool.

8. Furnish and install equipotential bonding system for the pool.

9. Replace existing fire alarm system in the bathhouse and vendor spaces.

10. Furnish and install electrical work for the audio sound system in the bathhouse, vendor spaces and pool deck area.

11. Furnish and install electrical work for the IT System in the bathhouse, vendor spaces, pool deck area, and exterior systems.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the site work, formwork, walls, partitions and ceilings.

2. Coordinate the electrical work with the work by others.

C. General:

1. Dimensions shown on the Drawings that are related to equipment are based on one manufacturer's equipment. Coordinate the dimensions of the equipment furnished with the space allocated for that equipment.

2. The Drawings show the principal elements of the electrical installation. They are not intended as detailed working drawings for the electrical work but as a complement to the Specifications to clarify the principal features of the electrical systems.

3. It is the intent of this Section that all equipment and devices, furnished and installed under this and other Sections, be properly connected and interconnected electrically with other equipment so as to render the installations complete for successful operation, regardless of whether all the connections and interconnections are specifically mentioned in the Specifications or shown on the Drawings.

4. Mounting heights of switches, receptacles, fixtures and other devices noted in the Specifications and on the Drawings are to the bottom of the device.

5. Refer to Contract Drawings for areas of sheeting and excavation specified under other sections of the Contract. Contractor shall schedule his work on underground conduit runs and handholes in these areas to run concurrently with that of the site work.

6. The Contractor shall be responsible for excavation, backfilling, bedding, curbing removal and replacement, concrete cover above conduits, and surface restoration, including pavement for underground conduit and cable installation. Truck vehicle access (H-20 loading) shall be maintained on facility roads during construction.

D. Related Work Specified Elsewhere:

1. Division 01, General Requirements.

2. Division 03, Concrete.

3. Division 05, Metals.

4. Division 09, Finishes for field painting.

5. Division 31, Earthwork.

E. Work Included But Specified Elsewhere:

1. All site work required for the construction of the underground structures and pavement restoration shall conform to the requirements of Division 31.

2. Concrete work for conduit curbs and concrete cover for buried conduit shall conform to the requirements of Division 03, Concrete.

3. Anchor bolts and other fasteners shall conform to requirements of Division 05, Metals.

4. Shop painting and surface preparation shall conform to requirements of Division 09, Finishes.

F. Temporary Power: Temporary light and power for construction purposes shall be provided in accordance with Division 01, General Requirements.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Certificate of Inspection: The Contractor shall, at his own expense, furnish the Owner with a Certificate of Inspection from an approved inspection firm acceptable to the Owner attesting that all electrical work in this Contract has been inspected and is in compliance with the National Electrical Code.

2. Codes: Material and equipment shall be installed in accordance with the current standards and recommendations of the National Electrical Code, the National Electrical Safety Code and with local codes which apply. Where discrepancies arise between codes, the most restrictive regulation shall apply.

3. Tests by Independent Regulatory Agencies: Electrical material and equipment shall be new and shall bear the label of the Underwriters

Laboratories, Inc., or other nationally-recognized, independent testing laboratory, wherever standards have been established and label service regularly applies.

B. Reference Standards: Electrical material and equipment shall conform in all respects to the latest approved standards of the following:

1. National Electrical Manufacturers Association (NEMA).

2. The American National Standards Institute (ANSI).

3. The Institute of Electrical and Electronic Engineers (IEEE).

4. Insulated Cable Engineers Association (ICEA).

5. National Electrical Code (NEC).

6. National Electrical Safety Code (NESC).

7. Occupational Safety and Health Code (OSHA).

1.3 SUBMITTALS

A. General: Conform to requirements of the General Specifications and Special Conditions.

B. Shop drawings shall include the following information to the extent applicable to the particular item:

1. Manufacturer's name and product designation or catalog number.

2. Electrical ratings.

3. Conformance to applicable standards or specifications of ANSI, ASTM, ICEA, IEEE, ISA, NEC, NEMA, NFPA, OSHA, UL, or other organizations.

4. Dimensioned plan, section, and elevations showing means for mounting, conduit connection, and grounding.

5. Materials and finish specification, including paints.

6. List of components including manufacturer's names and catalog numbers.

7. Internal wiring diagrams indicating all connections to components and numbered terminals for external connections.

8. Manufacturer's instructions and recommendations for installation, operation, and maintenance.

9. Manufacturer's recommended list of spare parts.

1.4 PROJECT CLOSE-OUT

A. Operation and Maintenance Data: Conform to requirements of the General and Special Conditions.

B. Provide Certificate of Inspection from an approved inspection firm acceptable to the Owner upon job completion prior to submission of final payment.

C. Record Drawings: In addition to the requirements of Division 01, General Requirements, the record drawings shall include the following:

1. One line wiring diagrams of the 480/277-volt and 208/120 volt or 240/120 volt distribution systems.

2. Actual in place conduit and cable layouts with schedule of conduit sizes and number and size of conductors.

3. Layouts of the lighting and other equipment arrangements.

4. Control and noncontrol wiring diagrams with terminal numbers and all devices identified and indicating point-to-point terminations.

1.5 PRODUCT DELIVERY

A. Delivery of Materials: Contractor shall instruct the manufacturers and vendors as to the maximum shipping sizes of equipment that can be accommodated at the site.

B. Storage: Electrical equipment and material shall be stored and protected in accordance with Division 1 and General and Special Conditions.

1.6 IDENTIFICATION OF EQUIPMENT

A. All electrical items shall be identified. Identification shall be in addition to the manufacturer's nameplates and shall serve to identify the items function and the equipment or system which it serves or controls.

B. All new equipment shall be identified by means of laminated phenolic nameplates incised to show 1-inch high, white letters on a black background. Labels shall be fastened by means of 3/16-inch diameter, round-head, stainless steel, self-tapping screws. Equipment whose designation has been changed shall be relabeled accordingly.

C. Wires and cables shall be color coded and identified by means of wire markers.

D. Raceways shall be identified by means of vinyl adhesive tape.

E. Pull and junction boxes shall be identified with laminated phenolic nameplates showing the names of the feeders or system wires and cables passing through them.

F. The text, size, and type of lettering, and the location of identifying labels or tags, shall be approved by the Owner.

1.7 PROCEDURES FOR INSTALLATION

A. The Contractor is cautioned to perform his work with due regard to safety and in a manner that will not interfere with the existing equipment or in any way cause interruption of any of the functions of the facility.

B. Work shall be carried out without disruption to facility operations.

C. No existing equipment shall be removed, or any live circuits disturbed, without the specific direction and approval of the Owner, and without clearance by appropriate representatives of the Owner. Whenever such work is contemplated, the Contractor shall submit to the Owner a written request for scheduling such work. Written request must be received five (5) working days prior to the date on which the proposed work is to be performed.

1.8 MAINTENANCE OF OPERATION

A. Refer to Division 01 for Maintenance of Operation requirements.

B. The Contractor shall be responsible for furnishing temporary generator sets to maintain facility operations for any facility functions, which would be disrupted by any portion of his work.

C. The Contractor shall furnish written notice to the Engineer and Owner five (5) working days prior to performing the work that requires a disruption of power. The written notice shall contain a schedule of proposed work.

1.9 AREA CLASSIFICATIONS

A. Damp Locations: The following areas shall be considered damp locations:

1. All outdoor locations, unless otherwise specified.

2. Tunnel.

3. Pool Filter Room.

4. Materials, equipment and incidentals in areas identified as damp locations shall meet NEC and NEMA requirements for wet locations. Enclosures installed in damp locations shall meet NEMA 4X stainless steel requirements as a minimum. Conduits shall be terminated at enclosures with watertight, threaded hubs.

B. Dry Locations: The following areas shall be considered dry locations:

1. Bathhouse.

2. Vendor spaces.

3. Event space.

4. Enclosures installed in these locations shall meet NEMA 12 requirements as a minimum.

C. Corrosive Locations: The following areas shall be considered corrosive locations:

1. None on this project.

2. Enclosures installed in these locations shall meet NEMA 4X glass reinforced polyester (fiberglass) requirements as a minimum.

+ +END OF SECTION + +

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SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide 600-volt cable as shown and specified.

B. Related Work Specified Elsewhere:

1. Section 260526, Grounding and Bonding for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Codes: Cable shall be installed in accordance with the standards and recommendations of the National Electrical Code and with local codes which apply. Where discrepancies arise between codes, the most restrictive regulation shall apply.

2. Tests by Independent Regulatory Agencies: Cable shall bear the label of the Underwriters Laboratories, Inc.

B. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. ASTM B 3, Soft or Annealed Copper Wire.

2. ASTM B 8, Concentric-Lay-Stranded Copper Conductors, Hard, Medium-hard or Soft.

3. ICEA S-95-658/NEMA WC70, Nonshielded Power Cables Rated 2,000 V or Less.

4. National Electrical Code.

5. UL 44, Standard for Thermoset-insulated Wires and Cables.

6. UL 83, Standard for Thermoplastic-insulated Wires and Cables.

7. UL 854, Standard for Service-Entrance Cables.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval manufacturer's literature, specifications, and engineering data for 600 volt insulated cable.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Insulated Cable In Raceways:

1. Material: Single conductor copper cable conforming to ASTM B8 with abrasion resistant, moisture and heat resistant cross-linked polyethylene insulation rated 90C in dry locations and 90C in wet locations. Cable shall be listed by UL as Type XHHW-2. All underground raceways for power wiring shall be wired using extra heavy cross-linked polyethylene wire insulation, rated type USE-2/RHW-2.

2. Where cable is designated as multiconductor on the Drawings (10/c for example), the conductors shall have an overall PVC jacket.

3. Wire Sizes: Not smaller than No. 12 AWG for power and lighting and No. 14 AWG for control.

4. Stranding: All 600 volt cable shall be stranded.

5. Product and Manufacturer: Provide material manufactured by one of the following:

   a. Okonite Company.

   b. Superior Essex.

   c. Or approved equal.

B. Metal-Clad Cable: Type MC

1. Material: Two or more stranded copper circuit conductors and copper grounding conductor covered with thermoplastic insulation (THHN), polypropylene cable assembly tape in an outer galvanized steel interlock armor.

2. Product and Manufacturer: Provide one of the following:

   a. Allied Tube and Conduit.

   b. Or approved equal.

C. Cable Connectors, Splices and Terminals, Solderless Type:

1. For stranded wire sizes up to #6 AWG, use compression type.

2. Product and Manufacturer: Provide one of the following:

   a. T&B Sta-Kon.

   b. Burndy Hylug.

   c. Or approved equal.

3. For sizes #4 AWG and above, use either compression type or bolted type with silver plated contact faces.

4. For sizes #250 MCM and larger, use connectors and terminals with at least 2 cable clamping elements or compression indents and provision for at least 2 bolts for joining to apparatus terminal.

D. Cable Markers: Product and Manufacturer: Provide one of the following:

1. Omni-Grip by W.H. Brady Company.

2. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all cables complete with proper terminations at both ends. Check and correct for proper phase sequence and proper motor rotation.

B. Pulling:

1. Use insulating types of pulling compounds containing no mineral oil.

2. Pulling tension shall be within the limits recommended by the wire and cable manufacturer.

3. Use a dynamometer where mechanical means are used.

4. Cut off section subject to mechanical damage.

C. Bending Radius: Limit to 6 times cable overall diameter.

D. Slack: Provide maximum slack at all terminal points.

E. Splices:

1. Where possible, install cable continuous, without splice, from termination to termination.

2. Where required, splice in junction box using terminal boards.

3. Splices in conduits are not allowed.

4. Use of screw shell splices, “wire nuts” is not permitted.

F. Identification: Identify all conductors by circuit number and phase or wire number, at each terminal or splice location. Control conductors shall be numerically coded.

G. Color code power cables as follows: 208 volt systems - blue, black, and red; 240-volt systems - blue, black and orange; 480 volt systems - brown, orange, and yellow; neutral - white; equipment ground - green; isolated ground - green with yellow stripe.

3.2 TESTING

A. Test each electrical circuit after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.

B. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service with a Megger whose rating is suitable for the tested circuit. Tests shall meet with the applicable specifications of ICEA S-95-658/NEMA WC70.

C. The insulation resistance for any given conductor shall not be less than the value recommended by the ICEA or a minimum of 1 megohm for 600-volt and less service, if not ICEA listed. Any cable not meeting the recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.

+ + END OF SECTION + +

SECTION 26 05 23

INSTRUMENTATION CABLE

PART 1 - GENERAL

1.1 Description

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide instrumentation cable as shown and specified.

1.2 Quality Assurance

A. Requirements of Regulatory Agencies:

1. Codes: Cable shall be installed in accordance with the standards and recommendations of the National Electrical Code and with local codes which apply. Where discrepancies arise between codes, the most restrictive regulation shall apply.

2. Tests by Independent Regulatory Agencies: Cable shall bear the label of the Underwriters Laboratories, Inc.

B. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. UL 13, Standard for Power-Limited Circuit Cables.

2. UL 2250, Standard for Instrumentation Tray Cable.

3. National Electrical Code.

1.3 Submittals

A. Shop Drawings: Submit for approval manufacturer's literature, specifications, and engineering data for instrumentation cable. This shall be coordinated with requirements of instrumentation equipment.

PART 2 - PRODUCTS

2.1 Materials

A. Shielded Cable:

1. Material: Seven strand concentric bare copper wire, Class B. Wire shall contain a polyester backed aluminum shield with a tinned copper drain wire. Insulation shall be a 15-mil 90°C flame-retardant PVC jacket, 600-volt minimum. Wire shall be listed by UL as Type TC.

2. Wire Size: No. 16, multiconductor, as required by process equipment. Conductors shall be as shown on Conduit and Cable schedule or drawings.

3. Product and Manufacturer: Provide material manufactured by one of the following:

   a. Belden.

   b. Or approved equal.

4. Shielded cable shall be coordinated with requirements of process equipment prior to installation. Shielded cable shall meet all requirements of instrumentation equipment.

B. Ethernet Cabling:

1. Ethernet connections between fiber optic terminations and equipment and within local areas shall be made using Category 6 Ethernet cable as follows:

   a. UTP 100 base TX, CAT-6 Ethernet cable shall:

      1) Be industrial grade, four unshielded twisted pairs, category 6, 24 AWG copper cable conductors shall have standard colors.

      2) Have a second overall protective jacket of industrial grade PVC.

      3) Have a core of standard high speed Cat-6 cable.

      4) Be capable of stable operation to 350 MHz with 44.3 dB/100ft maximum attenuation to allow for future expansion and capability.

      5) Use industrial RJ-45 connectors with protective boots for all terminations.

      6) Belden “Data-Tuff” or approved equal.

C. Cable Connectors, Splices and Terminals, Solderless Type:

1. Use compression type connectors.

2. Product and Manufacturer: Provide one of the following:

   a. T&B Sta-Kon.

   b. Burndy Hylug.

   c. Or approved equal.

D. Cable Markers: Product and Manufacturer: Provide one of the following:

1. Omni-Grip by W.H. Brady Company.

2. Or approved equal.

PART 3 - EXECUTION

3.1 Installation

A. Install all cables complete with proper terminations at both ends, including all spare cables. Install in conduit separate from power and control cables.

B. Pulling:

1. Use insulating types of pulling compounds containing no mineral oil.

2. Pulling tension shall be within the limits recommended by the wire and cable manufacturer.

3. Use a dynamometer where mechanical means are used.

4. Cut off section subject to mechanical damage.

C. Bending Radius: Limit to 6 times cable overall diameter.

D. Slack: Provide maximum slack at all terminal points.

E. Splices:

1. Where possible, install cable continuous, without splice, from termination to termination.

2. Where required, splice in junction box using terminal boards.

3. Splices in conduits are not allowed.

4. Use of screw shell splices, “wire nuts” is not permitted.

F. Terminations:

1. Provide low-voltage barriered, labelable screw-type terminal strips for all instrumentation cables. Label strips to match cable and conductor labeling.

2. Provide separate terminals for all cable shields.

3. Provide crimp-on, insulated fork terminals for all conductors and shields.

G. Ground shield at one end only and as recommended by process equipment manufacturer.

H. Identification: Identify all conductors by circuit number at each terminal or splice location.

I. Color code cables per ISA and ICEA color coding standards.

3.2 Testing

A. Test each electrical circuit after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.

B. Individually test cables for insulation resistance. Test after cables are installed and before they are put in service with a Megger whose rating is suitable for the tested circuit. Tests shall meet with the applicable specifications of the ICEA.

C. The insulation resistance for any given conductor shall not be less than the value recommended by the ICEA. Any cable not meeting the recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.

+ + END OF SECTION + +

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide a complete new grounding and bonding system for the new facilities, equipment and pool as shown, specified and required by the National Electrical Code.

B. Related Work Specified Elsewhere:

1. Division 31, Earthwork.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 250, Grounding and Bonding.

2. NEC Article 680, Swimming Pools, Fountains and Similar Installations.

3. UL 467, Standard for Grounding and Bonding Equipment.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer’s technical information for grounding materials proposed for use.

B. Test Data: Submit for approval results of ground resistance testing.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bare Ground Cable:

1. Material: Annealed, bare, stranded copper, No. 4/0 AWG minimum size unless specifically noted otherwise.

2. Manufacturers: Provide material manufactured by one of the following:

a. Wire and Cable Division of Anaconda Company.

b. General Cable Corporation.

c. Or approved equal.

B. Bare Bonding Cable:

1. Material: Annealed, bare, stranded coper, No. 4 minimum size unless specifically noted otherwise.

2. Manufacturers: Provide material manufactured by one of the following:

a. Wire and Cable Division of Anaconda Company.

b. General Cable Corporation.

c. Or approved equal.

C. Ground Rods, Material: Copperclad steel rods, 3/4-inch diameter, 10 feet long, unless otherwise noted on the Drawings. Heary Bros, cat #HB107-GR or equal.

D. Grounding Connectors:

1. Material: Pressure connectors to be copper alloy castings, designed specifically for the items to be connected, and assembled with Durium or silicone bronze bolts, nuts and washers. Welded connections to be by exothermic process utilizing molds, cartridges and hardware designed specifically for the connection to be made.

2. Product and Manufacturer: Provide material manufactured by one of the following:

a. Pressure Connectors:

1) Burndy Corporation.

2) O-Z/Gedney, Division of General Signal Corporation.

3) Or approved equal.

b. Welded Connections:

1) Cadweld by Erico Products, Incorporated.

2) Therm-O-Weld by Burndy Corporation.

3) Or approved equal.

PART 3 - EXECUTION

3.1 FACILITY GROUND SYSTEM

A. Install ground rods in locations shown on the drawings to provide a resistance to ground of less than 5 ohms.

B. Weld all buried connections. Buried bolted connections are not permitted.

C. Provide accessible test points for measuring the ground resistance of ground grids.

D. Coordinate all work with site work by other trades.

E. Ground new electrical services in accordance with NEC requirements.

3.2 EQUIPMENT GROUNDING

A. Ground all electrical equipment in compliance with the National Electrical Code.

B. Equipment grounding conductors shall be bare stranded copper cable of adequate size installed in metal conduit where necessary for mechanical protection.

C. Connect ground conductors to conduit with copper clamps, straps or with grounding bushings.

D. Connect to piping by welding or brazing. Use copper bonding jumpers on all gasketed joints.

E. Connect to equipment by means of lug compressed on cable end. Bolt lug to equipment frame using holes or terminals provided on equipment specifically for grounding. Do not use hold-down bolts. Where grounding provisions are not included, drill suitable holes in locations designated by the Engineer.

F. Connect to motors by bolting directly to motor frames, not to sole plates or supporting structures.

G. Connect to service water piping by means of copper clamps. Use copper bonding jumpers on all gasketed joints.

H. Scrape bolted surfaces clean and coat with a conductive oxide resistant compound.

3.3 POOL BONDING SYSTEM

A. The Contractor shall furnish and install an equipotenfial bonding system for the pool and surrounding areas as per NEC Article 680, and as shown on the Drawings.

B. The Contractor shall bond all metallic parts of the pool structure, metal fittings within or attached to the pool structure, metal parts of electric equipment associated with the pool water circulating system, and metal piping and metal parts as outlined in NEC Article 680.

3.4 TESTING

A. Test the complete ground systems for continuity and for resistance to ground of less than five ohms using an electrical ground resistance tester. Furnish certified report to Engineer.

+ + END OF SECTION + +

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide conduit and fittings as shown and specified to form complete, coordinated and grounded raceway systems.

2. The types of conduit required include the following:

a. Rigid galvanized steel for all exposed conduit runs, unless otherwise noted.

b. Galvanized electrical metallic tubing (EMT) in walls of finished areas.

c. Metal-clad cable (MC) above suspended ceilings.

d. PVC, Schedule 40, for exterior underground duct banks as indicated, unless noted otherwise.

e. Rigid galvanized steel conduit for instrumentation wiring (shielded cable) in exterior underground duct banks. This includes, but is not limited to, wiring for the audio sound system and IT system.

3. Unless otherwise shown, all interior conduits shall be run exposed. All conduits, boxes and fittings in finished areas (rooms with suspended ceilings) shall be run concealed.

B. Coordination:

1. Conduit runs shown are diagrammatic. Coordinate conduit installation with piping, ductwork, lighting fixtures and other systems and equipment and locate so as to avoid interferences.

2. Prior to installation of conduit, Contractor shall verify equipment locations where conduits are to be terminated and shall verify the size of conduit required for the actual size and number of wires to be installed in the conduits.

C. Related Work Specified Elsewhere:

1. Section 099100, Painting.

2. Section 260543, Underground Ducts and Raceways for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 344, Rigid Metal Conduit: Type RMC.

2. NEC Article 352, Rigid Polyvinyl Chloride Conduit: Type PVC.

3. UL 6, Standard for Electrical Rigid Metal Conduit - Steel.

4. UL 514A, Standard for Metallic Outlet Boxes.

5. UL 514B, Standard for Conduit, Tubing and Cable Fittings.

6. UL 514C, Standard for Nonmetallic Outlet Boxes, Flush-device Boxes, and Covers.

7. UL 651, Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.

8. ANSI C80.1, Standard for Electric Rigid Steel Conduit (ERSC).

9. ANSI C80.3, Standard for Steel Electrical Metallic Tubing (EMT).

10. NEMA TC2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

11. NEMA TC3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer’s catalog cuts and technical information for the conduit, fittings, tooling, installation techniques and supports proposed for use.

2. Construction details of conduit racks and other conduit support systems. Include calculations confirming the adequacy of the

proposed systems to support the weight of the conduits and cables being furnished.

3. Layout drawing showing proposed routing of exposed conduits, and concrete encased conduit duct banks directly buried in earth. Drawings shall show rack supports; locations of pull and junction boxes; all penetrations in walls and floor slabs; and equipment where conduit terminates.

B. Record Drawings: Include the actual routing of exposed and below grade conduit runs on record drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rigid Galvanized Steel Conduit, Elbows and Couplings:

1. Material: Rigid, heavy wall, mild steel, hot dip galvanized inside and out, smooth interior, tapered threads and carefully reamed ends; 3/4-inch NPS minimum size.

2. Manufacturers: Provide material manufactured by one of the following:

a. Allied Tube and Conduit Corporation.

b. Robroy Industries Inc.

c. Or approved equal.

B. Electrical Metallic Tubing:

1. Material: Thin wall, galvanized steel, hot-dip galvanized inside and out, smooth interior, carefully reamed ends, 3/4-inch minimum size unless otherwise noted.

2. Manufacturers: Provide material manufactured by one of the following:

a. Allied Tube and Conduit Corporation.

b. Or approved equal.

C. Metal-Clad Cable (MC):

1. Material: Galvanized steel armor (interlocked type continuous and close fitting) with insulated green ground (refer to Section 260519).

D. Plastic Conduit - Schedule 80 PVC:

1. Material: Schedule 80 PVC plastic, NEMA Type TC-2, 90°C rated, conforming to UL 651.

2. Product and Manufacturer: Provide one of the following:

a. Carlon Plus 80.

b. Certainteed Corporation.

c. Scepter Mfg. Co.

d. Or approved equal.

E. Plastic Conduit-Schedule 40 PVC:

1. Material: Schedule 40 PVC plastic, NEMA Type TC-2, 90°C rated, conforming to UL 651.

2. Product and Manufacturer: Provide one of the following:

a. Carlon Plus 40.

b. Certainteed Corporation.

c. Scepter Mfg. Co.

d. Or approved equal.

F. Conduit Fittings and Outlet Bodies:

1. Material and Construction: For rigid galvanized steel conduit systems, cast gray iron alloy or cast malleable iron bodies and covers; all units to be gasketed and watertight. Gaskets to be of an approved type designed for the purpose. Improvised gaskets not acceptable. All units to be threaded type with five full threads. Material to conform to ANSI C80.4 and be listed by UL. Fittings and bodies in or on PVC conduit runs shall be Schedule 80 PVC. All screws and miscellaneous hardware shall be stainless steel.

2. Manufacturers: Provide material manufactured by one of the following:

a. Crouse-Hinds Company.

b. Appleton Electric Company.

c. Killark.

d. Robroy Industries, Inc.

e. Or approved equal.

G. Conduit Hubs:

1. Material: Threaded conduit hub, vibration proof, weather proof with captive O-ring seal, zinc metal with insulated throat. Hubs used on PVC conduit systems shall be Schedule 80 PVC.

2. Use: Provide for all conduit terminations to boxes, cabinets and other enclosures.

3. Manufacturer: Provide material manufactured by Myers Electrical Products Company or approved equal.

H. Expansion Fittings:

1. Expansion Fittings: Malleable or ductile iron, hot-dip galvanized, stainless steel clamps and tinned copper braid bonding jumper. Fitting shall be watertight, corrosion-resistant, UL listed and compatible with the conduit system.

2. Deflection/Expansion Fittings: Neoprene sleeve, stainless steel bands, and tinned copper braid bonding jumper, suitable for concrete encasement in nonhazardous areas. Fitting shall be watertight, corrosion resistant, UL listed and compatible with the conduit system. Expansion fittings used on PVC coated conduit systems shall be coated with a 40 mil PVC factory coating.

3. Hazardous Areas: Steel body and sleeve with grounding spring, suitable for use in Class I, Division 1, Group D hazardous areas. Fitting shall be watertight, UL listed and compatible with the conduit system. Furnish 40 mil PVC factory coating.

4. Product and Manufacturer: Provide one of the following:

a. Type DX for expansion/deflection or AX for expansion only by O-Z/Gedney Company.

b. Or approved equal.

I. Flexible Conduits:

1. Flexible Conduit - Dry and Damp Locations:

a. Material: Flexible galvanized steel core with smooth, abrasion resistant, liquid-tight, neoprene cover. Continuous copper ground built in for sizes 3/4-inch through 1 1/4-inch. Material shall be UL listed.

b. Product and Manufacturer: Provide one of the following:

1) Sealtite UA by Anaconda Metal Hose Division, Anaconda American Brass Company.

2) Liquatite Type L.A. by Electri-Flex Company.

3) Or approved equal.

2. Flexible Conduit Fittings - Dry and Damp Locations:

a. Material and Construction: Malleable iron with zinc electroplate. Fittings shall adapt the conduit to standard threaded connections, shall have an inside diameter not less than that of the corresponding standard conduit size and shall be UL listed.

b. Manufacturers: Provide products of one of the following:

1) Crouse-Hinds Company.

2) Appleton Electric Company.

3) Or approved equal.

3. Flexible Conduit - Corrosive Locations:

a. Material: Flexible nonmetallic conduit, liquid-tight. Material shall be UL listed.

b. Product and Manufacturer: Provide one of the following:

1) Carflex liquid-tight flexible nonmetallic conduit by Carlon.

2) Or approved equal.

4. Flexible Conduit Fittings - Corrosive Locations:

a. Material and Construction: Thermoplastic or PVC liquid-tight nonmetallic. Fittings shall adapt the conduit to standard

threaded connections, shall have an inside diameter not less than that of the corresponding standard conduit size and shall be UL listed.

b. Manufacturers: Provide products of one of the following:

1) Carflex liquid-tight nonmetallic fittings by Carlon.

2) Or approved equal.

J. Supports, Fasteners:

1. Individual rigid galvanized steel conduits shall be supported using rigid hot-dip galvanized steel one-hole straps and back straps.

2. Multiple rigid galvanized steel conduits shall be supported on rigid hot-dip galvanized steel electrical channel with straps.

3. Threaded fasteners shall be stainless steel, including screws, anchors, rods, nuts, spacer washers and miscellaneous items.

4. Supports used on PVC conduit systems shall be fiberglass.

K. Conduit Markers: Conduit markers shall be vinyl adhesive tape engraved with the conduit designation and affixed to the conduit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in conformance with National Electrical Code requirements.

B. Dissimilar Metals:

1. Take every action to prevent the occurrence of electrolytic action between dissimilar metals.

2. Do not use copper products in connection with aluminum work, and do not use aluminum in locations subject to drainage of copper compounds on the bare aluminum.

C. Supports:

1. Rigidly support conduits by clamps, hangers, channels or conduit racks.

2. Support single conduits by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the support surface. Support multiple runs of conduits on trapeze type hangers with hot-dip galvanized steel horizontal members and threaded hanger rods, Kindorf or equal. Rods shall be not less than 3/8-inch diameter and shall be stainless steel.

3. For exposed PVC conduit systems, supports shall be fiberglass, Robroy or approved equal.

D. Fastenings: Fasten raceway systems rigidly and neatly to supporting structures by the following methods:

1. To Wood: Wood screws.

2. To Hollow Masonry Units: Toggle bolts.

3. To Brick Masonry: Price expansion bolts or equal.

4. To Concrete: Phillips: Hilti Corporation: or approved equal, anchors.

5. To steel: Welded threaded studs, beam clamps or bolts with lock washers or locknuts.

E. Plug or cap conduit ends at the time of installation to prevent the entrance of moisture and foreign materials.

F. Empty Conduits:

1. Install nylon pull wire in each empty conduit and cap conduits not terminating in boxes with permanent fittings designed for the purpose.

2. Identify each empty conduit with a durable tag showing the conduit number indicated on the Drawings.

G. Make underground and embedded conduit joints watertight to prevent ground water from entering buildings.

H. Orientation:

1. Install parallel or perpendicular to structural members or walls, unless concealed.

2. Wherever possible, run in groups.

3. Install on structural members in protected locations.

4. Locate clear of interferences.

5. Locations shown on Drawings are approximate only.

I. Clearance: Maintain 6 inches from hot fluid lines and 1/4 inch from walls.

J. End Cuts: Square and ream to prevent damage to wire and cable.

K. Field Bends: No indentations. Diameter of conduit shall not vary more than 15 percent at any bend.

L. Threads:

1. Apply conductive compound, Kopr-Shield by T&B Corporation, or approved equal to all joints before assembly.

2. Make up joints tight and ground thoroughly.

3. Conduit and fitting threads to be standard tapered pipe threads. Standard straight thread conduit couplings permitted only on exposed indoor conduit runs. Running threads not permitted.

4. Use strap wrenches and vises to install conduit. Conduit with wrench marks to be replaced.

M. Insulated Bushings:

1. Provide insulated bushings on all conduits entering boxes or cabinets.

2. Provide locknuts on both inside and outside of enclosures except where threaded hubs are provided.

3. Bushings not to be used in lieu of locknuts.

N. Vertical Drops:

1. Rigidly support from equipment or building.

2. Unsecured drop length not to exceed 12 feet.

3. Install vertical runs plumb. No diagonal runs.

O. Thruwall Seals: Install for conduits passing through subsurface walls or floor slabs of buildings.

1. Manufacturer:

a. Thunderline “Link Seal”.

b. O-Z/Gedney.

c. Or approved equal.

P. Drainage:

1. Pay particular attention to drainage for conduit runs.

2. Wherever possible, install conduit runs so as to drain to one end and away from buildings.

3. Take extreme care to avoid pockets or depressions in conduit.

Q. Conduit Curb:

1. In concrete slabs or floors, provide a two inch high curb extending two inches from the outer surface of the conduit penetrating the floor, to prevent corrosion.

2. Terminate conduit stub-ups in couplings, slightly above the finished concrete curb.

R. Couplings: Provide full threaded conduit couplings. Split couplings shall not be permitted.

S. For individual exposed conduits passing through floor slabs and walls, install sleeves to protect the conduit against action of alkaline substances which may be present.

T. Before concrete is placed, make the necessary location measurements of the conduit to be embedded so that the information is available to prepare record drawings.

U. Install individual underground conduits 24 inches (minimum) below grade and provide concrete cover above conduits, unless otherwise indicated on the Drawings. Perform all excavation, backfilling, bedding, curbing removal and replacement, concrete encasement, and surface restoration including pavement for underground conduit installation.

V. Core drill for individual conduits passing through existing concrete walls or slabs. Obtain authorization from Owner prior to core drilling. Seal spaces around conduit as per 3.1.O above.

W. Conduit Racks: For rigid galvanized steel conduit systems, provide hot-dip galvanized steel conduit racks of suitable width, length and height and arranged to suit field conditions. For PVC conduit systems, conduit racks shall be fiberglass. Support shall be provided at every ten feet minimum.

X. PVC schedule 80 heavy wall conduit shall be used when entering or exiting new concrete pours, except in hazardous areas where prohibited by code.

Y. Conduit Expansion and Deflection Fittings: Conduit expansion and/or deflection fittings shall be provided wherever conduit crosses a structural expansion joint, is attached between two separate structures or wherever the conduit run is 100 feet or more in a single straight length.

Z. Exposed conduits, boxes and fittings shall be painted in accordance with Specification Section 09 91 13 and 09 91 23.

AA. Install conduit to maintain fire resistance rating of walls and ceilings. Furnish and install a noncombustible compound that functions as a fire stop sealant for conduit penetrations. Compound shall be GyProc Fire-Halt Sealant or approved equal.

3.2 TESTING

A. Test conduits by pulling through each conduit a cylindrical mandrel not less then two pipe inside diameters long, having an outside diameter equal to 90 percent of the inside diameter of the conduit.

B. Maintain a record, by number, of all conduits testing clear.

3.3 IDENTIFICATION

A. Identify all conduits at the ends and in all intermediate boxes, chambers, hand holes and other enclosures. All conduits shall be identified every 75 feet.

B. Conduit numbers shall be assigned in accordance with the Conduit and Cable Schedule.

3.4 SEISMIC RESTRAINT

A. Seismic restraint shall conform to the requirements of section 1621 of the New York State Building Code and the drawings. Shop drawings for the restraining system shall be provided by the manufacturer and shall include seismic analysis certified by a professional engineer licensed by the State of New York and under the employment of the manufacturer of the restraining system. Seismic requirements are defined on the structural drawings and are repeated here for convenience:

1. Seismic Category B

2. Occupancy Group III

3. Importance Factor (Ie) 1.25

B. Any conflict between these requirements and those stated on the structural drawings, the structural drawings shall prevail.

C. All sections within this division shall comply with the above.

+ + END OF SECTION + +

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide underground duct banks as shown and specified.

B. Coordination:

1. Duct bank routing on the Drawings is diagrammatic. Coordinate installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

2. Refer to plans for areas of sheeting and excavation and the Contractor's sequence of construction. Contractor shall schedule his work on duct banks in these areas to run concurrently with that of other trades.

3. The Contractor shall be responsible for excavation, backfilling, curbing removal and replacement, and surface restoration to match existing conditions. Truck vehicle access (H-20 loading) shall be maintained during construction.

C. Related Work Specified Elsewhere:

1. Division 01, General Requirements.

2. Site work shall conform to the requirements of Division 31, Earthwork.

3. Concrete work shall conform to the requirements of Division 03, Concrete.

4. Section 26 05 33, Raceways and Boxes for Electrical Systems.

5. Section 26 05 45, Manholes and Handholes.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.

2. National Electrical Safety Code.

B. Record Drawings: Include the actual routing of underground duct runs on record drawings as specified under Division 01, General Requirements, and General and Special Conditions.

1.3 SUBMITTALS

A. Shop Drawings: Submit the following for approval:

1. Layouts showing proposed routing of duct banks and the locations of hand holes and crossings with piping and other underground structures.

2. Typical cross sections.

3. Installation procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Duct:

1. Schedule 40 PVC conduit and fittings in accordance with Section 16111.

2. Rigid galvanized steel conduit for instrumentation wiring (shielded cable).

B. Backfill: Select backfill in accordance with Division 31, Earthwork.

C. Concrete: In accordance with Division 03, Concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Make duct bank installation and penetrations through foundation walls watertight.

B. Provide excavation and backfilling required for duct bank installation. Where duct banks cross paved areas, maintain vehicle access for H-20 loading.

C. Assemble duct banks using nonmagnetic saddles, spacers and separators. Position separators to provide minimum concrete separation between the outer surfaces of the ducts as shown on the Drawings. Provide side forms for each duct bank.

D. Provide a 2-inch minimum concrete cover on top of conduits, unless otherwise shown.

E. Make bends with sweeps of not less than 48-inch radius or 5 degree angle couplings.

F. Where ducts enter structures such as service cabinet compartments, terminate the ducts in suitable radius bell end fittings or bushings and provide watertight expansion/deflection fittings.

G. Slope duct runs for drainage away from buildings with a slope of approximately 3 inches per 100 feet.

H. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately one-fourth inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to make certain that no particles of earth, sand or gravel have been left in the duct.

I. Install a warning ribbon approximately 12 inches below finished grade over all underground duct banks. The identifying ribbon shall be a polyvinyl chloride tape, 6 inches wide, yellow color, permanently imprinted with “CAUTION BURIED ELECTRIC LINE BELOW” in black letters.

J. Plug and seal watertight all empty spare ducts entering buildings and structures. Seal watertight all ducts in use entering buildings and structures.

K. Contractor shall employ an experienced photographer to photograph underground electrical installations prior to backfilling. Pictures shall not be less than 7-1/2 in. by 9-1/2 in. in size and shall be cloth mounted. Photographs shall be labeled to identify:

1. Conduit sizes.

2. Conduit identification number, label, etc., (conform to record drawing identification).

3. Service(s).

4. Manhole numbers, handhole numbers.

5. Locations - referenced to structures, roadways, etc.

Three copies of each photograph shall be submitted to the Engineer.

+ + END OF SECTION + +

SECTION 26 05 45

MANHOLES AND HANDHOLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide manholes and handholes as shown and specified.

B. Coordination:

1. Coordinate handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

C. Related Work Specified Elsewhere:

1. Site work shall conform to the requirements of Division 31, Earthwork.

2. Concrete work shall conform to the requirements of Division 03, Concrete.

3. Division 05, Metals.

4. Section 260543, Underground Ducts and Raceways for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.

2. National Electrical Safety Code (ANSI C2).

3. ASTM A48, Standard Specification for Gray Iron Castings.

4. OSHA.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit for approval copies of manufacturer's technical information for handholes and accessories proposed for use, including handhole castings, cable racks and accessories proposed for use.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Manholes:

1. Material and Construction: Cast-in-place reinforced concrete shall meet the requirement of Division 3, Concrete.

2. Accessories:

a. Frames and Covers:

1) Material: Cast iron.

2) Covers shall be watertight and gasketed.

3) Covers shall be marked "ELECTRIC" in raised two inch letters.

4) Frame shall be grouted on the handhole.

5) Rated for H20 loading.

6) Product and Manufacturer: Provide one of the following:

a) Campbell Foundry (Harrison, New Jersey), refer to manhole and/or handhole details on Drawings for model number.

b) Or approved equal.

B. Handholes:

1. Material and Construction: Polymer concrete, rated for H2O loading.

2. Cover shall be engraved “Electric” or “Communications” as appropriate.

3. Product and Manufacturer: Quazite PG style or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install manholes and handholes where shown on Drawings. Verify final locations in field. Contractor shall be responsible for all excavation, backfilling and all other site work required for installation.

B. Complete installation of handholes so that structures are watertight.

C. Provide dewatering operations as required during construction of the handholes and ductbank system.

D. The minimum interior dimensions shall be as indicated on the drawings.

E. Duct entrances shall be sized and located to suit duct banks.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 26 05 73

ELECTRICAL SYSTEMS ANALYSIS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Power system studies shall be provided in accordance with the requirements specified under this section.

B. The power system studies shall consist of a short circuit analysis, protective device coordination analysis and arc-flash hazard analysis. The studies shall include the existing 480/277 volt main distribution panel, new 480/277 volt and 208/120 volt panelboards and new dry-type transformers.

1.2 REFERENCES

A. The power distribution system coordination shall comply with the latest applicable provisions and recommendations of the following:

1.	NFPA 70	-	National Electrical Code
2.	ANSI Standard C37.04	-	Rating Structure for AC High Voltage Circuits Rated on a Symmetrical Basis
3.	ANSI Standard C37.010	-	Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Basis
4.	IEEE 141	-	Recommended Practice for Electric Power Distribution in Industrial Plants
5.	IEEE 399	-	Recommended Practice for Industrial and Commercial Power System Analysis

1.3 SUBMITTALS

A. Contractor shall submit the short circuit and protective device coordination studies for approval as follows:

1. Calculations and results of the power system studies shall be submitted. The short circuit study, protective device evaluation and coordination studies shall be submitted in a report format. The report shall be stamped and signed by a Licensed Professional Engineer.

2. Qualifications of proposed firm to provide the power system studies.

1.4 QUALITY ASSURANCE

A. General:

1. The power system studies shall be performed in accordance with the latest applicable provisions and recommendations of the following:
   a. NFPA 70, National Electrical Code
   b. ANSI C37.04
   c. ANSI C37.010
   d. IEEE 141
   e. IEEE 399

2. The Contractor shall retain the services of a Professional Engineer, licensed in the State of New York, to perform the power system studies.

3. The Contractor shall coordinate with the Engineer performing the studies and assist him in the collection of all information necessary to complete the studies specified.

4. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the U.S. National Institute of Standards and Technology and the NETA maintenance testing specification.

PART 2 – PRODUCTS

2.1 POWER SYSTEM STUDIES

A. General:

1. The Contractor shall provide a current and complete short-circuit study, protective device coordination study and arc flash hazard analysis for the electrical distribution system.

2. The studies shall include all portions of the electrical distribution system as described herein.

3. Problem areas or equipment inadequacies shall be promptly brought to the Engineer's attention.

B. Short Circuit Study:

1. The short circuit study shall be performed with the aid of a computer program.

2. The study input data shall include the utility company's short circuit, single and three phase contributions, with the X/R ratio, the resistance and reactance components of each branch impedance, motor and generator contributions, base quantities selected, and all other applicable circuit parameters.

3. Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.

4. The short circuit tabulations shall include symmetrical fault currents, and X/R ratios. For each fault location, the total duty on the bus, as well as the individual contribution from each connected branch, including motor back EMF current contributions shall be listed with its respective X/R ratio.

C. Protective Device Coordination Study:

1. A protective device coordination study shall be performed to select or to check the selections of the power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and setting.

2. The overcurrent device settings computed in the coordination study shall provide complete 100 percent selectivity. The system shall be selectively coordinated such that only the device nearest a fault will operate to remove the faulted circuit. System selectively shall be based on both the magnitude and the duration of a fault current.

3. The coordination study shall include all voltage classes of equipment starting at the utility's incoming line protective device down to and including

each of the medium and low voltage equipment. The phase and ground overcurrent and ground fault protection shall be included, as well as settings for all other adjustable protective devices.

4. The time-current characteristics of the installed protective devices shall be plotted on the appropriate log-log paper. Reasonable coordination intervals and separation of characteristic curves shall be maintained. The coordination plots for phase and ground protective devices shall be provided on a complete system basis. Sufficient curves shall be used to clearly indicate selective coordination achieved to the utility main breaker, power distribution feeder breakers, and the overcurrent devices at each major load center.

5. There shall be a maximum of eight protective devices per plot. Each plot shall be appropriately titled. Plots shall include the following information as required for the circuits shown:

   a. Representative one-line diagram, legends and types of protective devices selected.

   b. Power company's relays or fuse characteristics.

   c. Significant motor starting characteristics.

   d. Parameters of transformers, ANSI magnetizing inrush and withstand curves.

   e. Operating bands of low voltage circuit breaker trip curves, and fuse curves.

   f. Relay taps, time dial and instantaneous trip settings.

   g. Cable damage curves.

   h. Symmetrical and asymmetrical fault currents.

6. The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system.

D. Arc-Flash Hazard Analysis

1. The Arc-Flash Hazard Analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.

2. The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.

3. Results of the Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.

4. The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

5. The Arc-Flash Hazard Analysis shall be performed by a registered professional engineer.

6. The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE *Guide for Performing Arc-Flash Calculations*.

7. The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.

2.2 STUDY REPORT

A. The results of the power system study shall be summarized in a final typewritten report. The report shall include the following Sections:

1. Description, purpose, basis, written scope, and a single-line diagram of the power distribution system which is included within the scope of the study.

2. Tabulations of circuit breaker, fuses, and other equipment ratings versus calculated short-circuit duties, and commentary regarding same.

3. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.

4. Fault current tabulation including a definition of terms and a guide for interpretation.

5. Tabulation of appropriate tap settings for relay seal-in units.

6. Incident energy and flash protection boundary calculations, including the following: racing fault magnitude; protective device clearing time; duration of arc; working distance; incident energy; hazard risk category; recommendations for arc flash energy reduction; and recommendations for the Personal Protective Equipment (PPE).

PART 3 - EXECUTION

3.1 FIELD TESTING

A. Coordinate findings of the short circuit study and protective device coordination study with the electrical distribution equipment.

3.2 ARC FLASH WARNING LABELS

A. The Contractor shall provide a 3.5-inch by 5-inch thermal transfer type label of high adhesion polyester for each work location analyzed.

B. All labels shall be based on recommended overcurrent device settings and shall be provided after the results of the analysis have been presented to the Engineer and after any system changes, upgrades, or modifications have been incorporated in the system.

C. The label shall include the following information, at a minimum: location designation; nominal voltage; flash protection boundary; hazard risk category; incident energy; working distance; and engineering report number, revision number and issue date.

D. Labels shall be machine printed with no field markings.

E. Arc flash labels shall be provided in the following manner, and all labels shall be based on the recommended overcurrent device settings:

1. For each panelboard, one arc flash label shall be provided.

2. For main incoming switchgear and motor control centers, one arc flash label shall be provided for each of them.

3. Labels shall be field installed by the approved firm performing the arc flash hazard analysis study.

3.3 ARC FLASH TRAINING

A. The Professional Engineer performing the arc flash analysis shall train the Owner’s personnel of the potential arc flash hazards associated with working on energized equipment.

+ + END OF SECTION + +

SECTION 26 22 00

LOW VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide dry type transformers as shown and specified.

B. Related Work Specified Elsewhere:

1. Division 03, Concrete.

2. Section 26 24 16, Panelboards.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. ANSI C57.12, General Requirements for Dry-Type Distribution and Power Transformers.

2. UL 506, Standard for Specialty Transformers.

3. UL 1561, Standard for Dry-Type General Purpose and Power Transformers.

4. National Electrical Code.

5. 2016 DOE Efficiency Standards.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer’s technical information for transformers proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dry Locations:

1. Type: General purpose, dry type, high efficiency, 60 Hz.

2. Rating: kva, primary voltage and connection, secondary voltage and connection, and number of phases shall be as indicated on the Drawings.

3. Taps: Full capacity, two 2-1/2 percent primary taps above normal and two 2-1/2 percent primary taps below normal.

4. Sound Level: ANSI C89.2 standard.

5. Enclosure: Open type for mounting in motor control centers; ventilated for separately mounted transformers.

6. Insulation: Class 220°C, 80°C rise.

7. Identification: Diagrammatic nameplate identifying the transformer number and voltage.

8. Product and Manufacturer: Provide equipment manufactured by the following:

   a. Cutler-Hammer.

   b. Or approved equal.

B. Damp Locations:

1. Type: General purpose, dry type, high efficiency, 60 Hz, with weathershield.

2. Rating: kva, primary voltage and connection, secondary voltage and connection, and number of phases shall be as indicated on the Drawings.

3. Taps: Full capacity, two 2 1/2 percent primary taps above normal and four 2 1/2 percent primary taps below normal.

4. Sound Level: ANSI C89.2 standard.

5. Insulation: Class 220°C, 80°C rise.

6. Identification: Diagrammatic nameplate identifying the transformer number and voltage.

7. Product and Manufacturer: Provide equipment manufactured by the following:

   a. Cutler-Hammer.

   b. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Transformers shall be furnished and installed as an integral part of the motor control center where specified.

B. Mount transformers so that vibrations are not transmitted to the structural parts of the building.

C. Adjust tap settings to provide proper voltage at panelboards.

D. Ground transformers in conformance with the National Electrical Code.

E. Conduit connections within two feet of transformer shall be made with flexible conduit.

F. Floor mounted transformers shall be installed on vibration isolators and concrete pads designed to minimize noise transmission.

G. Provide top jumper cables.

+ + END OF SECTION + +

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SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide lighting and distribution panelboards as shown and specified.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 408, Switchboards and Panelboards.

2. UL 50, Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations.

3. UL 50E, Standard for Enclosures for Electrical Equipment, Environmental Considerations.

4. UL 67, Standard for Panelboards.

5. NEMA PB1, Panelboards.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer's technical information for panelboards, including circuit breakers, and schedules for particular panelboards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Panelboards:

1. Rating: voltage rating, current rating, number of phases, number of wires and number of poles shall be as indicated on the Schedules.

2. Circuit breakers: Molded case, thermal magnetic type with number of poles and trip ratings as shown on the Drawings. Ground fault circuit interrupter (GFI) breakers shall be furnished as shown on panelboard schedule (UL Class A 4-6 mA for receptacles and UL Class B 30 mA for heat trace cable).

3. Branch circuit interrupting capacity: Refer to panel schedules on Drawings.

4. Bus Bars: 98 percent conductivity copper. All 4-wire panelboards shall have a solid neutral bar. All panels shall have ground bus.

5. Main: Circuit breaker or main lugs only as indicated on the Schedules.

6. Branch circuit breakers connected for sequence phasing.

7. Construction: Ample gutter space, flush door, flush snap latch and lock. Panelboards shall be rated NEMA 12 in dry locations and NEMA 4X (stainless steel) in damp locations.

8. Trim: Surface as required to meet requirement of mounting.

9. Directory: Typed card with glass cover in frame on back of door giving the circuit numbers and the area or equipment served.

10. Identification: Nameplate identifying the panel number and voltage.

11. Product and Manufacturer: Provide one of the following:

    a. 120/208 Volt and 120/240 Volt Panels:

        1) Cutler-Hammer.

        2) Or approved equal.

    b. 480/277 Volt Panel:

        1) Cutler-Hammer.

        2) Or approved equal.

    c. 480-240/120 Volt Mini-Power Zone

        1) Cutler-Hammer.

        2) Or approved equal.

12. Schedules: The panelboard schedules are on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting: Panelboards shall be flush mounted in the motor control center or surface mounted, and provided with hinged cover door with latch, lock, and 4 keys.

B. Directory: Complete typewritten directory indicating items controlled by each circuit breaker and the size of feeder serving the panel. The location and identification of feeder overcurrent device serving the panel shall be mounted on the panelboard.

C. Balance the loads on the panelboards.

3.2 SEISMIC RESTRAINT

A. Seismic restraint shall conform to the requirements of section 1621 of the New York State Building Code and the drawings. Shop drawings for the restraining system shall be provided by the manufacturer and shall include seismic analysis certified by a professional engineer licensed by the State of New York and under the employment of the manufacturer of the restraining system. Seismic requirements are defined on the structural drawings and are repeated here for convenience:

1. Seismic Category B

2. Occupancy Group III

3. Importance Factor (I_e) 1.25

B. Any conflict between these requirements and those stated on the structural drawings, the structural drawings shall prevail.

C. All sections within this division shall comply with the above.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide switches for lighting and other systems as shown and specified.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.

1. National Electrical Code.

2. UL 20, Standard for General-use Snap Switches.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer's technical information for switches proposed for use.

PART 2 - PRODUCTS

2.1 SWITCHES

A. Dry Locations: Single pole AC toggle switch, quiet type, 120/277 volt AC, 20 ampere, Ivory, specification grade.

1. Product and Manufacturer: Provide one of the following:

a. Cat. #1221-I, by Harvey Hubbell Incorporated (3-way: Cat. #1223-I).

b. Cat. #1991-I, by Arrow-Hart Incorporated (3-way: Cat. #1993-I).

c. Or approved equal.

B. Damp Locations: 120 v AC, 20-ampere single pole snap switch, aluminum, weathertight.

1. Product and Manufacturer:

a. Series EDS by Crouse Hinds.

b. Or approved equal.

C. Corrosive Locations: NEMA 4X PVC box and cover. Furnish and install AC toggle switch (as specified above) in PVC box with toggle switch cover.

1. Product and Manufacturer:

a. PVC box with Model E98TSC cover, by Carlon.

b. Or approved equal.

D. Contactors, where indicated, shall control lighting. Contactors shall be mechanically held, 277 volts, suitable for two-wire control. Specific model numbers shown on Drawings.

1. Product and Manufacturer:

a. Square D.

b. Or approved equal.

2.2 RECEPTACLES

A. Dry Locations: Duplex grounding receptacle, two pole, three wire, 125 volt AC, 20 ampere.

1. Product and Manufacturer: Provide one of the following:

a. Cat. #5362, by Harvey Hubbell Incorporated.

b. Cat. #5362, by Arrow-Hart Wiring Devices.

c. Or approved equal.

B. Damp Locations and Corrosive Locations: Duplex grounding receptacle, corrosion resistant, two pole, three wire, 125 volt AC, 20 ampere.

1. Product and Manufacturer: Provide one of the following:

a. Cat. #53CM62, by Harvey Hubbell Inc.

b. Cat. #5362-CR, by Arrow-Hart Wiring Devices.

c. Or approved equal.

C. Ground Fault Circuit Interrupter Receptacles: Provide GFCI receptacles as shown on the Drawings. GFCI receptacles in unclassified areas shall be duplex grounding, two pole, three wire, 125 volt AC, 20 ampere.

1. Product and Manufacturer:

a. Cat. #GF5362, by Harvey Hubbell Inc.

b. Cat. #GF5342, by Arrow-Hart Wiring Devices.

c. Or approved equal.

D. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown on the Drawings. Coordinate with equipment plugs. Provide matching plug for each receptacle. Coordinate with cables provided with equipment.

2.3 DEVICE BOXES

A. Material: Cast gray iron alloy, or cast malleable iron, with zinc electroplate finish in dry and damp locations (weathertight in damp locations), and weather tight PVC in corrosive locations. Boxes shall include external mounting lugs.

B. Device Cover Plates (Receptacles and Miscellaneous Items Only):

1. Stainless steel Type 304 alloy for dry and damp locations. Weathertight PVC for corrosive locations.

2. Weather tight, gasketed spring door cover for devices in damp locations, and corrosive locations. Aluminum in damp locations, PVC in corrosive locations.

3. Stainless steel screws and hardware.

C. Manufacturers: Provide material manufactured by one of the following:

1. Crouse-Hinds Company.

2. Appleton Electric Company.

3. Carlon Electrical Products.

4. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount wall switches 4 feet 6 inches above finished floor unless otherwise noted.

B. Install switches in conformance with National Electrical Code.

+ + END OF SECTION + +

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide disconnect switches as shown and specified and as required by the National Electrical Code.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.

2. UL 98, Standard for Enclosed and Dead-front Switches.

3. NEMA KS1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer's technical information for disconnect switches proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Disconnect Switches (Single Throw):

1. Type: Unfused, service entrance equipment rated where applicable; horsepower rated, heavy-duty, single throw, two pole and three pole with visible blade and safety handle, lockable in the open position.

2. Enclosure: NEMA 12 for dry locations, NEMA 4X stainless steel for damp locations and NEMA 4X fiberglass for corrosive areas.

3. Provide nameplate identifying equipment being disconnected.

4. Product and Manufacturer: Provide material manufactured by one of the following:

   a. Crouse-Hinds Company.

   b. Appleton Electric Company.

   c. Square D.

   d. Or approved equal.

B. Disconnect switch voltage ratings shall be suitable for equipment served.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance. Mount all disconnect switches four feet above floor level.

B. Securely fasten equipment to walls or other structural surfaces on which they are mounted. Provide independent supports (galvanized steel in dry locations, stainless steel in damp and corrosive locations) where no wall or other structural surface exists.

C. Furnish and install disconnect switches where shown on the drawings.

D. Furnish and install disconnect switches, as a minimum, in all locations required by the National Electrical Code.

+ + END OF SECTION + +

SECTION 26 29 00

MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide individually mounted magnetic and manual motor starters as shown and specified.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable, provisions, and recommendations of the following except where otherwise shown or specified.

1. NEMA Standard ICS2, Industrial Control and Systems: Controllers, Contactors and Overload Relays Rated Not More Than 2,000 Volts AC or 750 Volts DC.

2. UL Electrical Construction Materials Directory (NLDX).

3. National Electrical Code.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval, copies of manufacturer's technical information for magnetic motor starters proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Magnetic Motor Starters:

1. Type: Magnetic coil operated, horsepower rated with thermal overload protection.

2. Combination starter with magnetic only motor circuit protector.

3. Enclosures:

a. NEMA 12 in dry locations.

b. NEMA 4X stainless steel in damp locations.

c. NEMA 4X polycarbonate in corrosive locations.

4. Functional Type: Full voltage, single speed, nonreversing unless otherwise noted on Drawings.

5. Start/stop control stations, selector switches, pilot lights and devices as shown on Drawings, and in Schematic Diagrams, for respective starters.

6. Control power transformer with primary and secondary fuses and grounded on low voltage (120 v) side for each starter.

7. Auxiliary contacts for remote status signals and interlocks as shown on the Drawings, and two normally open, and two normally closed, spare contacts.

8. Three-phase, manual reset overload relays and overload heaters sized to coordinate with actual motors being controlled.

9. Engraved phenolic nameplate identifying the equipment controlled; 1/2-inch letters, mounted on wall or suitable support adjacent to starter, if too large to be mounted on the starter itself.

10. Products and Manufacturers: Provide one of the following:

a. A200 series by Cutler-Hammer.

b. Bulletin 512 by Allen Bradley.

c. Class 8539 by Square D Company.

d. Or approved equal.

B. Manual Motor Starters:

1. Type: Manual toggle switch, horsepower rated with thermal overload protection.

2. Enclosures:

a. NEMA 12 in dry locations.

b. NEMA 4X stainless steel in damp locations.

c. NEMA 4X polycarbonate in corrosive locations.

3. Manual reset overload relays and overload heaters sized to coordinate with actual motors being controlled.

4. Engraved phenolic nameplate identifying the equipment controlled: 1/2-inch letters, mounted adjacent to starters on wall or suitable support.

5. Products and Manufacturers: Provide one of the following:

   a. Type B100 by Cutler-Hammer.

   b. Class 2510 by Square D Company.

   c. NFS series by Crouse Hinds (NEMA 4X).

   d. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount equipment so that sufficient access and working space is provided for safe operation and maintenance.

B. Securely fasten enclosure to wall or other mounting surfaces. Where local wall is not available, provide channel supports (galvanized steel in dry locations, stainless steel in damp and corrosive locations) to rigidly support equipment reasonably close to motor. Space starter enclosures 1/2 inch from mounting surface.

C. Install in conformance with the National Electrical Code.

+ END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 26 50 00

LIGHTING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: Contractor shall furnish all labor, materials, equipment and incidentals required to provide lighting fixtures as shown and specified.

B. Coordination: Coordinate location of fixtures with piping, ductwork, openings and other systems and equipment and locate clear of interferences.

C. Related Work Specified Elsewhere:

1. Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables.

2. Section 26 27 26, Wiring Devices.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.

2. UL 1598, Standard for Luminaires.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval copies of manufacturer's technical information for lighting fixtures, including ballasts.

1.4 SPARE PARTS

A. LED Fixtures: One of each fixture type required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type: Fixtures to be complete with supports, lamps and incidentals as required.

B. Hardware: All necessary hangers, supports, conduit adaptors, reducers, hooks, brackets and other hardware required for safe fixture mounting shall be furnished. Hardware shall be stainless steel.

C. Schedule: The lighting fixtures shall be provided in accordance with the schedule on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Fixture mounting heights and locations indicated on the Drawings are approximate and are subject to revision in the field where necessary to clear conflicts and obstructions.

B. Suspended Fixtures: Pendant mount using 1/2-inch conduit stems. Ground to outlet box. Attach mounting to building structure with expansion anchors.

C. Surface Mounted Fixtures: Attach to appropriate outlet box.

D. Boxes and Fixtures:

1. For units mounted against masonry or concrete walls, provide suitable 1/2-inch spacers to prevent mounting back of box directly against wall.

2. Bolt units rigidly to building with expansion anchors, toggle bolts, hangers or Unistrut.

3. No boxes shall be installed with open conduit holes.

4. Cable each circuit and identify with tag.

E. Mounting Heights: Mounting heights or elevations are to bottom of the fixture or to centerline of device.

F. Install fixtures in conformance with the National Electrical Code.

+ + END OF SECTION + +

SECTION 26 55 68

POOL LIGHTING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: The Contractor shall furnish all labor, materials, equipment and incidentals to provide a pole-mounted lighting system for the pool as shown and specified.

1.2 RELATED SECTIONS

A. Division 03, Concrete.

1.3 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

2. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).

3. ANSI/NFPA 70 - National Electrical Code.

4. New York State Sanitary Code - Part 6, Subpart 6-1, Swimming Pools.

5. AASHTO - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

1.4 SYSTEM DESCRIPTION

A. Lighting of pool water surface, and surrounding deck area, as required by New York State Sanitary Code, and as further specified herein.

B. System Control

1. Power to the lights shall be supplied from a new panelboard, and a main contactor. The contactor shall be manually controlled by an on/off selector switch.

1.5 DESIGN REQUIREMENTS

A. Design and layout lighting system in conformance with IES recommended procedures using IES standard computer program and luminaire data to generate point by point lighting calculations.

1.6 PERFORMANCE REQUIREMENTS

A. Minimum maintained illumination level on pool water surface and five feet beyond the edge of the pool: 50 FC.

B. Maximum to minimum ratio for pool water surface shall not exceed 1.4.

C. Luminaires used for pool and deck areas shall not exceed a total of 28, 831W, LED luminaires.

D. Maximum wattage and type of lamps: 831 watts, LED.

E. Maximum power used for pool lighting system shall not exceed 26 kva.

F. Maximum current of lighting system on balanced three phase system, at a minimum power factor of 0.9 shall not exceed 73 amperes per phase.

1.7 SUBMITTALS

A. Shop Drawings: Indicate locations and aiming angles of all luminaires.

B. Product Data: Provide dimensions, ratings, and performance data, for poles and luminaries.

C. Design Data: Include lighting calculations and site plan showing illumination levels.

D. Test Reports: Indicate measured illumination levels.

E. Manufacturer’s Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under “Regulatory Requirements.”

F. Manufacturer’s Instructions: Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.8 PROJECT RECORD DOCUMENTS

A. Submit field test photometric data certified by independent Engineer.

B. Accurately record actual locations and aiming angles of each luminaire.

1.9 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include instructions for maintaining luminaires.

1.10 QUALIFICATIONS

A. Manufacturer: Companies specializing in manufacturing products specified in this section with documented experience.

1.11 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. on a testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site prior to installation.

B. Accept products on-site. Inspect for damage.

C. Protect poles from finish damage by handling carefully.

D. Install poles using mechanical equipment which does not exceed allowable loading of deck slabs.

1.13 SPARE PARTS

A. Provide 15% spare fixtures (based on total installed).

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish products as per the schedule on the Drawings.

2.2 POLES

A. Material and Finish: Steel, hot dipped galvanized per AASHTO standards.

B. Section Shape and Dimensions: Round tapered.

C. Height: 25 feet.

D. Base: Tapered base with fully concealed mounting bolts, handhole with tamperproof screws.

E. Accessories:

1. Top tenon brackets to accommodate luminaires, brackets, and flexible cords with connectors. Finish to match pole.

2. Top handhole.

F. Loading Capacity Ratings:

1. Luminaire weight: 81 pounds.

2. Luminaire and bracket effective projected area: Confirm based on fixture tilt.

3. Steady wind: 100 miles per hour.

4. Maximum number of luminaires per pole: 4.

5. Maximum number of poles: 10.

G. Manufacturer and Model: Refer to schedule on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate pole anchor bolts, bolt template, and pole base conduits with pole base.

B. Install in accordance with manufacturers' instruction.

C. Install lighting poles at locations indicated.

D. Install poles plumb - double nuts to adjust plumb. Grout around each base.

E. Install lamps in each luminaire.

F. Bond luminaires, metal accessories and metal poles to branch circuit equipment grounding conductor and pool bonding conductor.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

B. Measure and record illumination levels to verify conformance with performance requirements.

C. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring said moon.

3.3 ADJUSTING

A. Aim and adjust luminaires to provide illumination levels and distribution as directed by system supplier to achieve certified illumination levels.

3.4 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage, including galvanized surfaces.

+ + END OF SECTION + +

NO TEXT ON THIS PAGE

SECTION 27 13 23

FIBER OPTIC CABLE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to install, and place into successful operation, fiber optic cable and appurtenances. The system includes, but is not limited to, fiber optic cables, connectors, patch panels, enclosures and related appurtenances.

2. Fiber optic cable shall be installed, as shown on the Drawings and specified herein.

3. Fiber optic cable shall be coordinated with IT system hardware.

1.2 SUBMITTALS

A. Shop Drawings

Submit for approval the following:

1. Manufacturer's product data sheets and complete construction details, including physical characteristics of optical fiber, strength members, and jackets.

2. Overall dimension of cable.

3. Cable pulling plan which specifies the sequence of work tasks, materials, and equipment. The information submitted must include splicing and termination data, including the following:

   a. List of materials

   b. Method of connecting cables

   c. Details of cable preparation

   d. Method of applying materials (including quantities)

   e. Precautionary measures

f. Drawings showing method of splicing, including dimensions

g. Written statement from cable manufacturer that splices and terminations submitted are acceptable.

h. Written statement from the termination/splice manufacturer that the splices and terminations are suitable for the proposed application.

4. Cable manufacturer's certified test data for attenuation and bandwidth and the maximum pulling strain allowed.

5. Provide an optical link analysis for each fiber optic link. Calculate point-to-point (transmit/receive) optical power loss of each fiber link using proposed installed cable lengths. Include all losses through connectors. Submit calculated values, including sketches graphically showing the proposed cable route.

6. Installer and field advisor qualification data, including name, employer, experience with fiber installations, including a list of completed installations, and the names of five references for installations completed that are similar in scope to this project.

1.3 SAMPLES

A. Provide 2-foot samples of each type of cable.

B. Sample of each type of splicing and termination material.

1.4 QUALITY ASSURANCE

A. Installers shall be personally experienced in the installation of optical fiber systems and shall have been regularly engaged in the installation of fiber cable for a minimum of the past three years.

B. The installer shall retain the services of a field advisor from the manufacturer for the following:

1. Render advice regarding method of cable installation.

2. Inspection of equipment for installing cable.

3. Witness representative amount of cable pulling.

4. Witness the installation of at least one splice and termination performed by each cable installer.

5. Witness the after installation test.

6. Certify with an affidavit that the aforementioned particulars are satisfactory and the cable is installed in accordance with cable manufacturer's recommendations.

C. Provide all products in this section from the same supplier.

D. Provide all cable in accordance with the listing requirements of Article 770 of the National Electrical Code.

1.5 DELIVERY, STORAGE AND HANDLING

A. Cable Delivery:

1. No cable over 1-year old is acceptable for delivery.

2. Ends of cables are to be kept sealed at all times, except when making splices and terminations. Use methods approved by the cable manufacturer.

3. Include the following data on each reel:

a. Facility Name and Address.

b. Contractor's Name.

c. Project Title and Number.

d. Date of Manufacture.

e. Manufacturer's Name.

f. Linear Feet.

g. Project specific locations specific cable is to be installed.

B. Cable Storage: Store cable where the temperature shall be at temperature recommended by the manufacturer for optimum workability.

PART 2 - PRODUCTS

2.1 FIBER OPTIC CABLE

A. Provide multimode graded index, buffered, optical glass fiber cores compatible with LED-based transmission systems and suitable for fiber optic Ethernet LAN standards. Cable with plastic fiber core construction shall not be used. The number of cables and the number of fibers in each cable shall be as shown on the drawings. The cable shall be provided

with the necessary number of splitter kits to accommodate the number of terminations shown for each interconnection box on the drawings. Cable shall have PVC jacket and shall be suitable for indoor/outdoor use, UL listed type OFNR. Cable shall be UV, water and fungus resistant.

B. Cable Characteristics:

1.	Attenuation Loss:	less than 3.5 dB/km @ 850 nm less than 1.5 dB/km @ 1,310 nm
2.	Bandwidth: (LED)	200 MHz-km @ 850 nm 500 MHZ-km @ 1,310 nm
3.	Gigabyte Ethernet Distance:	300 meters @ 850 nm 600 meters @ 1,310 nm
4.	Fiber Size:	62.5/125 micron (core/cladding)
5.	Fiber Count:	As per Drawings.
6.	Fiber Type:	Glass
7.	Nominal Cable Diameter:	0.22 inches (for all fiber counts)
8.	Nominal Cable Weight:	22 pounds per 1,000 feet
9.	Crush Resistance:	1,800 N/cm
10.	Maximum Tensile Load (installation):	310 pounds
11.	Maximum Tensile Load (in-service):	100 pounds
12.	Minimum Bend Radius (installation):	3.4 inches
13.	Minimum Bend Radius (in-service):	2.2 inches
14.	Operating Temperature:	-40 to +85 degrees C

C. Product and Manufacturer:

1. Optical Cable Corporation DX Series

2. Or approved equal

2.2 FIBER OPTIC PATCH PANELS

A. Fiber optic patch panels shall provide termination and connection points for fiber optic cables. NEMA rating of panel enclosures shall as indicated on the Drawings. Enclosures shall have fiber cable hoops to maintain orderly fiber cable management. Enclosures shall have lockable hasps.

B. Patch panels shall include fiber optic adapter plates, dual LC type, multimode, ceramic sleeve. Ports shall be provided to match fiber quantity in cable. Ports shall be identified.

C. Product and Manufacturer:

1. Optical Cable Corporation

2. Or approved equal

2.3 TERMINAL CONNECTORS

A. Furnish connectors and components and use specific tools and methods as recommended by the connector manufacturer to form a complete connector system.

B. Provide fiber optic LC compatible simplex connectors; multimode version. Composite body with a ceramic ferrule.

1. Connector Specifications:

a. Insertion Loss (typical): .20 dB

b. Durability Delta (500 rematings): $\leq$ 0.2 dB

c. Operating Temperature: -40 to +75 degrees C

d. Tensile Strength: 15 pounds

2.4 FIBER OPTIC JUMPER CABLES

A. Provide fiber optic jumper cables, 2 feet in length, 62.5/125 micron multimode fiber compatible with fiber cable specified under paragraph 2.01, complete with LC connectors, and PVC jacket. Provide a quantity equal to the total number of fibers terminated.

B. Product and Manufacturer:

1. Optical Cable Corporation

2. Or approved equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cable and connectors as indicated on the Drawings and as specified in this section.

B. Install cables in the indicated raceway systems. Inspect raceways prior to pulling cables. Rod and swab out conduits and ducts prior to installing cables.

C. Pull cables prior to attachment of connectors. Terminate indicated fibers at each patch panel. Install jumper cables at each patch panel as shown, or as directed by the Engineer.

D. Pull cables using an indirect attachment method such as a “Kellems Grip,” which distributes the pulling forces over the outer portion of the cable. Pulls directly on the fiber core will not be allowed.

E. Do not exceed maximum pulling strength limits of the cable during installation. Monitor cable pull tensions at all times during the installation of the cable using a remote sensing puller, strain gauge or running line tensiometer. If electronic tension monitoring equipment is used, it shall be calibrated or checked for calibration on a daily basis or prior to any cable pull.

F. To reduce cable friction and minimize pulling forces during installation, use a polymer based water soluble lubricant when pulling cable.

G. Do not exceed the minimum bend radius of the cable. Tight loops, kinks, knots or tight bends will not be allowed during installation.

H. For conduit installation, the minimum bending radius shall be 8 inches. Use sweeping elbows at all transitions from horizontal to vertical conduit runs.

I. Provide adequate lengths of cable such that all runs, from termination-to-termination are without splices. Cable splices shall be avoided to the greatest extent possible. Where splice are required they shall be done with the approval of the Engineer and in accordance with the manufacturer’s recommendations.

J. Provide pull boxes as required by the cable manufacturer or at a minimum of every 200 feet or at the third 90 degree conduit bend.

K. Furnish and install patch panels as required.

3.2 IDENTIFICATION

A. Label each termination point.

B. Tag each cable in junction boxes and pull boxes. Tags shall indicate the cable number, date installed, type of cable and manufacturer. Attach tags to cable with nonferrous metal wire.

3.3 CHECKOUT AND TESTING

A. Test fiber optic cables before and after field installation. Tests shall be witnessed by the Engineer.

1. Upon receipt of the fiber optic cable reels, test each fiber separately with an Optical Time Domain Reflectometer (OTDR) to verify fiber length, attenuation and continuity.

2. After the cable has been installed, visually inspect each fiber termination for out-of-round conditions and surface defects such as cracks and micro-chips using a 200x inspection microscope.

3. After connectors have been attached at both ends, test each fiber with an OTDR. Tests shall be bi-directional.

4. Test all fibers, including spares.

B. Furnish certification documents for each test and record the following data. Include printouts from the OTDR with the certification documents.

1. Installer’s company name and address.

2. Installer’s name.

3. Date of certification.

4. Attenuation of each fiber link.

5. Length of each fiber optic link measured.

6. Equipment used to certify the fiber optic link.

7. Name of person(s) recording the test data.

C. Power meters shall have calibrations traceable to National Institute of Standards and Technology (NIST) standards.

D. The maximum total loss, including connectors and cable attenuation for each fiber optic link shall not exceed 7.5 dB.

+ + END OF SECTION + +

SECTION 27 20 00

IT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. The Contractor shall furnish all labor, materials, equipment and incidentals for the modifications to the IT System as follows:

   a. Demolition of the existing IT System hardware and related cabling as shown on the Drawings. The IT System hardware is located in the Ticket Booth, which is required to be demolished.

   b. The Contractor shall furnish and install all interconnecting conduit and wiring as required from the proposed IT System hardware in the IT closets to the equipment and devices, as well as receptacles in the IT closets for the IT hardware.

   c. The County IT Department will furnish and install the IT system hardware in the IT closets.

   d. The County IT Department will integrate the proposed IT system into the existing facility IT System. The Contractor shall be responsible for the cabling and interconnections.

1.2 QUALITY ASSURANCE

A. County IT Department

1. The work shall be performed in conjunction with the County IT Department.

B. Reference standards: The Security system supplier and Contractors shall comply with applicable provisions and recommendations of the following:

1. National Electrical Code

2. Underwriters Laboratories, Incorporated

3. Factory Mutual

4. National Electrical Manufacturers Association

5. Occupational Safety and Health Act.

C. Related Work Specified Elsewhere

1. Division 01, General Conditions.

2. Division 26, Electrical.

3. Section 27 13 23, Fiber Optic Cable.

1.3 SUBMITTALS

A. Shop Drawings: The Contractor shall submit for approval the following:

1. Manufacturer's literature, illustrations, specifications and engineering data, including: general arrangement, outline drawings, dimensions, materials, size, weight, and performance dates.

2. Fabrication, assembly and installation drawings and details, including all wiring diagrams.

3. Layout drawings clearly indicating all cabling.

4. Description of system operation, including wireless access points, communication between access points and data jacks, firewall, ethernet switch, etc.

5. Construction coordination summary including equipment delivery and installation dates for principal equipment items, testing schedule, and programming and startup schedule.

6. Interconnecting wiring diagrams.

7. Operation and Maintenance Manuals as specified in Division 01.

PART 2 - MATERIALS

2.1 GENERAL

A. Equipment and devices which are required to be connected to the IT System are in the I/O Schedule herein.

B. Upon completion of the building construction and IT equipment installation, the Contractor shall coordinate with the IT vendor to perform termination of instrumentation and control wiring and to perform programming and start-up of the security system.

2.2 I/O SCHEDULE

A. North IT Closet (Room 123)

	Location/Equipment	Description	Connection	Remarks
1	Pool Filter Pump Control Panel (Room 124)	Pool Treatment Equipment Status and Alarms	CAT6 Ethernet	
2	Locker Kiosk, Men's Locker Room (Room 111)	Point of Sale (POS)	CAT6 Ethernet	
3	Locker Kiosk, Men's Locker Room (Room 111)	Point of Sale (POS)	CAT6 Ethernet	
4	Checkpoint (Room 121)	VOIP Telephone	CAT6 Ethernet	
5	Checkpoint (Room 121)	Computer	CAT6 Ethernet	
6	Office (Room 109)	VOIP Telephone	CAT6 Ethernet	
7	Office (Room 109)	Computer	CAT6 Ethernet	
8	"Beach Main" Ticket Booth	VOIP Telephone	CAT6 Ethernet	
9	"Beach Main" Ticket Booth	Security Camera #8	CAT6 Ethernet	
10	"Beach Main" Ticket Booth	Security Camera #9	CAT6 Ethernet	
11	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
12	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
13	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
14	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
15	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
16	"Beach Main" Ticket Booth	Point of Sale (POS)	CAT6 Ethernet	
17	Lobby Ticket Booth (Room 101)	VOIP Telephone	CAT6 Ethernet	
18	Lobby Ticket Booth (Room 101)	Security Camera #13	CAT6 Ethernet	
19	Lobby Ticket Booth (Room 101)	Security Camera #14	CAT6 Ethernet	
20	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
21	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
22	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
23	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
24	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
25	Lobby Ticket Booth (Room 101)	Point of Sale (POS)	CAT6 Ethernet	
26	Bathhouse Lobby (Room 100)	Security Camera #15	CAT6 Ethernet	
27	Bathhouse Lobby (Room 100)	Wifi	CAT6 Ethernet	
28	Bathhouse Vestibule	Security Camera #16	CAT6 Ethernet	

	Location/Equipment	Description	Connection	Remarks
29	North Vendor Space, Breezeway	Security Camera #5	CAT6 Ethernet	
30	North Vendor Space (Vendor)	Point of Sale (POS)	CAT6 Ethernet	
31	Pool Exterior Service Area (PER)	Security Camera #4	CAT6 Ethernet	
32	Pool Deck (emergency phone)	VOIP Telephone	CAT6 Ethernet	
33	Pool Deck	Wifi for pool deck	CAT6 Ethernet	
34	Family Changing Room (Room 105)	Wifi	CAT 6 Ethernet	
35	Bus Entrance Booth	(Existing equipment)	4 Strand Fiber Optic	New fiber to pull box near booth
36	Lawn Area, West of Pool (at Playland Sign)	Security Camera #3	CAT6 Ethernet	
37	Public Address System (pool deck)	Public Address System	CAT6 Ethernet	
38	North IT closet	Card key reader	CAT6 Ethernet	
39	Spare		CAT6 Ethernet	
40	Spare		CAT6 Ethernet	
41	Spare		CAT6 Ethernet	
42	Spare		CAT6 Ethernet	
43	Spare		Fiber Optic	
44	Spare		Fiber Optic	

B. South IT Closet (Room 139)

	Location/Equipment	Description	Connection	Remarks
1	Checkpoint (Room 116)	VOIP Telephone	CAT6 Ethernet	
2	Checkpoint (Room 116)	Computer	CAT6 Ethernet	
3	Locker Kiosk, Women's Locker Room (Room 114A)	Point of Sale (POS)	CAT6 Ethernet	
4	Locker Kiosk, Women's Locker Room (Room 114A)	Point of Sale (POS)	CAT6 Ethernet	
5	Lobby (Room 135)	Card Key Reader	CAT6 Ethernet	
6	Corridor (Room 135)	Security Camera #11	CAT6 Ethernet	
7	Corridor (Room 133B)	Security Camera #10	CAT6 Ethernet	
8	Elevator	Security Camera #12	CAT6 Ethernet	
9	South Vendor Space, Breezeway	Security Camera #6	CAT6 Ethernet	
10	South Vendor Space (Vendor)	Point of Sale (POS)	CAT6 Ethernet	
11	South Vendor Space	Wifi	CAT6 Ethernet	

	Location/Equipment	Description	Connection	Remarks
12	South Side of Pool	Security Camera #1	CAT6 Ethernet	Existing security camera (may need to be replaced if not IP camera)
13	Event Space, Exterior South Wall	Security Camera #7	CAT6 Ethernet	
14	Event Space, Exterior South Wall	Wifi	CAT6 Ethernet	
15	Pool Parking Lot (North)	Security Camera #2	CAT6 Ethernet or fiber optic pending camera location	Exterior conduit and wiring by others
16	Pool Parking Lot Entrance Booth	Point of Sale (Existing Equipment)	4 Strand Fiber Optic	Replaces existing fiber optic connection
17	Pool Floodlight Pole (Southside)	Wifi	CAT6 Ethernet	
18	South IT closet	Card key reader	CAT6 Ethernet	
19	Spare		Ethernet	
20	Spare		Ethernet	
21	Spare		Ethernet	
22	Spare		Ethernet	
23	Spare		Fiber Optic	
24	Spare		Fiber Optic	

PART 3 - EXECUTION

3.1 INSTALLATION

A. IT equipment hardware removed under demolition shall be turned over to the County IT Department.

B. The Contractor shall furnish, install and terminate cable related to the IT System.

C. The Contractor shall be responsible to test each termination to the IT System hardware and devices.

D. The Contractor shall coordinate with the IT vendor to perform programming, start-up and testing of the IT System.

3.3 TESTS, TRAINING AND SERVICE

A. After installation and prior to final acceptance, the new IT and communication system shall be placed into service for a continuous test period of five (5) days. During the test period, the Contractor shall be available to assist the Owner in issues related to cabling and terminations. The Contractor shall coordinate the efforts of the IT system vendor as required for successful completion.

B. The Contractor shall furnish Shop Drawings, descriptive data, list of installations, and all other information requested by the Engineer.

C. No equipment shall be manufactured prior to obtaining complete acceptance of the equipment and approval of the Shop Drawings by the Engineer.

D. Upon completion of the work, the Contractor shall furnish the Engineer with manufacturer's certifications that all equipment has been installed properly.

+ + END OF SECTION + +

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SECTION 28 31 00

FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to replace the existing fire detection and alarm system, as shown on the Drawings and specified herein. The new devices are shown to be connected to the existing fire alarm panel. The existing fire alarm panel shall be modified, expanded or replaced to accommodate the proposed system.

2. Contractor shall be responsible for submission of drawings to the local authority having jurisdiction for approval.

B. Related Work Specified Elsewhere:

1. Section 26 053 3, Raceway and Boxes for Electrical Systems.

2. Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables.

1.2 QUALITY ASSURANCE

A. System Supplier:

1. Manufacturer and contractor shall be specialized in furnishing complete fire detection and alarm systems for at least five years.

2. Licensed Contractors - All persons installing, altering, repairing or maintaining any fire alarm system shall be licensed in the State of New York. Upon approval by the Engineer, a manufacturer's designated representative meeting the preceding qualifications may install, alter or repair a specific fire alarm system.

B. Manufacturer's Representative:

1. The service of the manufacturer's representative shall be provided for a period of not less than sixty (60) days after acceptance. Should additional services be required for a successful installation, such services shall be furnished at no additional cost to the Owner.

2. A representative of the equipment manufacturer, thoroughly experienced in fire alarm work, shall be furnished and shall be present at the job site to supervise installation of the fire alarm equipment at all times work is in progress. A representative shall also be present to conduct final acceptance tests.

C. Tests:

1. Upon completion of the installation, operational tests of the system shall be conducted. The Engineer shall be notified at least ten days prior to tests. Tests shall include, but not be limited to, operation of all alarm initiating devices and testing of all supervisory features of the system. Equipment manufacturer's representative shall be present during final tests. Contractor shall provide all labor and equipment necessary to conduct tests. Any deficiencies shall be corrected by the Contractor, and the system shall be retested as necessary to assure proper operation. Upon completion of testing, Contractor shall leave system ready for normal operation prior to final acceptance.

2. Acceptance Tests: When ready for acceptance testing, the Contractor shall give the local authority having jurisdiction advance notification of time when testing of the fire alarm system will be performed. The Contractor shall likewise notify Factory Mutual giving them the option to also witness the testing. Upon satisfactory performance of the testing, Contractor shall submit a test report to the local authority having jurisdiction with a copy also submitted to Factory Mutual.

D. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.

1. NFPA 70 - National Electrical Code.

2. NFPA 72 - National Fire Alarm Code.

3. FM, Factory Mutual.

4. UL, Underwriters Laboratories, Inc.

5. Authority having jurisdiction.

E. General:

1. Plans, specifications and approval are required for the fire alarm system.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval, copies of manufacturer's technical information for:

1. All components, including wiring diagrams.

2. System wiring diagrams, including interconnections between the fire alarm control panel, battery backup, detection devices and alarm signaling devices.

3. System layout drawing showing locations of all devices.

4. Accessory catalog sheets and specification data.

5. System operation description. The fire detection and alarm system submittal will not be reviewed without the system operation description.

B. Spare Parts:

1. One smoke detector.

2. One heat detector of each type.

3. One manual pull station of each type.

4. One audio signaling device of each type.

5. One visual signaling device of each type.

6. Two spare fuses for each size required.

C. Temporary fire detection and alarm system equipment and plans.

PART 2 - MATERIALS

2.1 GENERAL

A. System Design:

1. The system shall consist of an addressable, electrically supervised fire detection and alarm system as described herein. Operation shall be that actuation of any smoke detector or manual pull station shall cause building evacuation alarm devices to furnish audio and visual alarm signals.

2. Fire alarm system shall be under constant electrical supervision, so that failure of the main power supply, or an open grounded circuit which prevents the normal operation of the system, will be instantly and audibly indicated.

3. All operations shall remain in the alarm mode (except alarm signaling devices if manually silenced) until the fire alarm panels are restored to normal. System shall be electrically supervised against open circuits and grounds for all signal initiating circuits, alarm signal sounding and indicating circuits, battery power supply circuits, (low, no, and open circuit standby battery voltage) and master box tripping circuits. A ground fault condition which prevents the required operation of the system or a single break or open circuit and indicating circuit condition in any of the above circuits shall result in activation of system audible trouble signals. Open and grounded circuits in the system shall not cause the sounding of false fire alarms. Loss of AC power shall also result in operation of system trouble signals. Audible and visual equipment for supervision of the AC power supply shall be energized from the auxiliary DC power supply and vice versa. Trouble signals shall sound continuously until system has been acknowledged at the fire alarm panel. Upon correction of the trouble condition, trouble signals shall automatically reset.

4. All equipment and components furnished under this item requiring electrical power shall be suitable for operation on a 115-volt, ±10 percent, 60 Hz, ±2 Hz supply.

2.2 MATERIALS

A. Fire Alarm Control Panel:

1. The existing fire alarm panel is Edwards Model EST3. The existing fire alarm panel shall be modified, expanded or replaced to accommodate the proposed system.

2. New fire alarm devices shall be compatible with the existing fire alarm control panel.

B. Multi-Criteria Fire Detectors

1. Dual optical and thermal sensors to provide fire detection. Redundancy protects against false alarms caused by steam, dust or gas.

2. Tri-color detector status LED.

3. Suitable for use in a harsh, industrial environment.

4. Operating Temperature:

5. Relative Humidity: 0-95%; non-condensing.

6. Product and Manufacturer:

   a. Edwards.

   b. Or approved equal.

C. Fixed Temperature Heat Detectors

1. Thermistor to sense temperature changes.

2. Seven field-selectable, pre-programmed temperature settings: Fixed 135 degrees F; fixed 145 degrees F; fixed 155 degrees F; fixed 165 degrees F; fixed 174 degrees F; rate of rise of 15 degrees F/minute at fixed 135 degrees F; and rate of rise of 15 degrees F/minute at fixed 174 degrees F.32 degrees F to 120 degrees F.

3. Operating Temperature: 32 degrees F to 100 degrees F.

4. Relative Humidity: 0-95%; non-condensing.

5. Product and Manufacturer:

   a. Edwards.

   b. Or approved equal.

D. Manual Pull Stations

1. Metal, single action with pull down lever that remains down until reset.

2. “Pull Down Fire Alarm” lettering

3. Reset with Allen key

4. Breakglass rod.

5. Weathertight.

6. Product and Manufacturer:

   a. Edwards.

b. Or approved equal.

E. Horns/Strobes

1. Horns shall have 3 selectable dBA settings o 90/95/99 dBA in both tones, selectable continuous or temporal.

2. Strobes shall have field selectable Candela settings as follows: 15/30/75/110cd. The selector switch for selecting the Candela setting shall be tamper resistant.

3. Strobes shall incorporate a Xenon flashtube enclosed in a rugged Lexan lens.

4. Strobes shall not drift out of synchronization at any time during operation.

5. Product and Manufacturer:

a. Edwards.

b. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor and fire alarm system vendor shall visit the site to review the existing system and determine the modifications to (or replacement of) the existing fire alarm panel.

B. Furnish and install all wiring and conduit for the fire alarm system as required for a fully operational system. Conduit installation and routing shall conform to the requirements of Division 26, Electrical.

C. Mount equipment so that sufficient access and working space is provided for safe operation and maintenance.

D. Securely fasten enclosures to wall or other mounting surfaces.

E. Mounting heights shall be as follows:

1. Fire alarm control panel - top 5’6” above floor.

2. Fire and heat detectors - ceiling.

3. Pull stations - 48” to top above floor.

4. Audio and visual signaling devices - 80” to top above finished floor or grade.

F. Provide interlocks with ventilation equipment as shown on the Drawings.

G. Conduit boxes and fittings shall be in accordance with the requirements of Division 26, Electrical.

H. Wire:

1. Wiring shall be in accordance with local, sate and national codes (e.g. NEC Article 760) and as recommended by the manufacturer of the fire alarm system.

2. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and signaling line circuits, and 16 AWG for notification appliance circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

3.2 FIELD QUALITY CONTROL SERVICES

A. Contractor shall retain a qualified factory-trained serviceman to perform the following services:

1. Inspect and adjust the equipment after installation and ensure that it operates properly.

2. Instruct Owner’s personnel in the operation and maintenance of the equipment.

B. Field Tests:

1. Field testing to be supervised by a factory-trained serviceman.

2. Verify that the entire installation has been made in accordance with the approved manufacturer’s drawings, and that the alarm system is ready for total plant operation.

3. Adjust and leave equipment in proper working order.

C. Contractor shall make available to the Owner a local service department of a duly authorized distributor of the equipment manufacturer which shall stock the manufacturer’s standard parts. On-the-premises maintenance

shall be provided during normal working hours at no cost to the Owner for a period of 12 months from date of acceptance of the installation.

3.3 MAINTENANCE SERVICE

A. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months commencing with Substantial Completion, using factory-authorized service representatives.

B. Basic Services: Systemic, routine maintenance visits on a quarterly basis at times coordinated with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components and supplies.

3.4 CENTRAL STATION MONITORING

A. The existing fire alarm control panel is connected to Central Station Monitoring.

3.5 GUARANTEE

A. The equipment furnished under this Section shall be guaranteed by the manufacturer in the name of the Owner for period of two (2) years from the date of final acceptance thereof, against defective materials, designs and workmanship, unless otherwise noted. Upon receipt of notice from the Owner of failure of any part of the equipment during the guarantee period, the affected part or parts shall be replaced promptly by and at the expense of the Contractor.

+ + +END OF SECTION + +

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall perform all excavating, backfilling and disposing of earth materials as shown, specified, and required for the purpose of Rehabilitation of Playland Pool and Bathhouse as shown and specified.

2. Also included is earthwork necessary for removal and replacement of a swimming pool, walks, pavements, grading, ramps, utilities, structures and other facilities as required to complete the Work as shown and specified. All materials necessary for fill, backfill, granular embedment and crushed stone are included.

3. All necessary preparation of subgrade is included.

4. Disposal of Excavated Materials: All excavated materials encountered/generated during construction shall be managed on-site in accordance with the minimum soil erosion and sediment control procedures outlined in the Contract Documents. The Contractor shall coordinate the location of the excavated material stockpile with the Owner. Contractor shall be responsible for implementing all soil erosion measures necessary to isolate the excavated materials from the surrounding environment. Contractor shall also be responsible for the proper characterization (i.e., testing), handling, loading and off-site transportation and disposal of all excess soil encountered/generated throughout the performance of the work. The Contractor shall provide his own data for this purpose. The Contractor may direct load excavated soil into the Contractor's disposal trucks or shipping containers for off-site transportation and disposal, provided that the soil to be excavated has been properly characterized in-situ, as approved by the Owner and the disposal facility.

5. Soil that shall be excavated as part of this project has been sampled and determined to exceed the New York State Department of Environmental Conservation's (NYSDEC's) Unrestricted Use Soil Cleanup Objectives (SCOs). As a result, it appears that all excavated material may be disposed off-site as nonhazardous waste, as further outlined in the below paragraph; however, the actual characterization

and management of the soil shall be determined by the Contractor's samples. The nature and extent of contamination within the area of work is detailed in the Soil Sample Analysis prepared for the site (refer to Appendix 2).

6. All labor, materials, equipment, and incidentals to perform all work under this Section shall be included in the base bid. No separate payment will be made for any Work associated with the disposal of nonhazardous waste indicated to be included in the base bid, as the cost of said work shall be deemed included in the Contract.

B. Sources of Materials:

1. General fill materials shall be obtained from on-site excavation work and/or off-site sources.

1. Select fill materials shall be obtained from on-site excavation work and/or off-site sources.

2. Engineered fill materials shall be obtained from on-site excavation work and/or off-site sources.

3. Nonfrost susceptible fill material shall be obtained from off-site sources.

4. Crushed stone materials shall be obtained from off-site sources.

5. Topsoil, except for topsoil stripped from the work areas, shall be obtained from off-site sources.

C. Related Work Specified Elsewhere:

1. Section 02 80 00, Waste Transportation and Disposal

2. Section 03 30 00, Cast-in-Place Concrete.

1.2 QUALITY ASSURANCE

A. Permits and Regulations: Contractor shall perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Design Criteria:

1. Contractor shall be wholly responsible for installing and operating the system used to accomplish the sheeting and bracing shown on the Drawings, or otherwise required.

C. Tests:

1. An independent testing laboratory shall be employed by the Contractor to perform the required tests.

2. Required Tests:

a. Select Fill Samples: Gradation, ASTM D 422.

b. Compacted Select Fill: Compaction, ASTM D 698 and ASTM D 1556.

c. Optimum moisture - maximum density curve for each soil used for backfill.

d. Field Density Tests on each lift of backfilled material: ASTM D1556, ASTM D2167 or ASTM D6938.

3. Testing of materials for approval shall include, but shall not be limited to, the following (all tests to be performed after screening or processing of the material).

a. Grain size distribution in accordance with ASTM D422, including hydrometer analysis.

b. Characterization in accordance with ASTM D2487.

c. Moisture/Density relationship in accordance with ASTM D698 (Standard Proctor).

d. Chemical Analysis: Chemical analysis of soil shall be performed in accordance with NYSDEC Division of Environmental Remediation DER-10 (“Technical Guidance for Site Investigation and Remediation”). Analysis shall include Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides, TCL herbicides, TCL polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals, hexavalent chromium, and cyanide. Sample collection and analysis shall be in accordance with the SW-846 procedures. Sample analysis shall be performed by a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory. The results of the chemical analysis shall meet the requirements of the New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives found at 6 NYCRR Part 375-6.8(a).

4. Testing laboratory will submit copies of the following reports directly to Engineer with a copy to Contractor:

   a. Tests on borrow material.

   b. Field density tests.

   c. Optimum moisture-maximum density curve for each soil used for backfill.

   d. Results of contamination testing.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit, for information purposes only, shop drawings of sheeting and bracing systems for excavations deeper than five (5) feet. Information supplied shall include, as a minimum, type and size of sheeting to be used, extent of sheeting and tip and top elevations.

2. Shop drawings shall be prepared and signed by a Professional Engineer licensed in the State of New York.

3. Submit plans of open cut excavations showing limits of the excavation at grade where not shown on the Contract Drawings, where applicable.

B. Independent Testing Laboratory: Prior to conducting the required tests, the Contractor shall submit, to the Engineer, for approval, the name of the independent test laboratory which will facilitate the required testing.

C. Samples:

1. At least two weeks prior to the date of anticipated use, the Contractor shall submit, to the Owner, for approval, a representative sample of all on-site and off-site material required. The Contractor shall notify the Owner in writing of the source of each sample.

2. The Contractor shall provide, along with the above samples, the required test results, excluding the field density test.

C. Disposal Sites:

1. List of disposal sites for unsuitable materials and all required permits for use of the sites.

D. Manufacturer's Data: Submit for approval manufacturer's specifications, performance characteristics and operating instructions for the compaction equipment.

E. Submit Contractor's proposed methods for the management of excavated soil, including but not limited to methods for characterization, an estimate of the soil volume to be excavated, number and locations of proposed samples and type of analyses, whether the soil will be stockpiled and sampled ex-situ or characterized in-situ so that the material can be direct loaded into the Contractor's disposal trucks or shipping containers, proposed locations for soil management areas, methods for protecting any stockpile or storage areas and preventing cross-contamination, and proposed disposal facility including the facility's sampling requirements.

1.4 JOB CONDITIONS

A. Existing Structures:

1. Shown on the Drawings are certain utilities and surface and underground structures located on or adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the Contractor. Contractor shall explore ahead of the required excavation to determine the exact location of all structures and utilities. They shall be supported and protected from injury by the Contractor. If they are broken or injured, they shall be restored immediately by the Contractor at no additional cost to the Owner.

2. Prior to execution of the Work, the Contractor shall check and verify governing dimensions and elevations. The Contractor and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

B. Locating Underground Utilities:

1. The locations of all utilities shown on the contract drawings are based on available in-house information furnished by the Owner and utility companies and public agencies with lines and property in the vicinity of the proposed work areas and are not guaranteed to be complete or accurate. The contractor shall obtain utility markouts on all public and private properties in accordance with all local and state requirements where work under this contract is to be performed. Prior to any excavation or construction, the contractor shall notify the Owner, all

utility companies and applicable agencies and request a markout of their lines and properties in the field in the area of the proposed work.

2. Schedules for maintenance of utility markouts on public and private property shall be consistent with New York State law throughout the duration of the Contract.

3. During construction/excavation, the contractor shall locate each utility by hand digging methods prior to the use of mechanical excavation equipment. During construction/excavation, if the contractor encounters evidence of suspected unmarked utilities, such as magnetic tape or other underground markers, the contractor shall promptly determine the location of the suspected utility, if any, before proceeding with the work. The contractor shall cooperate with the Owner and the utility companies involved to avoid delay or interference of service normally performed by their lines and properties.

4. The Contractor shall take extreme caution against damaging utilities when excavating, sheeting and backfilling, during construction of test probes and test pits and while performing the work required under this Contract.

5. The contractor shall be responsible for all costs associated with pre-project construction utility survey(s)/markout(s), and utility as-builts for this project, as well as protection and hand digging operations to verify location of all utilities during construction.

C. Test Pits

1. Test pit excavation shall consist of pavement saw-cutting and removal (if applicable) and earth excavation ordered , in writing, by the Engineer for exploratory purposes to determine the location and/or depth of existing sub-surface utilities, structures, etc.

2. Material excavated form test pits can be re-used to backfill the test pit if first approved by the Engineer.

3. Existing utility systems and service lines to remain and those encountered during excavation, if damaged, shall be repaired at the Contractor's expense.

4. Existing utility systems and service lines to remain and those encountered during excavation, if damaged, shall be repaired at the Contractor's expense.

D. Existing Utilities:

1. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

2. Perform test pits as shown on the Contract Drawings or as directed by the Engineer or as required to perform the work.

3. Should uncharted or incorrectly charted piping or utilities be encountered during excavation, consult Owner in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the Engineer. Relocate or offset all utilities as required to perform the new work, at no additional cost to the Owner.

4. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Engineer.

5. Demolish and completely remove existing underground utilities indicated to be removed.

E. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this Work and post with warning lights. Contractor shall provide "Jersey" type concrete barriers with reflective tape where shown on the Contract Drawings or as required by roadway Owner. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by contractor's operations.

3. Consult Engineer and obtain his approval before removing, trimming, or disturbing trees, shrubs, plants, fences, rails, walks, structures or other facilities that are encountered on the line of the excavation.

4. Structures, utilities, sidewalks, pavements and other facilities removed or disturbed shall be replaced to their original condition, unless otherwise shown, specified or directed.

F. Dust Control: Contractor shall conduct all of his operations and maintain the area of his activities, including sweeping and sprinkling of roadways, so as to minimize creation and dispersion of dust. In addition, Contractor shall be responsible for controlling dust caused by his operation of vehicles and equipment, clearing or for any reason whatever.

G. Odor Control: As an odor abatement measure, cover, at the end of each work day, all areas of organic or odorous material which were exposed during excavation with a minimum 6-in and a maximum 24-in deep of clean fill. Excavated organic or odorous material shall be immediately removed off-site and shall not be stockpiled on-site.

H. Roadways and Walks: Unless otherwise approved by Engineer, excavated material and materials of construction shall be so deposited, and the Work shall be so conducted, as to leave open and free for pedestrian traffic all crosswalks, and for vehicular traffic a roadway not less than 10 feet in width. All hydrants, valves, and other facilities which may require access during construction shall be kept accessible for use. During the progress of the Work, Contractor shall maintain such crosswalks, sidewalks, and roadways in satisfactory condition and the Work shall at all times be so conducted as to cause a minimum of inconvenience to the Owner. Temporary bituminous macadam shall be installed at all disturbed sidewalk areas until such time as the final restoration is performed.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR ALL FILL MATERIAL

A. All fill material shall be virgin, clean inert, well graded material that is free of refuse and vegetable matter, frozen material and other objectionable material.

B. Excavated materials meeting these requirements and the requirements stipulated below for the appropriate type of fill material shall be used when approved by the Engineer. Otherwise the Contractor shall excavate, haul and place material from approved off-site sources.

C. All materials for fill shall be environmentally clean material conforming to the requirements of NYSDEC Unrestricted Use Soil Cleanup Objectives found at 6 NYCRR Part 375-6.

2.2 SOIL MATERIALS

A. Engineered Fill: Well graded granular material or bank run gravel, free from organic matter and shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
3-inch	100
1/4-inch	100
No. 40	5-50
No. 200	0-10

B. Structural Fill and Select Fill: Well graded granular material or bank run gravel, free from organic matter conforming to the requirements of NYSDOT Section 203-2.02C and shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
4-inch	100
No. 40	0-70
No. 200	0-15

1. Fines passing No. 200 shall be non-plastic

2. Particle size shall show no gap grading

C. General Fill: Soil materials for general backfill and fill shall be free of organics, clay, rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials and other deleterious matter. No more than 30 percent by weight shall pass through a No. 200 sieve except for topsoils.

D. Granular embedment: Crushed rock or pea gravel with not less than 95 percent passing a 1/2-inch sieve, not less than 95 percent retained on a No. 4 sieve and maximum 5 percent passing a No. 10 sieve.

E. Crushed stone, as specified on the drawings, shall be a naturally or artificially graded mixture of crushed gravel, crushed stone, meeting the material requirements for NYSDOT Standard Specifications, latest revision, Section 703-02, Table 703-2, size No. 1 and 2 as indicated, meeting gradation requirements of Section 703-04, Type 2.

F. Pea Gravel: Pea gravel shall consist of clean naturally rounded aggregate with a range of particles between 1/8 inch and 3/4 inch in conformance with gradation requirements of ASTM C-33. The material shall not have more than 3% passing a #8 sieve. Deleterious substance limitations and soundness shall conform to requirements of ASTM C-33.

G. Unsuitable Material: All soils not meeting the requirements of Paragraphs 2.2A. through 2.2B and all organic materials.

2.3 REMOVAL OF WATER

A. The Contractor’s attention is directed to the fact that some of the work and structures may be below groundwater. Therefore, the need for an adequate and well-planned dewatering system is essential to allow excavation and concrete construction to be performed in a dry suitable environment.

B. The Contractor, at all times during construction, shall provide and maintain ample means and suitable equipment, consistent with conditions encountered, with which to promptly remove and properly dispose of all water entering excavations or other parts of the work. All excavations shall be kept dry at all times until the structures to be built therein are completed and backfilled to approximately final grades except where otherwise approved by the Engineer in writing. Concrete for structures, pipe and sanitary structures shall be placed on subgrades which are dry. Water shall be disposed of in a suitable manner so as to avoid damage to adjacent property, existing structures and all work under construction. It shall be the Contractor's responsibility to prevent flotation of any structures during construction.

C. Systems used to lower the groundwater level shall be maintained in operation continuously, twenty-four hours a day, seven days a week, until the structures are completed adequately to prevent flotation. Termination of the dewatering operation shall receive approval of the Engineer.

D. No additional compensation will be given to the Contractor because of damage from flooding caused by groundwater or surface waters rising above ground elevations.

E. The Contractor shall be responsible for obtaining and adhering to all provisions of necessary dewatering permits at no additional costs to the Owner. Groundwater shall not be permitted to be discharged into storm drains or surface waters without proper approval from regulatory agencies.

F. Dewatering system shall be installed as required to lower the groundwater level in general excavation at least 2 feet below final subgrade.

G. In order to limit the size of the area affected by dewatering, the use of deep wells shall be prohibited.

H. Prior to installing and operating any dewatering system, the Contractor shall install a series of observation wells and monitor same for a minimum period of 2 working days in order to determine the groundwater level at the time of construction. The observation wells shall be located both within and adjacent to the proposed construction site. Observation wells located within the limits of the proposed construction site shall be situated outside of the physical limits of the structures and protected from damage. Any damaged observation wells shall be replaced or repaired. During construction, the water level in the observation wells shall be measured and recorded periodically.

2.4 SHEETING, SHORING, AND BRACING

A. Wood Sheeting:

1. Temporary Work: New or used timber meeting the requirements for Douglas Fir Dense Construction grade or Southern Pine No. 2 Dense S3.

2. Permanent Work: New pressure creosoted timber or copper chrome arsenate treated wood.

B. Steel Sheeting:

1. Temporary Work: Steel conforming to ASTM A 328. Steel for soldier piles, wales and braces may be new or used and shall conform to ASTM A 36.

2. Permanent Work: New rolled steel sections of the continuous interlocking type, conforming to ASTM A 328.

C. Used materials shall be in good condition, not damaged or excessively pitted.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor shall provide Engineer with sufficient time and means to examine the areas and conditions under which excavating, filling, and grading are to be performed. Work shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.2 EROSION CONTROL

A. General:

1. In general, the construction procedures outlined herein shall be implemented to ensure minimum damage to the environment during construction.

2. Whenever possible, access and temporary roads shall be located and constructed to avoid environmental damage. Provisions shall be made to regulate drainage, avoid erosion and minimize damage to vegetation. Special care shall be taken to eliminate depressions that could serve as mosquito pools.

3. Where areas must be cleared for storage of materials or temporary structures, provisions shall be made for regulating drainage and controlling erosion, subject to Engineer's approval.

4. In the event of any temporary work stoppage, the Contractor shall take steps to prevent any temporary or permanent environmental damage to the area undergoing construction.

B. Control Measures:

1. Temporary measures shall be applied to control erosion and to minimize the siltation of the existing drains, streambeds and natural ponding areas. Such measures shall include but not be limited to the use of berms, baled straw silt barriers, gravel or crushed stone, mulch, grasses, slope drains and other methods. These temporary measures shall be applied to erodible materials exposed by any activities associated with the construction of this Project.

2. Temporary measures shall be coordinated with the construction of permanent drainage facilities and other work to the extent practicable to assure economical, effective, and continuous erosion and siltation control.

3. The Contractor shall provide special care in areas with steep slopes. Disturbance of vegetation shall be kept to a minimum to maintain stability. Remove only those trees and shrubs and grasses that must be removed for construction. Protect the rest to preserve their aesthetic and erosion-control values.

4. Install erosion and sediment control practices as specified herein and according to soil conservation standards and specifications. The practices shall be maintained in effective working condition during construction and until the drainage area has been permanently stabilized.

5. Temporarily stabilize each segment of graded or otherwise disturbed land, including the sediment-control devices not otherwise stabilized by seeding and mulching or by mulching alone.

3.3 EXCAVATION

A. General:

1. Contractor shall perform all excavation required to complete the Work as shown and specified. All material excavated shall be

nonclassified. It shall include all materials such as earth, sand, clay, gravel, hardpan, boulders, organic materials, decomposed rock, pavements, concrete, rubbish and all other materials within the excavation limits.

2. Excavations shall be open type, shored and braced as shown on the plans and where necessary to prevent injury to workmen and to new and existing structures or pipelines.

3. All excavations shall be made in the dry.

4. Dispose of excavated material and waste materials as specified herein under Disposal of Excavated Material.

B. Pipeline Excavation:

1. Pipe trenches shall be excavated below the pipe bottom by an amount sufficient for placement of the pipe bedding shown on the drawings and as specified. No more than 50 feet of trench may be opened in advance of pipe laying.

2. Trench width shall be minimized to greatest extent practical but shall conform to the following:

a. Sufficient to provide room for installing, jointing and inspecting piping, but in no case wider than that indicated in the Contract Drawings.

b. Enlargements at pipe joints may be made if required and approved by Engineer.

c. Sufficient for sheeting, bracing and sloping.

d. Sufficient to allow thorough compacting of granular embedment adjacent to bottom half of pipe.

e. Do not use excavating equipment which requires the trench to be excavated to excessive width.

3. At road crossings, trenching width shall be minimized by the use of sheeting, trench boxes on similar protection methods.

C. Manhole Excavation:

1. Excavation shall be made to the grades shown on the Contract Drawings and to such widths as will give suitable room for construction of the manholes, for bracing and supporting, pumping

and draining. The bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the Engineer.

2. Excavation shall be accomplished by methods which preserve the undisturbed state of subgrade soils.

3. Excavation equipment shall be satisfactory for carrying out the work in accordance with the Specifications. Earth shall not be plowed, scraped, or dug with machines so near to the finished subgrade as to result in excavation of, or disturbance of material below grade.

4. When excavation for foundations has reached final depths, the Engineer shall be notified and will inspect conditions. If materials and conditions are not satisfactory to the Engineer, the Engineer will issue instructions as to the procedures for correction of the unsatisfactory condition.

5. During final excavation to subgrade level, take precautions required to prevent disturbance of material. Hand excavate the final 6-in as necessary to obtain a satisfactory undisturbed bottom.

D. Unsuitable Excavation:

1. If any over excavation occurs through error of the Contractor or for the Contractor's convenience, it shall be refilled at the Contractor's expense with concrete, select fill or other material satisfactory to the Owner. The Contractor shall be held solely responsible for costs associated with characterizing, transporting and disposing the excavated material off-site in accordance with all applicable federal, state and local laws and regulations, as well as the requirements of these Contract Document.

2. If Contractor fails to properly dewater the excavation or trench, or disturbs the subgrade or otherwise fails or neglects to conduct the excavation work in a manner that provides surface of subgrade in proper condition for construction, the Contractor shall remove all disturbed material and replace it with concrete, select fill, or other approved material at his own expense. The condition of the subgrade shall meet with the approval of the Owner before any work is placed thereon.

3. If, in the opinion of the Engineer, the material, in its undisturbed natural condition, at or below the grade of the excavation indicated on the Drawings is unsuitable for foundations, or if organic or silty soil extends below excavation depth, it shall be removed to such depth and width as the Engineer may direct and be replaced with select fill

or other suitable material as directed by the Engineer. Compensation will be in accordance with the Agreement or applicable unit price bid.

E. Additional Excavation:

1. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material with structural fill or other material as approved by Geotechnical Engineer.

2. Removal of unsuitable material, and its replacement as directed, will be paid on basis of Contract conditions relative to changes in work.

F. Excavation for Structures:

1. Conform to elevations and dimensions shown on the drawings, within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction, and for inspection.

2. In excavating for footings and foundations, take care not to disturb the bottoms of the excavation. Excavate by hand to a final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave a solid base to receive concrete.

3. Sloping surfaces under footings and foundations, or other work where required, shall be cut in steps as indicated on the Drawings or as directed by the Engineer.

G. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C.).

3.4 SHEETING, SHORING AND BRACING

A. General:

1. Sheeting, shoring and bracing shall be used where necessary to prevent injury to workmen, structures, or pipe lines. Jetting or the use of vibratory hammers for sheeting installation is prohibited.

2. All municipal, county, state and federal ordinances, codes, regulations and laws shall be observed. All excavations shall be shored with the minimal protection of sheeting listed in OSHA Regulations, 29 CFR, Part 1926, Subpart P - Excavations, Trenching and Shoring.

3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

4. Unless otherwise shown, specified, or ordered, all materials used for temporary sheeting shall be removed when work is completed. Such removal shall be made in a manner not injurious to the structure or its appearance or to adjacent Work.

5. Provide permanent sheeting as shown. Cut off tops as required, but at least 2-feet below finished grade.

6. The clearances and types of the temporary sheeting, insofar as they affect the character of the finished Work, will be subject to the approval of the Engineer but the Contractor shall be responsible for the adequacy of all sheeting, shoring, bracing and other related Work.

7. Safe and satisfactory installation of the sheeting shall be the entire responsibility of the Contractor.

B. Sheeting Left in Place:

1. Steel sheet piling to be left in place (where directed by the Engineer) shall be driven straight to the lines and grades shown or directed. The piles shall penetrate into firm materials with secure interlocking throughout the entire length of the pile. Damaged piling having faulty alignment shall be pulled and replaced by new piling.

2. The type of guide structure used and method of driving steel sheet piling to be left in place shall be subject to the approval of the Engineer.

3. Contractor shall cut off piling left in place to the grades shown or ordered by the Engineer and shall remove the cut offs from the site.

4. Contractor shall thoroughly clean wales, braces and all other items to be embedded in the permanent structure, and shall make provisions that the concrete surrounding the embedded element is sound and free from air pockets or harmful inclusions. The provisions shall include the cutting of holes in the webs and flanges of wale and bracing members, and the welding of steel diaphragm waterstops perpendicular to the centerline of brace ends which are to be embedded.

5. Subsequent to removal of the inside face forms, and when removal of bracing is permitted, steel shall be cut back at least 2 inches inside the wall face and the opening patched with cement mortar. The concrete shall be thoroughly worked beneath wales and braces, around stiffeners and in any other place where voids may be formed.

C. Removal of Sheeting and Bracing:

1. Remove sheeting and bracing from excavation unless otherwise shown on the Drawings or ordered in writing by the Engineer. Removal shall be done so as to not cause injury to the Work. Removal shall be equal on both sides of excavation to ensure no unequal loads on pipe or structure. Use of vibratory extractors is prohibited.

2. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete, until wall and floor framing up to and including grade level floors are in place and concrete has attained sufficient strength to withstand the soil and superimposed loads.

3.5 STRUCTURAL FILL, BACKFILL, AND COMPACTION

A. Place fill materials in the types and thicknesses as detailed on the Drawings. All backfill shall be Select Fill unless otherwise directed by the Engineer, or shown on the Drawings.

B. Fill excavations as promptly as Work permits, but not until completion of the following:

1. Acceptance by Engineer of all Work within the excavation.

2. Inspection, testing approval, and recording of locations of underground utilities, connections, branches, structures and other facilities.

3. Removal of temporary shoring and bracing, and backfilling of voids with satisfactory materials.

4. Removal of trash and debris.

C. Excavation shall be kept dry during backfilling operations. Backfills around piping and structures shall be brought up evenly on all sides.

D. All structures and pipe trenches shall be backfilled with the type of material listed below except where shown otherwise on the Contract Drawings.

Type of Backfill	Location
Select Fill	Replacement of unsuitable material removed below bottom slabs of structures and manholes, below pipe beddings, and where shown on the drawing.
Granular Embedment Material	Pipe bedding and backfill within the pipe zone. The pipe zone extends from the bottom of the trench to six (6) inches above the top of the pipe for pipes thirty (30) inches and smaller, and to twelve (12) inches above the top of the pipe for pipes greater than thirty (30) inches in diameter.
Crushed Stone	In locations shown on the drawings.
Rip Rap	In locations shown on the drawings.
Pea Gravel	In locations shown on the drawings.
Common/General Fill	In all locations not enumerated above.

E. Backfill above and adjacent to pipe shall be compacted by light weight equipment, such as "walk behind" vibratory plate compactors. Heavy self-propelled compactors shall not be used until the following criteria are met:

1. A minimum of 18 inches of compacted backfill has been placed above the top of the pipe.

2. Area to be compacted is a minimum distance of three pipe diameters away from the adjacent pipe.

3. Area to be compacted is a minimum of 10 feet from building and tank walls and riser pipes.

F. Hydro hammers or "jumping jack" hammers shall not be used above pipes until a minimum of 3 feet of backfill has been placed and compacted.

G. After approval of the subgrade by the Geotechnical Engineer, the geotextile shall be placed, where shown on the Drawings, upon the subgrade in accordance with the manufacturer's instructions and the following:

1. After acceptance of the subgrade, the fabric shall be installed prior to placement of the first course of compacted structural fill, stone or subbase.

2. Geotextile may be joined by either sewing or overlapping. Sewn seams shall be lapped a minimum of 4 inches and double sewn with nylon or polypropylene. Overlapping seams shall have a minimum overlap of 18 inches, except where placed underwater where the overlap shall be a minimum of 3 feet.

3. Fabric which is torn or damaged shall be replaced or patched. The patch shall extend 3 feet beyond the perimeter of the tear of damage.

4. Traffic or construction equipment shall not be permitted directly upon the fabric. Maintain a minimum of 8 inches loose thickness of aggregate above the stabilization fabric subject to traffic.

H. Place backfill and fill materials in layers not more than 12" in loose depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction with 12" as a maximum lift height. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost, ice, ponded water or extraneous debris.

I. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced at the Contractor's expense.

J. Moisture Control:

1. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, or during, compaction operations.

2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

K. All fill shall be thoroughly and satisfactorily compacted to 95 percent of the maximum density of material used.

L. If the surface of any layer becomes contaminated by mud or unsuitable materials, the contaminated soil shall be removed.

M. Fill placement shall be suspended when wet weather prevents proper operation of compaction equipment.

N. Adjacent to structures, fill shall be placed in a manner which will prevent damage to the structures and will allow the structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to structure shall be increased at approximately the same rate on all sides of the structure.

O. No backfilling or compaction shall take place against any cast-in- place concrete footings or slabs prior to 7 days initial concrete set, or against any cast-in-place concrete walls prior to achieving the desired design strength, f'c.

P. Heavy equipment shall not be operated within 4 feet of any structure. Heavy vibratory compactors shall not be operated within 4 feet of any structure.

Q. Excavated material meeting the requirements of Select Fill shall be spread and allowed to dry until obtaining the required moisture content prior to re-use.

3.6 FIELD QUALITY CONTROL

A. Notify the Engineer at least one (1) working day in advance of all phases of filling and backfilling operations.

B. Compaction testing shall be performed to ascertain the compacted density of the fill and backfill materials in accordance with the following methods:

1. In-place relative density:

a. Method: AASHTO T191, Sand Cone Method

AASHTO T238, Nuclear Method

C. Foundation Subbase: Perform one (1) field density test, in each compacted fill lift, for the following:

1. Each isolated spread footing.

2. Each 20 feet or less of continuous footing, but no fewer than two tests along a wall.

3. Each 2,000 sq. ft. of structural base slab and/or slabs on grade, but in no case fewer than three tests.

D. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 50 feet or less of wall length, but no fewer than two tests along a wall face.

E. The Engineer may direct additional tests to establish gradation, maximum density, and in-place density as required by working conditions, at the Contractor's expense.

F. Acceptance Criteria: The sole criterion for acceptability of in-place fill shall be in situ dry density. Minimum dry density for all fill or backfill shall be 95 percent of the maximum dry density in accordance with ASTM D 698. If a test fails to qualify, the fill shall be further compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

G. Crushed stone shall be compacted with a vibratory plate compactor or vibratory rolling compactor. Three complete passes shall be made on each 8 inch thick loose layer of stone. Such passes shall overlap the adjacent previously compacted area a minimum of 20%. Density requirement for crushed stone will be considered satisfactory upon completion of compaction.

H. If the tests indicate unsatisfactory compaction, the Contractor shall provide the additional compaction necessary to obtain the specified degree of compaction. All additional compaction work shall be performed by the Contractor at no additional cost to the Owner until the specified compaction is obtained. This Work shall include complete removal of unacceptable fill areas and replacement and recompaction until acceptable fill is provided, as determined by the Engineer.

3.7 GRADING

A. Uniformly grade areas within limits of the Work, including adjacent transition areas. Smooth subgrade surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Pavements: Shape surface of areas under pavements to the line, grade and cross-section shown, with finish surface not more than 1/2 inch above or below the required subgrade elevation.

C. Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/4 inch when tested with a 10 foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density required.

3.8 CONTAMINATED MATERIALS STORAGE

A. Excavated material shall be placed in temporary storage or transported off-site for disposal immediately after excavation. Temporary storage areas shall be located within the property line of the Site and shall be delineated by the Contractor in its approved submittals. Storage areas shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. Each storage area shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each area.

B. Storage of excavated material outside the designated soil staging areas is prohibited without prior written approval by the Owner.

C. The following methods of storage are acceptable:

1. Stockpiles

a. Excavated materials shall be stockpiled in the areas noted in the Contractor's approved submittals. Stockpiles shall be located 10 feet or greater from property lines.

b. Stockpiles shall be constructed to isolate stored contaminated material from the environment. The maximum stockpile height shall be 10 feet. Each stockpile shall be labeled with an identification number identifying the material stored within the stockpile.

c. Diversion measures shall be employed to prevent storm water run-on and run-off. A sealed geomembrane liner and cover shall be used to prevent cross-contamination of existing ground surface, precipitation from entering the stockpile and emissions and dust from escaping. The minimum thickness of the geomembrane liner shall be 40 mils and the sealed geomembrane cover shall be 20 mils. Control measures such as wetting the stockpile surfaces shall be employed to suppress dust. Only potable water shall be used for this purpose.

2. Roll-off Units

a. Roll-off units may be used for temporary storage in lieu of stockpiling the material.

b. Roll-off units used to temporarily store contaminated material shall be watertight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. Liquid which collects inside the units shall be removed and disposed off-site in accordance with all applicable federal, state and local laws and regulations.

D. Storage and handling of contaminated soil must comply with all applicable NYSDEC solid waste regulations (6 NYCRR Part 360) and hazardous waste regulations (6 NYCRR Parts 370-376).

E. Excavated soil may not be stored on-site for a period greater than 30 days from being removed from the ground.

F. Spillage shall be minimized and contained for later off-site disposal in accordance with all applicable federal, state and local regulations.

G. All materials used to protect underlying soil and adjacent areas during the soil removal and handling activities must be properly characterized and removed for proper off-site disposal in accordance with all applicable federal, state and local laws and regulations following completion of these activities. The Contactor shall obtain the Owner's approval of the waste characterization and the disposal facility prior to any waste being transported off-site.

3.9 DISPOSAL OF EXCAVATED MATERIALS

A. No excavated materials suitable for common or select fill shall be removed from the site or disposed of by the Contractor except as directed by the Owner. Materials shall be neatly piled at designated locations on-site.

B. Organic material and material which does not conform to the requirements for backfill shall be disposed of in compliance with these specifications.

C. Contractor shall not dump soil onto those areas designated as wetlands or waterways. Contractor shall not stockpile or store spoil, materials, tools or equipment on wetlands.

3.10 RESTORING AND RESURFACING EXISTING ROADWAYS AND FACILITIES

A. Pavement, gutters, curbs, walks, driveways and roadways disturbed or damaged by the Contractor's operations shall be restored or replaced by him to original or better condition.

B. After all other work has been completed in each area not to be paved, place and grade topsoil to a depth of not less than 6-inches.

3.11 ENVIRONMENTAL PROTECTION AND RESTORATION

A. See Section 01 57 19 for requirements pertaining to additional environmental controls required.

+ + END OF SECTION + +

SECTION 31 10 00

DEMOLITION AND SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Site Demolition:

1. Demolition of site improvements including, but not limited to, paving, curbing, sidewalks, fencing, gates and existing building foundations.

2. Demolition of abandoned building foundations and associated utilities, in whole or in part, as shown on the Drawings.

3. Protection of site work and adjacent structures.

4. Pollution control during demolition, including noise control.

5. Removal and legal disposal of materials.

6. Dismantled items to be retained by the Owner.

7. Dismantled items to be reinstalled.

1.2 SUBMITTALS

A. Clearing Plan: Submit list of proposed operations, and identify site improvements and features to remain. Include proposed location for stockpiles.

B. Schedule: Submit for approval selective demolition schedule, including schedule and methods for maintaining existing utility service.

1.3 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Use experienced workers.

1.4 PROJECT CONDITIONS

A. Immediate areas of work will not be occupied during selective demolition. The public, including children, may occupy adjacent areas.

B. No responsibility for buildings and structures to be demolished will be assumed by the Owner.

1.5 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00, Submittal Procedures

B. Section 01 74 00, Cleaning and Waste Management:

PART 2 - PRODUCTS - NOT APPLICABLE TO THIS SECTION

PART 3 - EXECUTION

3.1 SITE CLEARING OPERATIONS

A. Protection of existing trees, vegetation, landscaping and site improvements not scheduled for clearing which might be damaged by construction activities.

B. Trimming of existing trees and vegetation as recommended by arborist for protection during construction activities.

C. Clearing and grubbing of stumps and vegetation, and removal and disposal of debris, rubbish, designated trees, and site improvements. This includes removal of tree stumps on-site from previous tree removals.

D. Topsoil stripping and stockpiling.

E. Temporary erosion control, siltation control and dust control.

F. Temporary protection of adjacent property, structures, benchmarks and monuments.

G. Temporary relocation of play structures, fencing and site improvements scheduled for reuse.

H. Watering of trees and vegetation during construction activities.

I. Removal and legal disposal of cleared materials.

3.2 DEMOLITION

A. Do not damage building elements and improvements indicated to remain. Items of salvage value, not included on schedule of salvage items to be returned to Owner, shall be removed from site. Storage or sale of items at project site is prohibited.

B. No explosives are permitted.

C. Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.

D. Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.

E. Provide adequate protection against accidental trespassing. Secure project after work hours.

F. Restore finish of patched areas.

+ + END OF SECTION + +

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SECTION 31 23 16.26

ROCK REMOVAL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes drilling, excavation, removal and disposal of rock as necessary for the installation of the Work, and as indicated and specified herein. Contractor shall refer to the Geotechnical Report included in Appendix 1 of the Technical Specifications for rock locations and suggested removal operation.

1.2 DEFINITIONS

A. Rock: Limestone, sandstone, shale, granite, quartz, and formations of other varying mineral or aggregate composition in solid beds or masses in its original or stratified position that exceed 1 cubic yard and that cannot be excavated with one of the following:

1. A crawler tractor having a minimum draw bar pull rated at not less than 71,000 pounds (Caterpillar D9N or equivalent) and occupying an original volume of at least 1 cubic yards or more.

2. A backhoe having a break out force rated at not less than 44,000 pounds (Caterpillar 235D or equivalent) and occupying an original volume of at least 1 cubic yards.

B. Rock Excavation: Removal of rock by means of drilling (exclusive of pile installation), or use of pneumatic tools or expansive chemical agents. Removal of materials which, in the opinion of the Engineer, can be loosened and excavated by mechanical means (ripping, etc.) including frozen materials, soft laminated shale or hardpan, pavements, curbs and similar materials shall be classified as earth excavation with the exception of rock face scaling. Contractor shall provide / include the following within Rock Excavation costs:

1. Survey of excavation(s) shall be provided by the Contractor. On-site Engineer will be responsible for survey confirmation and accuracy.

2. Contractor shall not proceed with the excavation of material until cross sections have been taken and the Engineer has classified (verified) the materials as common excavation or rock excavation.

3. Failure on the part of the Contractor to uncover such material, notify the Engineer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Engineer for the areas of work in which such deposits occur.

C. Unauthorized Excavation: Removal of any material beyond horizontal and vertical limits indicated on the Drawings or as specified herein, without the prior approval of the Engineer.

D. Scaling: Scaling shall be considered the removal of loose and broken rock from the face of rock cuts by mechanical means. Scaling shall be included in Rock Excavation item as defined above.

E. Pile Installation: Rock drilling, removal and disposal specifically for the installation of piles will not be considered rock removal.

1.3 REGULATORY REQUIREMENTS

A. Comply with the applicable requirements of the Code of Federal Regulations Title 29 - Labor, Part 1926 Safety and Health Regulations for Construction (OSHA).

1.4 SUBMITTALS

A. General:

1. Submit Specialty Contractors' qualifications, to the Engineer for approval.

2. Submit work plans, site safety plans, proposed equipment, and a detailed outline of intended rock removal procedures and any other information listed in this specification to the Engineer for approval. This submittal shall not relieve the Contractor of complete responsibility for the successful performance of the method(s) used.

B. Site Safety Plan:

1. Site safety shall be coordinated through the Contractor's office. A written safety plan shall be developed and distributed to all subcontractors, the Owner and the Engineer.

C. Certifications/Licenses:

1. One (1) copy of each certificate, license, permit, and proof of insurance required by this specification shall be submitted to the Engineer after award of contract and prior to commencement of work.

1.5 PROJECT/SITE CONDITIONS

A. Existing Conditions: Existing physical conditions as defined for design purposes are noted on the Drawings and are described in the Information Available to Bidders section of the Contract Documents.

1.6 MAINTENANCE

A. Any and all damage caused by the Rock Removal operations shall be repaired or replaced to the property Owner's and Engineer's satisfaction at the expense of the Contractor.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 ROCK REMOVAL

A. Remove rock as indicated by the Drawings and as necessary for the installation of the Work. Provide sufficient clearance, within the limits specified, for the proper execution of the Work.

B. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

1. 24 inches outside of concrete forms other than at footings.

2. 12 inches outside of concrete forms at footings.

3. 6 inches outside of minimum required dimensions of concrete cast against grade.

4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.

5. 6 inches beneath bottom of concrete slabs on grade.

6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

7. 12 inches outside of stone construction entrance limits as shown on plans.

C. Fill areas of over-excavated rock to the proposed subgrade elevations as required by Drawings with selected fill in accordance with Section “Trenching and Backfilling” or Section “Earthwork” Over-excavation beneath foundations shall be filled with footing concrete (f'c = concrete compressive= 3000 psi minimum).

D. All rock slopes shall be thoroughly scaled to the satisfaction of the Engineer. Scaled rock slopes shall be stable and free from possible hazards of falling rocks or rock slides that endanger public or worker safety. If such conditions exist after proper scaling, remedial treatment shall be provided by the Contractor at no additional expense to the Owner. In the event that natural conditions such as wedge instability are encountered, remedial treatment shall be provided as necessary to stabilize the rock slope. Such treatment may include, but is not necessarily limited to, rock bolting or grouting, shoring, or shotcreting. Large scale ripping shall not be permitted within 10 feet of any final rock slope prior to presplitting or line drilling.

E. Blasting will not be permitted.

3.2 EXCAVATION TOLERANCES

A. Rock removal limits shall include all materials defined as rock whether removal is accomplished by mechanical means (ripping, etc.) or by drilling.

+ + END OF SECTION + +

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section includes the excavation of trenching, backfilling, compacting, dewatering, excavation support and disposal, as shown on the Contract Drawings, and as herein specified.

B. The Engineer will determine the suitability of materials that are to be used in the work and should any materials encountered be unsatisfactory for the purpose intended, they shall be removed from the site at the Contractor's expense.

1.2 REFERENCES

A. Standards referenced in this Section shall be the latest edition of the following standards:

1. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering."

2. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."

3. American Society for Testing and Materials (ASTM).

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control and other requirements of governmental authorities having jurisdiction, including the State.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils and aggregate with the specifications in accordance with Section "Quality Requirements."

1.3 QUALITY ASSURANCE

A. Notify the Engineer of any unexpected subsurface condition.

B. Protect excavations by shoring, bracing, sheet piling, or by other methods, as required to ensure the stability of the excavation. Comply with OSHA requirements.

C. Underpin or otherwise support structures adjacent to the excavation, which may

be damaged by the excavation. This includes service lines.

D. Protection of Existing Utilities:

1. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Comply with OSHA requirements.

2. Coordinate interruption and/or termination of utilities with the utility companies and the Owner.

3. Provide a minimum of 48 hours' notice to the Owner and receive written notice to proceed before interrupting any utility.

E. Demolish and completely remove from the site any existing underground utilities designated to be removed, as shown on the Drawings or as specified.

F. Repair any damaged utilities as acceptable to the Owner, Engineer, and utility company at no additional cost to the Owner.

G. Contractor shall comply with maintenance and protection requirements as approved by the authority having jurisdiction.

H. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights, if required.

2. Operate warning lights as recommended by authorities having jurisdiction.

3. Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

4. Perform excavation within drip-line of trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with burlap. Paint cut roots of 1-inch diameter and larger with emulsified asphalt tree paint.

1.4 SUBMITTALS

A. Samples:

1. The Contractor shall furnish representative earth materials to the testing laboratory for analysis and report, as directed by the Engineer, or as outlined in the specifications.

B. Test Results:

1. The testing laboratory shall submit written reports of all tests, investigations, findings, and recommendations to the Contractor and the Engineer.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Pipe Zone Bedding: Select mixture of graded crushed stone, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section 703-02 and meeting the following gradation requirements (NYSDOT Size 2):

SIEVE	PERCENT PASSING
1-1/2"	100
1"	90 – 100
1/2"	0 – 15

B. Pipe Zone Backfill: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section 304 and meeting the following gradation requirements (NYSDOT Subbase Type 4):

SIEVE	PERCENT PASSING
2"	100
1/4"	30 – 65
No. 40	5 – 40
No. 200	0 – 10

C. Suitable Material: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT 203-2.02C and meeting the following gradation requirements:

SIEVE	PERCENT PASSING
4"	100
No. 40	0 – 70
No. 200	0 – 15

1. Run-of-trench material, meeting the above criteria, shall be considered suitable material and shall be used for trench backfill only after tested in accordance with Section "Quality Requirements" and approved by the Engineer. The Contractor shall pay for all additional testing required to determine the conformance of run-of-trench material, if at any time during the Work this material appears to be in non-conformance in the opinion of the Engineer.

PART 3 – EXECUTION

3.1 PRECONSTRUCTION MATERIAL QUALIFICATION TESTING

A. General:

1. Sufficient size samples shall be obtained from the potential borrow source to allow completion of tests listed in paragraph B below. Samples may be obtained from test borings, test pits, or from borrow pit faces provided that surficial dry or wet soil is removed to expose undisturbed earth. Tests listed below shall be performed on each sample obtained. A minimum of 3 representative samples from each potential borrow source shall be furnished to the testing laboratory for prequalification testing. Test data shall be provided to the Engineer a minimum of 2 weeks prior to construction for approval of borrow source. Three test reports completed within three months prior to construction may be submitted for commercial earth borrow sources or suppliers of stone products (crushed stone or graded stone products) in lieu of prequalification tests as approved by the Engineer.

B. Material Tests:

1. Particle Size Analysis:

a. Method: ASTM D422.

b. Number of Tests: One (1) per sample; three (3) per potential source.

c. Acceptance Criteria: Gradation within specified limits.

2. Maximum Density Determination:

a. Method: ASTM D1557 - Modified Proctor.

b. Number of Tests: One (1) per sample; three (3) per potential source.

3. Re-establish gradation and maximum density of fill material if source is changed during construction.

3.2 PREPARATION

A. Establish required lines, levels, contours, and datum.

B. Maintain benchmarks and other elevation control points; re-establish if disturbed or destroyed at no additional cost to the Owner.

C. Establish location and extent of existing utilities prior to commencement of excavation.

3.3 EXCAVATION

A. All excavation shall be made to such depth as required and of the width shown on the Drawings to provide suitable room for building the structures and laying the pipe(s) they are to contain and for sheeting, shoring, pumping and draining as necessary, and for removing peat, silt, or any other materials which the Engineer may deem unsuitable. Hand trench excavation may be required to protect existing utilities and structures.

B. Trench excavation for pipes shall be made by open cut to accommodate the pipe or structure at the depths indicated on the Drawings. Excavation shall be made to such a depth and to the width indicated on the Drawings so as to allow a minimum of 8 inches of pipe zone bedding to be placed beneath the bottom of all structures and barrels, bells or couplings of all pipes installed unless otherwise specified on the Drawings.

C. The bottom of the trench shall be accurately graded to provide a uniform layer of bedding material as required for each section of pipe. Trim and shape trench bottoms and leave free of irregularities, lumps, and projections.

D. Stockpile excavated subsoil for reuse where directed or approved.

E. Over excavation/undercut: If, in the opinion of the Engineer, existing material below the trench grade is unsuitable for properly placing bedding material and laying pipe, the Contractor shall excavate and remove the unsuitable material and replace the same with an approved pipe zone bedding material properly compacted.

F. Stability of Excavation: Slope sides of excavations shall comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavation in safe condition until completion of backfilling.

G. Removal of materials beyond the indicated subgrade elevations, without authorization by the Engineer, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Owner.

3.4 DEWATERING

A. The Contractor shall remove all water from the excavation promptly and continuously throughout the progress of the work and shall keep the excavation dry at all times until the work is completed and excavation is backfilled or have sufficient weight to resist uplift pressures. Groundwater levels shall be depressed to a minimum of 2 feet below excavation subgrade. No pipe or structure is to be laid in water and water shall not be allowed to rise on or flow over any pipe or structure until such time as approved by the Engineer.

B. Provide a suitable point of discharge from dewatering operations shall be conveyed in a non-erosive manner satisfactory to the Engineer.

C. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes. All pipe lines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected.

3.5 BEDDING AND BACKFILLING

A. All pipe trenches backfill (pipe zone bedding, pipe zone backfill and trench backfill) shall be compacted by tamping or rolling to achieve a minimum dry density of 90 percent of the modified Proctor maximum dry density of the material used (ASTM D1557). Backfill in pipe trenches to be covered with pavement shall be compacted to a minimum of 95 percent of modified Proctor maximum dry density. Backfill materials shall be placed with water content within plus or minus 4 percent of optimum moisture content per the modified Proctor method (ASTM D1557). Any water used for compaction shall be provided by the Contractor at his own expense. The Contractor is responsible for the repair of any trench settlement at no expense to the owner.

B. Bedding and backfilling shall be accomplished in three stages unless otherwise specified on the Contract Drawings. The first stage shall involve placement of "pipe zone bedding" as a layer(s) of selected material required to support, or to stabilize unsound or unsatisfactory foundation conditions. The second stage shall involve placement of "pipe zone backfill" from the top of the bedding material up to 1 foot above the pipe. The third stage involves the placement of "trench backfill" in the remainder of the trench up to the surface of the ground or the bottom of any special surface treatment subgrade elevation.

C. The bedding material shall be placed in the trench after the trench has been excavated a minimum of 8 inches below the bell of the pipe to permit the placing of not less than 8 inches of bedding material unless otherwise specified on the

Drawings. Where, in the opinion of the Engineer, more than 8 inches of bedding material shall be required, the excavation shall be performed and bedding placed to the depth ordered by the Engineer.

D. Provide uniform bearing and support for each section of pipe at every point along the entire length except where necessary to excavate for bell holes, pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make the joint connection properly.

E. The bedding material shall be placed to the full width of trench. The bedding material shall be placed in loose lifts not exceeding 6 inches to the elevation shown on the Drawings or directed by the Engineer. The bedding material shall be tamped and compacted to form a firm and even bearing surface.

F. Pipe zone backfill shall be placed to the elevation shown on the Drawings in loose lifts not-to-exceed 6 inches in thickness, before compaction. The backfill shall be placed on both sides of the pipe at the same time and to approximately the same elevation. Any pipe that is damaged or moved out of alignment, regardless of cause, shall be replaced or realigned at the Contractor's expense. Each layer shall be thoroughly compacted by hand-tamping or mechanical means being careful not to damage the pipe. When the pipe zone backfill reaches 1 foot over the top of the pipe, the entire surface shall be compacted by mechanical means.

G. The remainder, if any, of the trench above the pipe zone backfill shall be backfilled with suitable material in loose lifts not exceeding 6 inches in thickness before compaction. Each layer shall be thoroughly compacted by mechanical means.

3.6 BACKFILLING AROUND STRUCTURES

A. The Contractor shall not place backfill against any structure without obtaining the approval of the Engineer. No dumping shall be allowed where materials would flow against or around such structures. Backfill material shall be deposited in horizontal layers not exceeding 6 inches in loose thickness or as shown on the Drawings and thoroughly compacted by hand or by mechanical means to the satisfaction of the Engineer.

3.7 SUSPENSION OF WORK

A. Whenever the work is suspended, excavations shall be protected and the roadways, if any, left unobstructed. Within or adjacent to private property, material shall be stored at such locations as will not unduly interfere with traffic of any nature and in no case shall materials be stored in locations which will cause damage to existing improvements.

3.8 DISPOSAL OF MATERIAL

A. Excess and unsuitable materials shall be disposed of by the Contractor on the site in an area approved by the Engineer or legally disposed of off- site at the Contractor's expense.

3.9 FIELD QUALITY CONTROL

A. Notify the Engineer at least 3 working days in advance of all phases of filling and backfilling operations.

B. In-place density testing shall be performed to ascertain the compacted density of the fill and backfill materials in accordance with the following methods:

1. In-place relative density:

a. Method: AASHTO T238, Nuclear Method.

C. Perform initial density testing to verify that contractors proposed compaction effort will obtain the minimum required densities.

D. In-place density tests on trench backfills shall be provided for every 500 cubic yards of fill and in vertical lifts not exceeding 2 feet and at least once daily.

E. One particle size analysis (ASTM D422) and one modified Proctor compaction test (ASTM D1557) shall be competed for every 5,000 cubic yards of material placed.

F. The Engineer may direct additional tests to establish gradation, maximum density, and in-place density as required by working conditions, at the Contractor's expense.

G. Acceptance Criteria: The criteria for acceptability of in-place fill shall be in-situ dry density and moisture content. If a test fails to qualify, the fill shall be further compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

+ + END OF SECTION + +

SECTION 31 25 00

SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Erosion control shall include all work, materials and measures necessary to control soil erosion and sediment control resulting from construction operations, prevent flow of sediment from the construction site, and contain construction materials (including excavation and backfill) within protected working areas. In general, the work under this section shall include, but not be limited to, the work shown on the Soil Erosion and Sediment Control Plans and Details.

B. All Best Management Practices (BMPs) indicated in the Erosion and Sediment Control Plan (ESC) must be inspected and maintained regularly. Inspections are required either (1) at least once every 7 days or (2) at least once every 14 days and within 24 hours of the end of a rain event of 1/4-inch or more. The ESC plan must also be updated as site conditions and BMPs change. Keep records of maintenance activities and any ESC modifications for review during inspection.

1.2 QUALITY ASSURANCE

A. The contractor shall comply with the requirements of the NYSDEC as they relate to erosion control.

1.2 SUBMITTALS

A. Provide sample log, checklist, inspection report, or similar document that demonstrates periodic inspection of the implemented measures which must include sample dates, inspection frequency (at least monthly, year-round), & at least 3-inspections equally spaced over the site work period, description of any corrective action taken.

B. Provide date-stamped photos which show the implemented measures and any corrective action that was taken.

C. Describe what action was taken to effectively implement the ESC plan and maintain the erosion and sedimentation control measures.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Proper treatment and disposal of water from dewatering operations shall, at a minimum, require the use of a sedimentation/filtration system as necessary to remove suspended matter and other possible contaminants such as spilled fuel, lubricants, etc.

B. The design and operation of settling basins and/or filters shall be sufficient to protect the environment in accordance with all pertinent NYSDEC regulations. It shall be the responsibility of the Contractor to maintain compliance at all times during dewatering operations. In addition, care shall be taken not to damage or kill vegetation by excessive water discharge or by silt accumulation in the discharge area.

C. Settling basins, plastic filter fabrics, hay bales or other erosion and sediment control measures approved by the NYSDEC and as specified and shown on the Contract Plans shall be used where necessary to protect vegetation, wetlands and wetlands buffer zones and to prevent sediment from either surface runoff or the dewatering operations from entering catch basins, surface waters, etc.

D. All soil erosion and sediment control practices are to be installed prior to any major soil disturbance and maintained until permanent protection is established.

E. Traffic control standards require the installation of a 50-foot by 25-foot by 1-foot pad of 3-inch stone immediately after initial site disturbance. Said pad shall be underlain with a suitable synthetic filter fabric. The pad shall be maintained in a condition which will prevent tracking or flowing of sediment onto roadways and rights-of-way. This may require periodic top dressing with additional stone or additional length as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

F. Upon completion of construction activities, the area used for the tracking pad shall be returned to elevations and conditions which existed prior to start of construction.

G. The Contractor shall take necessary measures to maintain dust control. Dirt haul roads shall be sprinkled with water or given a surface of crushed stone or wood chips as required. Vehicles shall be cleaned, as necessary, prior to using public streets. Paved roads shall be sprinkled with water.

H. All soil erosion and sediment control devices shall be located in the field as shown on the drawing or at the direction of the Engineer. The contract drawings are not intended to show the location and details for all such devices but are to be used as a reasonable guide.

I. Any changes to the approved soil erosion and sediment control plans will require the submission of soil erosion and sediment control plans to the Engineer nd the NYSDEC for re-approval. The revised plans must meet all current State soil erosion and sediment control practices. No extension of the Contract time will be given to the Contractor should resubmission be required.

J. Contractor shall obtain all required permits.

K. Upon completion of construction work and after final grading and when permanent stabilization has been established, the bales and silt fences shall be removed by the Contractor. However, no soil erosion devices shall be removed without written permission of the Engineer.

L. All excess excavated material, except for topsoil, shall be removed from the site by the Contractor in accordance with the Contract Documents or as ordered by the Engineer.

M. Conduit outlets and catch basin inlets must be protected prior to start of construction.

N. The Contractor shall provide a detailed sequence of construction operations for review and submittal to the Engineer.

O. The Contractor shall meet the Engineer on-site to define those areas which will require soil erosion and sediment control facilities, discuss their construction.

P. All soil erosion and sediment control practices shall be left in place and maintained, including silt and sediment removal, until construction is completed, area is stabilized and the Engineer so directs.

Q. All dewatering operations must discharge directly into a sediment trap. Sediment filters shall be installed in accordance with the drawings and the details of design and construction shall be prepared and submitted by the Contractor to the Engineer and Owner for review.

R. The Contractor shall restrict his operations to the areas of construction as shown on the Contract Drawings. Any encroachment outside the areas of construction shall be the Contractor's responsibility and he shall assume all costs for repairing any damage caused by his operations.

+ + END OF SECTION + +

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SECTION 31 25 13

EROSION CONTROL MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Under this section, the Contractor shall provide all labor, equipment and material necessary to furnish and install erosion control materials as shown on the plans, as specified and as directed by the Engineer.

B. General:

1. Erosion control materials shall be installed on sideslopes to provide soil erosion resistance, as shown on the Plans and/or as directed by the Engineer.

2. Erosion control materials shall be installed in seeded drainage channels, swales and sideslopes to provide permanent soil erosion resistance and vegetation reinforcement, as shown on the Plans and/or as directed by the Engineer.

C. Related Work Specified Elsewhere:

1. Section 31 25 00, Soil Erosion and Sediment Control.

2. Section 31 00 00, Earthwork .

1.2 QUALITY ASSURANCE

A. The manufacturer of the erosion control materials shall be a specialist in the production of the specified materials and the proposed materials shall be a standard product of their manufacture.

1.3 SUBMITTALS

A. Submit shop drawings in accordance with the General Contract Conditions.

B. Submittal shall include, but not be limited to, manufacturer’s data, specifications, samples, installation instructions and a list of previous installations identifying the name of the owner, the project, Engineer (with telephone number and contact name), quantity of material furnished and its intended purpose.

C. The Contractor shall furnish a notarized affidavit signed by an authorized representative of the manufacturer certifying that the proposed materials comply with the requirements specified herein and are suitable for the intended purpose.

D. No material shall be shipped to the Project site until the affidavit is submitted to and approved by the Engineer.

PART 2 - PRODUCTS

2.1 PERMANENT EROSION CONTROL FABRIC

A. The composite turf reinforcement mat (C-TRM) shall be a machine produced mat of 100% UV stabilized polypropylene fiber matrix incorporated into a permanent 3-dimensional netting structure.

B. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between three super heavy-duty UV stabilized nettings with 0.50 x 0.50-inch (1.27 x 1.27 cm) openings. The middle, dramatically corrugated (crimped) netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50-inch (3.81 cm) centers with UV stabilized polypropylene thread to form a permanent 3-dimensional structure.

All mats shall be manufactured with a colored thread stitched along both outer edges (approximately 2 to 5 inches [5 to 12.5 cm] from the edge) as an overlap guide for adjacent mats.

C. The composite turf reinforcement mat shall be the North American Green P550, or equivalent. The P550 permanent composite turf reinforcement mat shall have the following physical properties:

Material Content

Matrix 100% UV Stabilized Polypropylene Fibers (0.50 lbs/yd^2) (0.27 kg/m^2)

Netting Top and bottom - Ultra Heavy UV Stabilized Polypropylene - (24 lb/1,000 ft^2 [11.7 kg/100m^2] approximate weight)

Mid - Ultra Heavy UV Stabilized Corrugated (24 lb/1,000 ft^2 [11.7 kg/100m^2] approximate weight)

Thread Black UV Stabilized Polypropylene

Physical Specifications (per roll)

	English	Metric
Width	6.50 ft	2.00 m
Length	55.50 ft	16.90 m
Weight	52 lbs ± 10%	23.59 kg
Area	40 yd^2	33.40 m^2
Stitch Spacing	1.50 in	3.81 cm

D. Erosion control fabric shall be secured in place using heavy duty metal staples. The metal staples shall be U-shaped, a minimum of 12 inches long (each leg) and shall be fabricated from 9 gauge or greater diameter metal wire. The metal staples shall be furnished by the manufacturer of the erosion control fabric and shall be suitable for the installed product and consistent with the manufacturer's recommendations.

2.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Each roll of erosion control material delivered to the site shall be labeled by the manufacturer identifying the manufacturer's name, product identification, roll dimension and direction for unrolling. Each roll of erosion control material shall be supplied wrapped in a relatively watertight and opaque protective cover.

B. All erosion control material shall be properly stored to protect the materials from ultraviolet degradation, precipitation or other inundation, mud, dirt, dust, puncture, cutting, extreme heat caused by direct sunlight or any other damaging or deleterious conditions.

C. Materials which are damaged during shipment, storage, handling or installation shall be rejected, removed from the job site and replaced at no additional cost to the Owner. The Contractor shall take special care to ensure that the integrity of the protective wrapping on each roll is maintained until the time of installation.

PART 3 - EXECUTION

3.1 GENERAL

A. The erosion control materials shall be installed over the prepared seedbed which has been constructed in accordance with the requirements of these specifications.

B. Prior to the placement of the erosion control materials in an area, the Contractor and the Engineer shall examine the prepared seedbed to ensure

that it is smooth, stable, firm, evenly graded, free of protrusions, sharp stones, vehicle imprints or other damaging objects, properly and evenly seeded and free of erosion. The Contractor shall immediately repair any damage or defect in the prepared seedbed, including reseeding if necessary, prior to the installation of the erosion control materials.

C. The Contractor shall handle and install the erosion control materials in such a manner to ensure that the material is not damaged in any way.

D. The protective wrapping on each roll shall not be removed sooner than one hour prior to unrolling. Unused portions of rolls, which are not used in the same day that they are unwrapped, shall be rewrapped and properly stored. Unused portions of rolls which are shorter than 33% of the manufactured roll length shall be discarded unless specifically approved by the Engineer for a particular application.

E. In the presence of wind, the erosion control material shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain in place until the installation of the erosion control material is completed. The sandbags shall not be left in place, incorporated into the work, or their contents deposited on the work.

F. The erosion control materials shall be cut using approved cutting instruments as recommended by the manufacturer. The method of cutting shall result in a neat, clean, controlled cut which does not cause pulling or unraveling of the material components.

G. The erosion control materials shall be installed on the prepared seedbed within 36 hours of the placement of the seed and landscaping materials.

H. Apply erosion control materials with the length of roll laid parallel to the flow of the water in swales and channels or along the direction of slope for crown and sideslope areas.

I. Sideslope Installation:

1. The erosion control fabric shall be installed on the sideslope areas in accordance with the manufacturer’s recommendations as specified and as directed by the Engineer.

2. The erosion control fabric shall be installed vertically downslope in the direction of water flow.

3. Anchor fabrics at top of slope in a 6-inch by 6-inch anchor trench, staple fabric in anchor trench on 3 feet centers. Backfill, compact and hand reseed trench areas.

4. Overlap fabric edges at least 3 inches and secure with staple at least 3 feet on centers.

5. Do not pull the erosion control fabric taut during installation. The erosion control fabric must be in intimate contact with the underlying soil surface. If trampolining is experienced, install additional staples to secure the fabric to the soil.

6. Staple the erosion control fabric to the underlying soil using a uniform stapling pattern which will provide a staple (field) density of at least two staples per square yard.

7. Install check slots every 50 feet by placing a fold at least 8 inches vertically into the soil. Staple the fabric in the check slot on 3 feet centers and at each edge. Backfill, compact and hand seed the check slots.

8. Overlap successive lengths of erosion control fabric at least 1-foot shingle style, with upslope layer on top. Staple overlapped area on 1-foot centers.

9. Anchor the downslope ends of the fabric in an anchor slot at least 8 inches deep. Secure the fabric in the anchor slot with staples 3 feet on center and at each edge. Backfill, compact and hand seed the anchor slot.

J. The Contractor shall exercise extreme care during the placement and installation of the erosion control materials so as to minimize the disturbance to the prepared seedbed. The Contractor shall repair any damage to the prepared seedbed to the satisfaction of the Engineer.

+ + END OF SECTION + +

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SECTION 31 40 00

SHORING AND UNDERPINING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and Design of bracing, shoring, and underpinning. Selection of construction sequence. Temporary bracing of the structure or portions of the structure as required to prevent the structure from becoming unsafe during construction. Temporary shoring of portions of the structure as required to prevent the structure from becoming unsafe during construction. Temporary shoring of excavations. Construction and removal of posts, timbers, lagging, braces, etc. required in connection with bracing, shoring, and underpinning the structure during construction. Excavation, concrete placement and backfilling required in connection with underpinning

2. The Contractor shall accept the site in the condition in which it exists at the time of the award of the Contract.

1.2 REFERENCES

A. Standards referenced in this Section are General:

The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.

B. State of New York – New York State Department of Transportation (NYSDOT): Standard Specifications.

1.3 QUALITY ASSURANCE

A. Design calculations and Shop Drawings of proposed bracing, shoring, and underpinning of the structure shall be prepared, stamped, and signed by a Structural Engineer registered in the State of New York.

1.4 SUBMITTALS

A. The Contractor shall submit Shop Drawings indicating layout, member sizes, connection details and construction sequence for bracing, shoring and underpinning. No work related to bracing, shoring or underpinning shall take place until the Engineer has reviewed the Shop Drawings.

B. The Contractor shall also submit Design calculations of bracing, shoring and underpinning showing member stresses and connections due to imposed loads.

PART 1 - PRODUCTS

2.1 MATERIALS

A. MATERIALS FOR SHORING AND BRACING

1. Materials for shoring and bracing shall be undamaged, high quality materials.

B. CONCRETE FOR UNDERPINNING

1. Concrete for underpinning shall meet the requirements of Division 03 Section “Cast-in-Place Concrete".

PART 3 -EXECUTION

3.1 CONSTRUCTION

A. Construction of bracing, shoring and underpinning shall be in accordance with the reviewed Shop Drawings prepared by the Subcontractor's Engineer.

B. The Contractor shall hire the Engineer responsible for the design of bracing, shoring and underpinning and inspection of the work as detailed on the bracing, shoring, and underpinning Shop Drawings, prior to sawcutting or removing portions of the structure.

C. Excavations for underpinning the foundations shall be inspected by the Geotechnical Engineer prior to placement of concrete.

D. Remove surplus excavated materials from site.

3.2 REMOVAL OF BRACING AND SHORING

A. Bracing and shoring shall not be removed until the new members have acquired sufficient strength to support their weight and the loads superimposed thereon safely. In no case may bracing or shoring be removed until the time and sequence has been approved by the Engineer responsible for bracing and shoring and reviewed by the University.

B. In general, bracing and shoring of concrete shall remain in place for at least ten days, when they may be removed provided the concrete is sufficiently hard and will not be injured.

+ + END OF SECTION + +

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SECTION 31 63 33

CONCRETE MICROPILES

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope:

1. This work shall consist of constructing micropiles as shown on the Contract plans in accordance with these Specifications.

2. The verification of micropile load capacities through the performance of proof load tests.

3. The work covered by this item shall consist of furnishing of all materials, products, accessories, tools, equipment, services, transportation, labor and supervision, installation and testing of micropiles and pile top attachments.

1.2 REFERENCES

A. FHWA's Micropile Design and Construction, Reference Manual, Publication No. FHWA-NHI-05-039.

B. ACI 336.3 R Design & Construction of Drilled Piers.

C. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

E. ASTM C494/AASHTO M194.

F. ASTM C150/AASHTO M85.

G. ASTM A416/A 416M.

H. ASTM D1143/D1143M Standard Test Methods for Deep Foundations Under Static Axial Compressive Load.

1.3 QUALITY ASSURANCE

A. Micropile Contractor's Qualifications and Submittal:

1. The micropile Contractor shall be experienced in the construction and load testing of micropiles and have successfully constructed at least 5 projects in the last 5 years involving construction totaling at least 100 micropiles of similar capacity to those required in these plans and specifications.

2. The Contractor shall have previous micropile drilling and grouting experience in soil/rock including karst formations similar to project conditions. The Contractor shall submit construction details, structural details and load test results for at least three previous successful micropile load tests from different projects of similar scope to this project.

3. The Contractor shall assign a project manager to supervise the work with experience on at least 3 projects of similar scope to this project completed over the last 5 years. The Contractor shall not use consultants or manufacturers' representatives to satisfy the supervising requirements of this section. The on-site foremen and drill rig operators shall also have experience on at least 3 projects over the past 5 years installing micropiles of equal or greater capacity than required in these plans and specifications and in the same or similar karstic geologic formations.

4. At least 45 calendar days before the planned start of micropile construction, the Contractor shall submit the completed project reference list and a personnel list. The project reference list shall include a brief project description with the owner's name and current phone number and load test reports. The personnel list shall identify the micropiles system design engineer (if applicable), supervising project manager, drill rig operators, and on-site foremen to be assigned to the project. The personnel list shall contain a summary of each individual's experience and be complete enough for the Engineer to determine whether each individual satisfies the required qualifications. The Engineer will approve or reject the Contractor's qualifications within 15 calendar days after receipt of a complete submission. Additional time required due to incomplete or unacceptable submittals will not be cause for time extension or impact or delay claims. All costs associated with incomplete or unacceptable submittals shall be borne by the Contractor.

5. Work shall not be started, nor materials ordered, until the Engineer's written approval of the Contractor's experience qualifications is given. The Engineer may suspend the work if the Contractor uses non-approval personnel. If work is suspended, the Contractor shall be fully liable for all resulting costs and no adjustment in contract time will result from the suspension.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.4 SUBMITTALS

A. Submit complete project specific shop drawings for the micropile system. Include all information required for the construction and quality control of the piling, including the following:

1. Information on space requirements for installation equipment that verify that the proposed equipment can perform at the site.

2. Step-by-step procedure describing all aspects of pile installation including personnel, testing and equipment to assure quality control. Indicate the step-by-step procedures on the shop drawings in sufficient detail so that the Resident Representative can monitor the construction and quality of the micropiles.

3. Details for drilling a plumb hole.

4. Details of centralizers.

5. Grout mix designs.

6. Details and procedures involved in testing components, including grout.

7. Pipe and reinforcement splice type and locations.

8. Details of equipment and operation for grouting. Include provisions for monitoring grout quality, volume installed, and pressure during installation.

9. Information on the minimum cure time and strength requirements of the pile system for test piles.

10. Drawing showing micropile location, number, design load, type and size.

11. Post construction, within 30 calendar days after completion of work, submit the following: As-built drawing showing locations of the micro piles and length; detailed drilling records; grouting records indicating the cement type and quantity injected; micro pile test results and graphs.

Allow the Engineer sufficient time to review the working drawing submittal after a complete set has been received. Do not install micropiles until the Engineer has approved, in writing, the working drawing submittal.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer and testing agency.

B. Welding certificates.

C. Design Mixes: For each concrete mix.

D. Material Certificates: For steel reinforcements, prestressing strand and concrete admixtures.

E. Material Test Reports: For concrete materials.

F. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.

G. Static Pile Test Reports: Submit within three days of completing each test.

H. Pile Records: Submit within three days of driving each pile.

I. Certified Piles Survey: Submit within seven days of pile driving completion.

J. Field quality-control reports.

K. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

1.6 PRECONSTRUCTION TESTING

A. Pile Tests: Arrange and perform the following pile tests:

1. Axial Compressive Static Load Test: ASTM D1143/D1143M, Procedure A, Quick Test.

B. Equip each test pile with two telltale rods, according to ASTM D1143/D1143M, for measuring deformation during load test.

C. Provide pile reaction frame, anchor piles, equipment, and instrumentation with enough reaction capacity to perform tests. Notify Engineer/Architect at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.

1. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.

2. Number of Test Piles: As indicated on design drawings.

D. Test micropiles at locations indicated to the minimum penetration or driving resistance indicated. Use test micropiles identical to those required for Project, and with appropriate micropile equipment operating at rated driving energy to be used in driving permanent piles.

E. Test Pile Records: Prepare records for each test pile, compiled and attested to by a qualified professional engineer. Include same data as required for records of permanent piles.

F. Load Test Equipment - Submit for approval information on the test jack and calibration results. The test jack and pressure gauge shall be calibrated in conformance with ASTM requirements.

1.7 FIELD CONDITIONS

A. Protect structures, underground utilities, and other construction from damage caused by pile driving.

B. Site Information: A geotechnical report has been prepared for this Project and is included elsewhere in the Project Manual for information only.

C. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Document conditions that might be misconstrued as damage caused by pile driving.

PART 2 - PRODUCTS

2.1 ADMIXTURES FOR GROUT

A. Admixtures shall conform to the requirements of ASTM C494/AASHTO M194. Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout, subject to the review and acceptance of the Engineer. Admixtures shall be compatible with the grout and mixed in accordance with the manufacture's recommendations. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations and anchorage covers. Accelerators are not permitted. Admixtures containing chlorides are not permitted. Structural Performance: Piles shall withstand transportation, erection, and driving stresses and design loads within limits indicated and under conditions existing at Project site.

2.2 CEMENT

A. All cement shall be Portland cement conforming to ASTM C150/AASHTO M85, Types II, III or V.

2.3 CENTRALIZER AND SPACERS

A. Centralizers and spacers shall be fabricated from schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood shall not be used. Centralizers and spacers shall be securely attached to the reinforcement; sized to position the reinforcement within ½ inch of plan location from center of pile; sized to allow grout tremie pipe insertion to the bottom of the drillhole; and sized to allow grout to freely flow up the drillhole and casing and between adjacent reinforcing bars.

2.4 ENCAPSULATION

A. Corrosion Protection - Provide corrosion protection of the internal steel reinforcing bars as follows:

1. Epoxy Coating: Electrostatically apply an epoxy coating to the reinforcing steel between 0.007 to 0.012 inches thick. Coat with epoxy in accordance with AASHTO M284 (ASTM A775). Bend test requirements are waived. Bearing plates and nuts encased in the pile concrete footing need not be epoxy coated. Provide mechanical couplers for splicing epoxy coated rebar that are either epoxy coated with the same thickness as the rebar or, for bare-steel couplers, coated with heat-shrink wrap. Apply heat-shrink wrap extending at least 6 inches past the ends of the couplers and 6 inches past any damaged areas.

2. Steel Protection: For bare steel reinforcement provide a minimum 3 inches of grout cover surrounding the reinforcing steel. For epoxy reinforcement provide a minimum of 2 inches of grout cover.

2.5 PLATES AND SHAPES

A. Structural steel plates and shapes for pile top attachments shall conform to ASTM A 572 Grade 50 (AASHTO M183).

2.6 CONCRETE MATERIALS

A. General: Limit water-soluble chloride ions in concrete to the maximum percentage by mass of cementitious material permitted by ACI 318, but not more than 0.06 percent.

B. Portland Cement: ASTM C150/C150M of same type, brand, and source.

1. Fly Ash: ASTM C618, Class C or F.

2. Silica Fume: ASTM C1240, amorphous silica.

C. Normal-Weight Aggregates: Except as modified by PCI MNL-116, ASTM C33/C 33M. Provide aggregates from single source.

1. Nominal Maximum Size of Aggregate: 1 inch.

D. Water: Potable, free of deleterious material that may affect color stability, setting, or strength of concrete, and complying with chemical limits of PCI MNL-116.

E. Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures.

1. Air-Entraining Admixture: ASTM C260/C26M.

2. Water-Reducing Admixture: ASTM C494/C494M, Type A.

3. Retarding Admixture: ASTM C494/C494M, Type B.

4. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.

5. Water-Reducing and Accelerating Admixture: ASTM C494/C494M, Type E.

6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.

7. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.

8. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

PART 3 - CONSTRUCTION

3.1 SITE DRAINAGE CONTROL

A. The Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accord with the standard Specifications and all applicable local codes and regulations. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the work, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place, may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

B. Immediately contact the Engineer if unanticipated existing subsurface drainage structures are discovered during excavation or drilling. Suspend work in these areas until remedial measures meeting the Engineer's approval are implemented. Cost of remedial measures or repair work resulting from encountering unanticipated subsurface drainage structures, will be paid for as Extra Work.

3.2 EXCAVATION

A. Coordinate the work and the excavation so the micropile structures are safely constructed. Perform the micropile construction and related excavation in accordance with the Plans and approved submittals. No excavations steeper than those specified herein or shown on the Plans will be made above or below the micropile structure locations without written approval of the Engineer.

3.3 MICROPILE ALLOWABLE CONSTRUCTION TOLERANCES

A. Centerline of piling shall not be more than 2 inches from indicated plan location

B. Pile shall be plumb within 2 percent of total-length plan alignment.

C. Top elevation of pile shall be plus 1 inch or minus 2 inches maximum from vertical elevation indicated.

D. Centerline of reinforcing steel shall not be more than ½ inch from indicated location.

E. Certified Piles Survey: Engage a land surveyor to prepare a piles survey showing final location of piles in relation to the property survey and existing benchmarks.

1. Notify Engineer when deviations from locations exceed allowable tolerances.

3.4 MICROPILE INSTALLATION

A. The micropile Contractor shall select the drilling method, the grouting procedure, and the grouting pressure used for the installation of the micropiles. The micropile Contractor is also responsible for estimating the grout take. There will be no extra payment for grout overruns. Pile shall be plumb within 2 percent of total-length plan alignment.

B. The minimum drilled hole diameter shall be within ½” of that shown on the plans. Holes shall be cased, as necessary, to the pile tip elevation or casing refusal materials. Casing may be terminated prior to the above requirements if the soils encountered can be drilled without caving.

C. If pile capacity dictates extending into refusal materials, continue drilling until an adequate rock socket is obtained as determined by the Designer.

D. Install micropile reinforcing in the center of the hole using centralizers as required. Measures shall be implemented to permit grout to flow from the pile to the annular spaces between the pile and the casing. Reinforcing bar and pile reinforcement shall be spliced as necessary.

E. Drill hole and casing shall be tremie grouted full length.

F. Installation of Reinforcement – Contractor'S project manager tasks during micropile construction shall include the following:

1. Verify reinforcement size, type, length and condition just prior to insertion into the drill hole.

2. Verify size, type, and condition of bar couplers.

3. Ensure that the micropile contractor installs the reinforcement before initial grout placement.

4. Always record the total pile length and bond zone length.

5. Ensure that the micropile inserts the reinforcement to the prescribed length without the use of force.

6. Verify location and spacing of centralizers/spacers, and locations of couplers.

7. Ensure that the micropile personnel takes precautions to not damage corrosion protection or centralizers/spacers during installation.

8. Make sure reinforcement is clean of any surface dirt, oil, mud, etc.

9. Check the attachment and intervals of centralizers/spacers.

10. Ensure that the reinforcement remains centered in the borehole.

3.5 DRILLING

A. The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to any overlying or adjacent structures or services. The drillhole must be open along its full length to at least the design minimum drillhole diameter prior to placing grout and reinforcement.

B. Casing of pile drillhole support will be required in caving or unstable ground to permit the pile shaft to be formed to the minimum design drillhole diameter. The Contractor's proposed method(s) to provide drillhole support

and to prevent detrimental ground movements shall be reviewed by the Engineer. Detrimental ground movement is defined as movement that requires remedial repair measures. Use of drilling fluid containing bentonite is not allowed.

3.6 PIPE CASTING AND REINFORCING BARS PLACEMENT AND SPLICING

A. Reinforcement may be placed prior to grouting or placed into the grout filled drillhole. Reinforcement surface shall be free of deleterious substances such as soil, mud, grease or oil that might contaminate the grout or coat the reinforcement and impair bond.

B. Reinforcing bar shall conform to ASTM A615 Grade 60, 75, 80 or equals. Splicing details shall be approved couplers.

C. The Contractor shall check pile top elevations and adjust all installed micropiles to the planned elevations.

D. Centralizers and spacers shall be provided at 10-foot centers maximum spacing. The upper and lower most centralizer shall be located a maximum of 5 feet in from the top and bottom of the micropile. Centralizers and spacers shall permit the free flow of grout without misalignment of the reinforcing bar and permanent casing. The central reinforcement bars with centralizers shall be lowered into the stabilized drill hole and set. The reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole. Contractor shall redrill and reinsert reinforcing steel when necessary to facilitate insertion.

E. Lengths of casing and reinforcing bars to be spliced shall be secured in proper alignment and in a manner to avoid eccentricity or angle between the axes of the two lengths to be spliced. Splices and threaded joints shall meet the requirements of the Materials Section. Threaded pipe casing joints shall be located at least two casing diameters (OD) from a splice in any reinforcing bar. When multiple bars are used, bar splices shall be staggered at least 1 foot.

3.7 GROUTING

A. Micropiles shall be primary grouted the same day the load transfer bond length is drilled. The Contractor shall use a stable neat cement grout or a sand cement grout with a minimum 28-day unconfined compressive strength of 4000 psi. Admixtures, if used, shall be mixed in accordance with manufacturer’s recommendations. The grouting equipment used shall produce a grout free of lumps and undispersed cement. The Contractor shall have means and methods of measuring the grout quantity and pumping pressure during the grouting operations. The grout pump shall be equipped with a pressure gauge to monitor grout pressures. A second

pressure gauge shall be placed at the point of injection into the pile top. The pressure gauges shall be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used, whichever is greater.

B. The grout shall be kept in agitation prior to mixing. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drill hole and injection shall continue until uncontaminated grout flows from the top of the pile. The grout may be pumped through grout tubes, casing, hollow-stem augers, or drill rods. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed the grout level is brought back up to the ground level before the next length is removed. The tremie pipe or casing shall always extend below the level of the existing grout in the drillhole. The grout pressures and grout take shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.

C. If the Contractor elects to use a post-grouting system, Working Drawings and details shall be submitted to the Engineer for review.

3.8 GROUT TESTING

A. Grout within the micropile proof test piles shall attain the minimum required 3-day compressive strength of 2000 psi prior to load testing. Previous test results for the proposed grout mix completed within one year of the start of work may be submitted for initial verification of the required compressive strengths for installation of initial production piles. During production, micropile grout shall be tested by the Contractor for compressive strength in accordance with AASHTO T106/ASTM C109 at a frequency of no less than one set of three 2-inch grout cubes from each grout plant each day of operation or per every 10 piles, whichever occurs more frequently. The compressive strength shall be the average of the 3 cubes tested.

B. Grout consistency as measured by grout density shall be determined by the Contractor per ASTM C 188/AASHTO T 133 or API RP-13B-1 at a frequency of at least one test per pile, conducted just prior to start of pile grouting. The Baroid Mud Balance used in accordance with API RP-13B-1 is an approved device for determining the grout density of neat cement grout.

C. Grout samples shall be taken directly from the grout plant. Provide grout cube compressive strength and grout density test results to the Engineer within 24 hours of testing.

3.9 MICROPILE INSTALLATION RECORDS

A. Contractor shall prepare and submit to the Engineer full-length installation records for each micropile installed. The records shall be submitted within one work shift after that pile installation is completed. The data shall be recorded on the micropile installation log. A separate log shall be provided for each micropile.

3.10 MICROPILE TESTING

A. Micropile Load Testing

Proof test piles at the locations designated in the drawings by the Design Engineer. Perform compression load tests in accordance with ASTM D1143 / D1143M. Procedure A, quick test.

B. Proof Load Test

Perform proof load tests prior to the installation of the remaining production piles in that location.

3.11 PILE ACCEPTANCE CRITERIA

A. The Pile Acceptance Criteria Includes:

1. Pile meets Construction Tolerance criteria.

2. Pile was installed in accordance with the approved submittal.

3. Pile is not damaged.

4. Pile was installed using the same method, grout volumes, and pressures as the accepted test pile, if applicable.

5. Submit the required documentation (i.e. micropile installation logs, grout records, etc.) to the EIC.

3.12 PROOF TEST PILE REJECTION

A. If a proof-tested micropile fails to meet the acceptance criteria, the Contractor shall immediately proof test another micropile within that footing. For failed piles and further construction of other piles, the Contractor shall modify the construction procedure or the Engineer shall modify the design or both. These modifications may include installing replacement micropiles, incorporating piles at not more than 50% of the maximum load attained, postgrouting, modifying installation methods, increasing the bond length, or changing the micropile type. Any modification that necessitates changes to the structure design shall require the Engineer’s prior review and

acceptance. Do not proceed with further micropile testing or construction without the Engineer's approval. Any modifications of construction procedures, or cost of proof load testing, or replacement production micropiles, shall be paid at the Contract unit price. No extension of contract time will be granted as a result of failed verification or proof load tests.

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SECTION 32 12 16

ASPHALT PAVEMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide hot mix-hot laid bituminous paving as shown and specified. In addition, any existing pavement damaged by the Contractor outside the removal limits shown on the Drawings shall be removed and replaced, as directed by the Engineer at no additional cost to the Owner.

2. The Contractor shall furnish all labor, materials and equipment necessary for saw cutting, installing and removing and disposing of temporary pavement, preparing the subgrade; and constructing a bituminous pavement. The Work includes pavements comprised of one or more of the following:

   a. Base course.

   b. Tack coats.

   c. Top course.

3. In order to prevent damage to the permanent pavement by the Contractor's operations, all permanent pavement materials, including the aggregate base course, shall not be installed until approved in writing by the Engineer. The finished course of paving shall not be installed until all buildings, structures, equipment, piping and outside facilities are substantially completed and at a time approved by the Engineer.

B. Related Work Specified Elsewhere:

1. Section 02 40 00, Demolition, Removals and Modifications.

2. Section 31 00 00, Earthwork.

3. Section 32 13 13, Concrete Paving

1.2 QUALITY ASSURANCE

A. Plant Inspection: All bituminous mixes will be subject to inspection, testing and approval by the Owner. The Contractor and suppliers shall furnish all necessary assistance and cooperation.

B. Laboratory approval of the sources of supply of the fine aggregates, coarse aggregates, mineral filler, bituminous materials, liquefiers and any other materials used in the mix shall be submitted by the Contractor for approval. No delivery or mixed materials shall be made from any bituminous mixing plant until such approval is obtained.

C. Testing Services:

1. General: Testing of materials and of compaction requirements for compliance with technical requirements of the Specifications shall be the duty of the testing laboratory provided by the Contractor.

2. Testing Services: The testing laboratory will:

   a. Test the Contractor's proposed materials in the laboratory and field for compliance with the Specifications.

   b. Perform field density tests to assure that the specified compaction of surface and base course materials has been obtained.

   c. Report all test results to the Engineer, and the Contractor.

3. Authority and Duties of Testing Laboratory: Technicians representing the testing laboratory will inspect the materials in the field and perform compaction tests, and will report their findings to the Engineer and the Contractor. When the materials furnished or work performed by the Contractor fails to fulfill Specifications requirements, the technician will direct the attention of the Engineer and the Contractor to such failure.

   a. The technician will not act as foreman or perform other duties for the Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor will it obligate the Engineer for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirements of the Specifications, nor to approve or accept any portion of the Work.

4. Responsibilities and Duties of Contractor: The use of testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Drawings and Specifications. To facilitate testing services, the Contractor shall:

   a. Secure and deliver to the Engineer and the testing laboratory representative samples of the materials he proposes to use and which are required to be tested.

   b. Furnish such casual labor as is necessary to obtain and handle samples at the project or at other sources of material.

   c. Advise the testing laboratory and Engineer sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

D. Reference Standards: Comply with the applicable provisions unless otherwise shown or specified.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval job mix formula proposed, giving complete data on materials, including source, location, percentages, temperatures, date of last testing, and all other pertinent data.

B. Submittals: Furnish certificate for approval, stating bedding course of well graded sand conforms to ASTM C33.

Furnish certificate for approval, stating the base course of crushed stone conforms to ASTM 2940, or approved equal.

1.4 JOB CONDITIONS

A. Weather Limitations:

1. Permanent paving materials, including the aggregate base course, shall be placed only when the air temperature is 40 degrees Fahrenheit and rising or warmer and the surface on which the paving is to be laid is 40 degrees Fahrenheit or higher. All temperatures are to be measured in the shade.

2. Bituminous pavement for temporary access roads, staging area and other temporary uses, that are not and will not become part of a permanent pavement, will not be subject to the above regulations in

regard to weather limitations. No pavement, however, shall be laid on a frozen subgrade.

B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope for each course during construction operations.

PART 2 - PRODUCTS

2.1 PAVEMENT THICKNESS

A. In-place compacted material thickness shall not be less than shown on the Contract Drawings. Temporary pavement shall be 4-inch minimum thickness.

2.2 MATERIALS

A. Materials shall conform to the following:

1. Subgrade shall be virgin material or select fill conforming to the requirements of Section 31 00 00, Earthwork.

2. Base Courses:

a. As indicated on contract drawings.

3. Pavement:

a. Provide a wearing surface for permanent pavement, consisting of a top course. Top course shall be as indicated on Contract Drawings..

4. Tack Coat: Tack coat shall be an asphalt emulsion conforming to County Standard Material Specification M5 Bituminous Materials, Material Designation RS-1.

PART 3 - EXECUTION

3.1 GENERAL

A. The installation of all pavement materials shall be performed by experienced personnel.

B. Preparing the mixtures, paving equipment, placing the mixes, and compacting the mixes shall be in accordance with the Specifications.

1. Preparing the mixtures include the plant equipment, stockpiling, heating, aggregate processing, mixing of aggregate and bituminous material, and transportation to job site.

2. Paving equipment includes bituminous pavers, rolling equipment and hand tools.

3. Placing the mixes includes paver placing, hand placing, spreading, tamping and jointing.

4. Compacting the mixes includes breakdown rolling, second rolling and finish rolling.

C. Regardless of the type of pavement restoration involved, the Contractor shall insure that all castings are set flush with the final surface. The Contractor is advised that there shall be no placement of bituminous concrete top course until:

1. All curbs, gutter aprons, driveway aprons, surface inlets, catch basins, and manholes have been constructed to their final elevation.

2. All defective areas of the binder course have been repaired.

D. Provide final surfaces of uniform texture, conforming to required grades and cross sections.

E. Repair holes from test specimens as specified for patching defective work.

3.2 SUBGRADE PREPARATION

A. Permanent Pavement: Preparation of the permanent pavement subgrade including compaction shall be completed for the full width of the area to be paved. All existing pavement edges shall be saw cut prior to installation of new pavement.

1. Fine grade earth subgrade and compact with self-powered rollers of sufficient size to provide a firm, unyielding surface to receive the aggregate base course. Remove and replace all unsuitable subgrade material as directed by the Engineer.

2. Where the subgrade is constructed by excavation of the existing grade, the top 6 inches of the subgrade shall be compacted to at least 95 percent of maximum density at optimum moisture content as determined in ASTM D 698.

3. When the subgrade is constructed on fill:

   a. The existing grade shall be made smooth and compacted per section 3.2.A.2.

   b. The subgrade shall be brought to the appropriate lines and grades utilizing select backfill and placed in accordance with the applicable requirements of Section 31 00 00, Earthwork.

4. Existing grades prior to placement of subbase or backfill shall be established such that when materials for construction are placed no rutting or displacement will occur.

B. No materials shall be placed on subgrades which are muddy or have water thereon.

3.3 PERMANENT PAVEMENT BASE COURSE INSTALLATION

A. Construct base course to thickness as shown on Drawings in equal layers. Installation shall be in conformance with County Standard Specification.

3.4 LIMESTONE SCREENINGS INSTALLATION

A. Construct limestone screenings course in the staging areas to thickness shown on the Drawings or as directed by engineer (min. 2 inches).

B. The screenings shall be spread evenly and thoroughly rolled with an approved three-wheel roller, weighing not less than 10 tons, until thorough consolidation is obtained. All depressions shall be filled with screenings, and the process of rolling and filling shall continue until a thoroughly compacted uniform surface, satisfactory to the Engineer, is produced. No segregation of large or fine materials will be permitted, but the screenings shall be sprinkled with water at times and in the amounts necessary to provide consolidation.

3.5 PAVEMENT INSTALLATION

A. The contact surfaces of all curbs, gutters, castings and adjacent pavement edges shall be painted with a layer of tack coat before placing or repairing the pavement course.

B. Bituminous concrete shall be constructed to thicknesses as shown on the Drawings and rolled with 12-ton self-powered two-axle or three-axle tandem or three-wheel roller to a density of 94 percent of maximum.

C. Pavement shall be uniform in appearance, free of bumps and hollows, worked to drain, and free of bleeding.

D. Trim the existing pavement by saw cutting of all loose edges and broom and tack coat all edges prior to placing the transition pavement.

E. In placing and compacting abutting courses of bituminous concrete pavements, joint heating devices shall be used on all joints (transverse, longitudinal and existing).

F. Bituminous pavement shall butt with the existing pavement in a smooth, even transition including a top sealing of the pavement joint with a bead of asphalt concrete.

G. Test bituminous pavement for conformity with the specified crown and grade immediately after initial compression. Correct variations by the removal or additional of materials and by continuous rolling.

H. The finished surface shall not vary more than 1/4 inch when tested with a 16-foot straightedge applied parallel with, or at right angles to, the centerline.

I. After final rolling, again test the smoothness of the course. Correct humps or depressions exceeding the specified tolerances or that retain water on the surface by removing the defective work and replacing with new material.

3.6 PATCHING

A. As directed by the Engineer, remove and replace all defective areas in temporary and permanent pavements. Cut-out such areas and fill with fresh bituminous concrete top course as specified in the County Standard Specification. Compact to the required density.

3.7 CLEANING AND PROTECTION

A. After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

B. Protect newly finished pavement until it has become properly hardened by cooling.

C. During the paving operation cover openings of drainage structures in the area of paving.

3.8 MAINTENANCE AND ACCEPTANCE

A. The Contractor shall maintain all paved surfaces until the roads and parking areas have been accepted. The paved areas will not be accepted until after

the Contractor has completed all phases of the work, including all necessary transportation, hauling and severe usage of the paved areas. The Engineer shall be the sole judge in this matter. The warranty period shall be as noted in the Agreement.

+ + END OF SECTION + +

SECTION 321313

CONCRETE PAVING

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. This section includes provisions for the placement of Portland cement concrete pavement.

B. Place Portland cement concrete pavement in conformance with the lines, grades, thicknesses and typical sections shown or detailed on the Drawings.

1.2 REFERENCES

A. Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering.

B. Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO).

1.3 SUBMITTALS

A. Submit product data and installation instructions for joint filler, sealant, curing compound, and admixtures.

1.4 PROJECT REQUIREMENTS

A. Coordinate the placement of Portland cement concrete pavement with the completion of underground work by other trades.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Conform with Section “Subbase Courses” for subbase course.

B. Concrete:

1. 28 Day Compressive Strength: 4000 psi (minimum).

2. Air Entrainment: 4% to 8%.

3. Slump: 1" to 3".

C. Formwork:

1. Do not use earth cuts for vertical surfaces.

2. All forms shall be built mortar tight and of materials sufficient in strength to hold concrete without bulging between supports. Forms shall be maintained to eliminate the formation of joints due to shrinkage of the forms. Concrete, misshapen by bulges or deformations caused by inadequate forms, shall be removed or corrected as ordered by the Engineer. All replacements or corrections shall be made at the Contractor's expense.

3. All surfaces of wooden forms that will be in contact with exposed concrete shall be thoroughly treated with an approved lacquer in the procedure recommended by the manufacturer. Forms so treated shall be protected from being damaged or dirtied prior to placing of the concrete.

D. Metal forms shall be treated with an approved form lacquer or may be treated with an approved form oil. The metal used for forms shall be of sufficient thickness to remain true to shape. All bolt and rivet heads shall be designed to hold the forms rigidly together and to allow removal, without injury to the concrete. Metal forms which do not have smooth surfaces, correct alignment and clean surfaces shall not be used.

E. Joint and Curb Ties:

1. Conform to the Details shown on the Drawings.

F. Surface Sealant:

1. JP-4 resistant.

2. Eucopoxy 1 by Euclid Chemical Co., EPOLITH by Sonneborn, or equal.

G. Joint Sealant:

1. Jet fuel resistant, polyurethane based, pourable, conforming to Federal Specifications SS-S- 200D and SS-S-195B.

2. Urexpan NR-300 by Pecora, or equal.

H. Joint Bond Breaker:

1. 3/8-inch diameter polyethylene foam rod.

I. Premolded Joint Filler:

1. ASTM D1751 or ASTM D1752.

PART 3 – EXECUTION

3.1 GENERAL

A. Concrete pavement shall not be applied when the air temperature is below 40 Deg.F or above 95 Deg.F, unless otherwise directed, or when weather conditions would prevent proper construction.

B. All application equipment, methods, and installation shall conform to [NYSDOT] Section 500, unless otherwise specified.

3.2 PREPARATION

A. The subbase shall be placed and compacted true to line and grade as shown on the Drawings and conforming to Section “Subbase Courses.”

B. Proof roll prepared subbase surface with a 10-ton static steel wheel roller, to check for unstable or otherwise unsuitable areas, as determined by the Engineer. Replace and recompact all unsatisfactory areas, as approved by the Engineer, prior to commencement of paving operations.

C. Notify the Engineer 48 hours prior to commencing placement of concrete.

D. Moisten base to minimize absorption of water from fresh concrete.

3.3 CONCRETE PLACEMENT

A. All foreign matter of any kind shall be removed from the interior of forms before placement of the concrete. Temporary struts or braces within the forms shall be removed when concrete has reached an elevation rendering their further service unnecessary.

B. Concrete shall be rejected which does not reach its final position in the forms within 60 minutes after water is first added to the mix.

C. Concrete shall be placed so as to avoid segregation of the materials and displacement of the reinforcement. Long troughs, chutes and pipes for placing or conveying concrete may be used only on written authorization of the Engineer, and he may also order their discontinuance, if inferior quality of concrete is produced.

D. Dropping the concrete, a distance of more than 3 feet or depositing a large

quantity at any point and running or working it along the forms will not be permitted.

E. Concrete shall be compacted by continuous working with a suitable tool in a manner acceptable to the Engineer. All thin section work shall be thoroughly worked with a steel slicing rod.

F. Concrete shall be placed in horizontal layers not more than 12 inches thick, except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead. Each layer shall be placed and compacted before the preceding batch has taken its initial set to prevent injury to the concrete and avoid cold joints between the batches. Each layer shall be compacted so as to avoid the formation of a joint with a preceding layer, which has not taken initial set.

G. Construction joints shall be placed only where shown on the plans or as permitted by the Engineer.

H. Concrete shall be thoroughly compacted during and immediately after depositing by vibrating the concrete internally by means of mechanical vibrating equipment.

I. Lateral transport of the concrete by means of vibrating equipment will not be allowed.

3.4 FINISH

A. After placement the concrete shall be smoothed with an approved mechanical or hand screed.

B. Edge rounding shall not exceed 1/4 inch and surface irregularities shall not exceed 1/8 inch in 10 feet.

C. Texturing:

1. Immediately after smoothing operations have been completed and prior to application of curing compound, the surface of the concrete shall be textured with a set of spring steel tines in a direction perpendicular to the center line of pavement.

2. The individual tines shall be rectangular in shape, 3/16-inch-wide, 1/32-inch-thick, and approximately 6 inches long. The center to center spacing of the tines shall be approximately 3/4 inch. They shall be capable of producing striations generally not less than 3/16-inch-deep in the plastic concrete in the one pass.

3. More than one pass over the same area will not be permitted unless the surface has first been refinished. The capability of the tines to provide an

acceptable texture shall be demonstrated to the Engineer prior to approval for use.

4. The tine head may be operated by hand or mechanically. In either case, concrete texturing shall take place with the longitudinal axis of the tines as nearly at an angle of 45 degrees to the concrete surface as is practicable to eliminate the dragging of mortar by the tines. The tines shall be kept free of hardened concrete particles.

3.5 CURING

A. Cure using an approved method as given in NYSDOT Section 502-3.10.

3.6 REMOVAL OF FORMWORK

A. Forms will remain in place at least 12 hours after the placing of the concrete. This duration may be lengthened if, in the opinion of the Engineer, conditions warrant.

3.7 JOINTS

A. Longitudinal and transverse joints shall be constructed as indicated on the Plans and in accordance with these requirements. All joints shall be constructed true to line with their faces perpendicular to the surface of the pavement. Joints shall not vary more than 1/4 inch from a true line or from their designated position. The surface across the joints shall be tested with a 10-foot straight edge as the joints are finished and any irregularities in excess of 1/8 inch shall be corrected before the concrete has hardened.

B. Transverse joints shall be at right angles to the center line of the pavement and shall extend the full width of the panel. The transverse joints in succeeding lanes shall be placed in line with similar joints in the first lane.

C. All joints shall be so prepared, finished, or cut to provide a groove of sufficient width and depth to receive and effectively retain joint- sealing material.

D. When joints in concrete pavements are sawed, the joints shall be cut at the time and in the manner approved by the Engineer. The circular cutter shall be capable of cutting in a straight line, and shall produce a slot at least 5/16 inch wide. When shown on the Plans or required by the Specifications, the top portion of the slot or groove shall be widened by means of a second cut or by suitable and approved leveling to provide adequate space for joint sealers. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing. The joints shall be sawed at the required spacing consecutively in sequence of the concrete placement, unless otherwise approved by the Engineer.

3.8 SURFACE SEALANT

A. Apply surface sealant in accordance with manufacturer' instructions.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DIVISION 01 - GENERAL REQUIREMENTS: Drawings, quality, product and performance requirements, general and supplemental conditions apply as applicable to the project and project documents.

1.2 SUMMARY

A. This Section includes commercial chain link fence and gates specifications:

1. Galvanized steel coated chain link fabric
2. Polymer coated steel chain link fabric
3. Zinc 5% Aluminum alloy coated steel chain link fabric
4. Galvanized steel framework and fittings
5. Polymer coated galvanized steel framework and fittings
6. Gates: swing
7. Installation

B. Related Sections:

1. 01 33 00 Submittal Procedures
2. 01 45 00 Quality Control
3. 01 60 00 Product Requirements
4. 03 30 00 Cast in Place Concrete

1.3 REFERENCES

A. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

B. ASTM A817 Specification for Metallic-Coated Steel Wire for Chain Link Fence Fabric and Marcelled Tension Wire

C. ASTM A824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link

D. ASTM F552 Standard Terminology Relating to Chain Link Fencing

E. ASTM F567 Standard Practice for Installation of Chain Link Fence

F. ASTM F626 Specification for Fence Fittings

G. ASTM F668 Specification for Polymer Coated Chain Link Fence Fabric

H. ASTM F900 Specification for Industrial and Commercial Swing Gates

I. ASTM F934 Specification for Standard Colors for Polymer-Coated Chain Link

J. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework

K. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

L. ASTM F1184 Specification for Industrial and Commercial Horizontal Slide Gates

M. Comply with ASTM A 53 for requirements of Schedule 40 piping.

1.4 DEFINITIONS

A. Height of Fence: Distance from the top of concrete footing to the top of fabric.

1.5 SUBMITTALS

A. Shop Drawings: Complete detailed drawings for fence and gate.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions for each item specified.

C. Samples:

1. Fence Fabric: Minimum one sq ft.

2. Fence and Gate Posts: Two each, one ft long, if requested.

3. Miscellaneous materials and accessories: As requested.

1.6 QUALITY ASSURANCE

A. Comply with standards of the Chain Link Fence Manufacturer's Institute.

B. Provide steel fence and related gates as a complete system produced by a single manufacturer, including necessary erection accessories, fittings, and fastenings.

C. Posts and rails shall be continuous without splices.

D. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. Framework, posts, rails, pipe for gate frames:

1. Wheatland Tube Co. 800 343 0124 e-mail: fence@wheatland.com
www.wheatland.com

2. Or approved Equal.

2.2 MATERIALS

A. Class B Steel Tubing (Option):

1. SS-40 Fence Pipe by Allied Tube and Conduit Corp., Harvey, IL.

2. Tuf-40 Fence Framework by American Tube Corp., Phoenix, AZ.

2.3 STEEL FRAMEWORK (FOR FENCES 6'-1" - 10'-0" HIGH)

A. End Posts and Corner Posts:

1. Pipe: 2.875 inches OD, 5.79 lb per lin ft (Schedule 40).

2. Square Tubing: 2.50 inches OD, 5.70 lb per lin ft.

3. Class B Steel Tubing: 2.875 inches OD, 4.64 lb per lin ft.

4. Roll Formed C-Section: 3.5 inches x 3.5 inches x 0.128 inches thick, with minimum bending strength of 486 lb under a 6 foot cantilever load.

B. Line Posts:

1. Pipe: 2.375 inches OD, 3.65 lb per lin ft (Schedule 40).

2. Class B Steel Tubing: 2.375 inches OD, 3.11 lb per lin ft.

3. H-section: 2.25 inches x 1.95 inches x 0.143 inches, 4.10 lb per lin ft.

4. Roll Formed C-Section: 2.25 inches x 1.70 inches x 0.121 inches thick, with minimum bending strength of 316 lb under a 6 foot cantilever load.

2.4 STEEL FABRIC

A. One-piece widths for fence heights up to 12’-0”.

B. Zinc-Coated Steel Fabric: ASTM A392 hot dipped galvanized before or after weaving.

C. Chain link, No. 9 gage, 2 inch mesh.

D. Salvages: Top side twisted and barbed; bottom side knuckled.\

2.5 SWING GATE POSTS

A. Single width of gate up to 6’-0” wide and less than 10’-0” high.

1. Pipe: 2.875 inches OD, 5.79 lb per lin ft (Schedule 40).

2. Square Tubing: 2.50 inches OD, 5.70 lb per lin ft.

3. Class B Steel Tubing: 2.875 inches OD, 4.64 lb per lin ft.

4. Roll Formed C-Section: 3.5 inches x 3.5 inches x 0.128 inches thick, with minimum bending strength of 486 lb under a 6 foot cantilever load.

2.6 SWING GATE FRAMES

A. Height: 6’-0” - 12’-0”, or leaf width exceeding 8’-0”:

1. Pipe: 1.90 inches OD, 2.72 lb per lin ft (Schedule 40).

2. Square Tubing: 2 inches OD, 2.60 lb per lin ft.

3. Class B Steel Tubing: 1.90 inches OD, 2.28 lb per lin ft.

B. Assemble gate frames by welding or with special steel fittings and rivets for rigid connections. Install mid-height horizontal rail on gates over 10 feet high. When width of gate leaf exceeds 10 feet, install mid-distance vertical bracing of the same size and weight as frame members. When either horizontal or vertical bracing is not required, provide truss rods as cross bracing to prevent sag or twist.

2.7 GATE HARDWARE

A. Hinges: Pressed Steel Offset 180 degree gate hinge item no. 014005 or appropriate for use by Hearne Steel Company, Inc.

B. Latch: Forked type for single gates 10 feet wide or less. Plunger bar type, complete with flush plate set in concrete for double gates and single gates over 10 feet. Padlock eye shall be an integral part of latch construction.

2.8 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Rails and Post Braces:

1. Pipe: 1.660 inches OD, 2.27 lb per lin ft (Schedule 40).

2. Class B Steel Tubing: 1.660 inches OD, 1.84 lb per lin ft.

3. Roll formed C-Section: 1.625 inches x 1.25 inches x 0.0747 inches thick with minimum bending strength of 192 lb on a 10 foot span.

B. Fittings and Post Tops: Steel, wrought iron, or malleable iron.

1. Fasteners: One-way cadmium plated steel screws.

C. Stretcher Bars: One piece equal to full height of fabric, minimum cross-section 3/16 inch x 3/4 inch.

D. Metal Bands (for securing stretcher bars): Steel, wrought iron, or malleable iron.

E. Wire Ties:

1. For tying fabric to line posts, rails and braces: 9 gage steel wire.

2. For tying fabric to tension wire: 11 gage steel hog rings.

F. Truss Rods: 3/8 inch diameter.

G. Concrete: Portland Cement concrete having a minimum compressive strength of 4000 psi at 28 days.

H. Spiral Paper Tubes:

1. Sonotube by Sonoco Products Company.

2. Sleek/tubes by Jefferson Smurfit Corporation.

I. Tension Wire: 7 gage coiled spring steel wire.

J. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:

1. Embeco 636 by Master Builders.

2. Ferrolith G-NC by Sonneborn.

3. Ferro-Grout by L&M Construction Chemicals.

4. Vibra-Foil by A.C. Horn.

K. Privacy slats

1. Vinyl Fence fabric slats:

a. Manufacturer: The Reinforced Vinyl Fence fabric with pre-inserted slats as manufactured by PrivacyLink®, LLC P.O. Box 295, Hyde Park, Utah 84318. The manufacturer may be contacted at 800-574-1076, 435-563-1058 or via fax at 435-563-1062.

b. Fabric Diameter & Finish. 3-1/2” x 5” mesh by 9 ga. (0.148”) galvanized before weaving per ASTM A392 & A817, 1.2 oz Type II Class 4.

c. Fabric Color: gray or approved equal.

2.9 FINISHES

A. Steel Framework:

1. Pipe: Galvanized in accordance with ASTM A 53, minimum 2.0 oz zinc per sq ft.

2. Square Tubing: Galvanized in accordance with ASTM A 123, 2.0 oz zinc per sq ft.

3. Class “B” Steel Tubing: Exterior; 1.0 oz zinc per sq ft plus chromate conversion coating and clear polyurethane. Interior; zinc rich organic coating.

4. H-Section: Galvanized in accordance with ASTM A 123, 1.6 oz zinc per sq ft.

5. Roll Formed C-Section: Galvanized in accordance with ASTM A 123, 2.0 oz zinc per sq ft.

B. Fabric; one of the following:

1. Galvanized Finish: ASTM A 392 class II zinc coated after weaving, with 2.0 oz per sq ft.

C. Fence and Gate Hardware, Miscellaneous Materials, Accessories:

1. Wire Ties: Galvanized Finish, ASTM A 90, 1.6 oz zinc per sq ft, or aluminized finish, ASTM A 809, 0.40 oz per sq ft.

2. Hardware and Other Miscellaneous Items: Galvanized Finish, ASTM A 153 (Table 1).

D. Tension Wire; one of the following:

1. Galvanized Finish: ASTM A 121 class 3, 0.80 oz per sq ft.

2. Aluminized Finish: ASTM A 585 class 2, 0.30 oz per sq ft.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clear and grub along fence line as required to eliminate growth interfering with alignment. Remove debris from State property.

B. Do not begin installation of fence in areas to be cut until finish grading has been completed.

3.2 INSTALLATION

A. Space posts equidistant in the fence line with a maximum of 10 feet on center.

B. Setting Posts in Earth: Drill holes for post footings. Unless otherwise indicated, drill holes 3’-6” deep, 10 inches in diameter for line posts, 12 inches in diameter for all other posts. If existing grade at the time of installation is below finished grade, provide spiral paper tubes to contain concrete to finish grade elevation. Set posts in center of hole and fill hole with concrete. Plumb and align posts. Vibrate or tamp concrete for consolidation. Finish concrete in a dome shape above finish grade elevation to shed water. Do not attach fabric to posts until concrete has cured a minimum of 7 days.

C. Setting Posts in Rock: Drill holes into solid rock one inch wider than post diameter, 18 inches deep for end, pull, corner, and gate posts, and 12 inches deep for line posts. Set posts into holes and fill annular space with shrink-resistant grout.

D. Install top rail continuously through post tops. Install expansion couplings as recommended by fencing manufacturers.

E. Install bottom and intermediate rails in one piece between posts and flush with post on fabric side using special offset fittings where necessary.

F. Diagonally brace corner posts to adjacent line posts with truss rods and turnbuckles.

G. Attach fabric to security side of fence. Maintain a 2 inch clearance above finished grade except when indicated otherwise. Thread stretcher bars through fabric using one bar for each end and gate post and 2 for each corner and pull post. Pull fabric tight so that the maximum deflection of fabric is 2 inches when a 30 pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced 15 inches oc. Fasten fabric to steel framework with wire ties spaced 12 inches oc for line posts and 24 inches oc for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties, and other fasteners securely.

H. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of fence. Tighten nuts and cut off excess threads so no more than 1/8 inch is exposed. Peen ends to prevent loosening or removal of nuts.

1. Secure post tops with one-way screws.

I. Install gates plumb and level and adjust for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

J. Tension Wire: Support bottom edge of fabric with tension wire. Weave tension wire through fabric or fasten with hog rings spaced 24 inches oc. Tie tension wire to posts with 9 gage wire ties.

+ + END OF SECTION + +

SECTION 32 31 20

ORNAMENTAL STEEL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: The work in this section shall include, but not be limited to the following:

1. New pool fence and fence posts

2. New boardwalk fence

3. New decorative light pole\

4. New gates

B. Description:

1. Under this item, the Contractor shall install new ornamental steel fencing and gates at the pool perimeter, along the boardwalk and other locations as shown on the plans. Work under this item shall consist of fabrication, surface preparation, galvanizing, painting of steel components and installation as shown on the plans, as directed by the Engineer in accordance with the specifications. All work shall be done in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

1.2 REFERENCES

A. ASTM International(ASTM):

1. ASTM A36 – Carbon Structural Steel.

2. ASTM A121 – Metallic-Coated Carbon Steel Barbed Wire.

3. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

4. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

5. ASTM B117 - Operating Salt Spray (Fog) Apparatus.

6. ASTM D822 - Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

7. ASTM D2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

8. ASTM D3363 - Test Method for Film Hardness by Pencil Test.

1.3 DEFINITIONS

A. Ornamental Steel Fences and Gates refers to pool fence, gates and other ornamental and railing as indicated on the contract drawings.

1.4 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:

1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."

2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.

b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point and in any direction.

b. Uniform load of 50 lbf/ft. applied in any direction.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

    a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.

C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effect. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected fence, gates, and light posts.

2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for products with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. 6-inch-long (6") sections of each distinctly different linear railing member, including handrails, top rails, posts, and pickets.

2. Fittings and brackets.

3. Assembled sample of railing system, including but not limited to fence panels, decorative light pole and intermediate fence posts made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Sample need not be full height.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Product Test Reports: From a qualified testing agency indicating products comply with requirements, based on comprehensive testing of current products.

1.6 QUALITY ASSURANCE

A. Supplier Qualifications: The railing and finishing manufacturer(s) must have commercially fabricated and finished railing products for a minimum of (10) years.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: All materials must be obtained from single manufacturer with not less than ten (10) years of successful experience in manufacturing and applying principle materials described in this section. The Contractor shall engage an experienced applicator approved by the manufacturer and the County of Westchester who has completed work similar in material and design and extent to that indicated for this Project and whose work has resulted in installation with a record of successful in-service performance.

1.7 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weather-tight location.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Contractor shall retain, on-site, a representative sample of all of the existing ornamental fence, gate and light pole elements to use to compare the new work to.

1.9 COORDINATION

A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.10 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls.

1.11 CONTRACTOR'S GUARANTEE

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Galvanizing: The Contractor shall guarantee all his work performed under this Contract to be free from inherent defect and/or poor workmanship, and shall repair and replace any defective materials or workmanship at no additional cost to the County for a period of twenty (20) years for fabrication and galvanizing, from actual date of final acceptance of the total completed work. The Contractor shall remove defective paint coated areas as directed by Engineer and replace them where any failures occur.

C. Paint: The Contractor shall guarantee all his work performed under this Contract to be free from inherent defect and/or poor workmanship, and shall repair and replace any defective materials or workmanship at no additional cost to the County for a period of ten (10) years for the paint system, from actual date of final acceptance of the total completed work. The Contractor shall remove defective paint coated areas as directed by Engineer and replace them where any failures occur.

1.12 MANUFACTURER'S WARRANTY

A. Provide in accordance with Section 01 77 00 - Closeout Procedures:

Note: Manufacturer may have particular preparation, installation and workmanship requirements that must be achieved in order to obtain this warranty. The Contractor is responsible for fulfilling all requirements necessary in providing this warranty. Field conditions which precluded and prevented preparation and/or execution of the manufacturer's application specifications shall be reported to the County in writing to the attention of the Engineer.

The Engineer shall review the field condition and shall respond in writing to the Contractor's report. The Engineer may relieve the Contractor of the Warranty in that limited reported area only.

1. Special Warranty: The Manufacturer of the galvanizing and paint coatings shall provide a written warranty, agreeing to repair or replace galvanizing and paint/coatings that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, blistering, peeling, or water penetration through exterior surfaces.

2. Galvanizing Warranty:

   a. Prior to approval of all finish galvanized coatings, the Contractor shall be solely responsible for obtaining from the coating manufacturer, and providing to the County, a twenty (20) year warranty in writing which includes the following:

      1) For TWENTY (20) YEARS from actual date of final acceptance of the total completed work after the entire approved system has been properly applied according to all manufacturer's recommendations, instructions and label directions, the manufacturer warrants:

         a) Products are free from any manufacturing defect and these products are in conformity with the properties described in the latest technical bulletins.

         b) Warranty guarantees that zinc coated finish to be free from cracks, peels or blisters. Accidental damages, defects resulting from improper installation and damages from vandalism or abuse are not included.

3. Paint Coating Warranty:

   a. Prior to approval of all finish coatings, the Contractor shall be solely responsible for obtaining from the coating manufacturer, and providing to the County, a ten (10) year warranty in writing which includes the following:

      1) For TEN (10) YEARS from actual date of final acceptance of the total completed work after the entire approved system has been properly applied according to all manufacturer's recommendations, instructions and label directions, the manufacturer warrants:

         Products are free from any manufacturing defect and these products are in conformity with the properties described in the latest technical bulletins.

         a) One (1) coat shall completely cover any color of the previous coat and existing surface when applied according to label directions.

         b) Resistance to peeling, blistering, and chalking (staining surfaces below).

         c) Washability.

         d) Durability: The coating film will not erode and expose the substrate. When recoating is desired, the coatings will be in suitable condition for recoating.

   b. If this coating system fails to perform within the ten (10) year warranty period, as determined by the Engineer, as specified and provided the Contractor has followed completely all manufacturer's recommendations and instructions; the paint/coatings manufacturer shall furnish the required quantities of products necessary for repair of any condition where the material used has been proved to be defective; all at no additional cost to the County.

   c. The manufacturer shall furnish technical service to the Contractor, free of charge, which will include all required technical advice in case any technical difficulties are experienced.

   d. This warranty is an integral part of this specification. The Engineer, the Manufacturer's Representative and the Contractor are all parties to this warranty that will be issued by the manufacturer upon completion of this project.

e. This warranty becomes operative and effective once the final payment has been released to the Contractor. The Engineer shall determine the exact date of the commencement of the warranty period.

PART 2 - PRODUCTS

2.1 METALS

A. Steel bar stock: The type of ornamental steel fence, gates and light poles installed shall be constructed of solid steel bars, posts, rails and braces of the sizes shown on the plans. All steel shall conform to ASTM A36.

B. Steel tubing: ASTM A500, Grade B.

C. Lock Bolt- Double gates: Shall be a drop rod bar arranged to engage the gate stop. Locking device shall be constructed so that the drop rod cannot be raised when gate is locked. The locking bolt and bolt catch hardware shall be constructed as shown on the standard detail drawings. The locking device shall have provisions for a padlock. All necessary fitting and gate holders to lock gates in both open and closed positions shall be furnished.

2.2 WELDING MATERIALS, FASTENERS AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.

1. For handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, unless otherwise indicated.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.

2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Cast-in-Place and Post-installed Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place anchors.

2. Chemical anchors.

3. Expansion anchors.

2.3 GROUT

A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 SHOP FINISH

A. All ornamental steel fences and gates shall be hot-dip galvanized to 1.25 ounces per square foot minimum zinc coating in accordance with ASTM A123. Standard size components shall receive polyester powder coating.

B. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.

1. Minimum hardness measured in accordance with ASTM D3363: 2H.

2. Direct impact resistance tested in accordance with ASTM D2794: Withstand 160 inch-pounds.

3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than 3/16 inch undercutting.

4. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1-year exposure in South Florida with test panels tilted at 45 degrees.

C: Color: Custom color selected by Engineer

2.5 FABRICATION

A. General: Fabricate ornamental fence, gates, and light poles to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined.

C. Form changes in direction of railing members as follows:

1. As shown on the plans.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

E. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuous to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

F. Non-welded Connections: Fabricate handrails and railings by connecting members with concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive where this is manufacturer's standard splicing method.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

H. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings.

I. For railing posts set in concrete, provide preset sleeves for steel not less than 9-inches (9") long inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.

J. Shear and punch metals cleanly and accurately. Remove burns from exposed cut edges.

K. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

L. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

M. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior to moisture from condensation or other sources.

N. Fabricate joints that will be exposed to weather in a watertight manner.

O. Close exposed ends of handrail and railing members with prefabricated end fittings.

P. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is Y4 inch or less.

Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

R. Filler: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to fabrication, field verify required dimensions.

B. Provide setting holes for embedment of fence posts. Core drill concrete fence wall, footings or structural slabs for embedment of fence posts. Holes shall be 2 inches minimum greater than post width.[AM1]

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting, required to install fence, gates, and light poles. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust fence, gates, and light poles before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing fence, gates, and light poles and for property transferring loads to in-place construction.

3.3 ANCHORING POSTS

A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wooden blocks and padding to prevent damage to railing members and fittings. Seat recessed holes of exposed locking screws using plastic cement filler colored to match finish of handrails and railings

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS.

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Non-shrink, nonmetallic grout

B. Cover anchorage joint with flange of same metal as post, attached to post as follows:

1. Welded to post after placing anchoring material.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces,

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

+ + END OF SECTION + +

SECTION 32 92 00

GRASS RESTORATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: The General Construction Contractor shall furnish all labor, materials and equipment necessary to restore grass areas disturbed by the construction. The limits of restoration will be determined by the Engineer. Disturbance of grass areas shall be kept to a minimum during construction.

B. In the event that seeding restoration fails or is not feasible due to season, the Contractor shall be required to restore the grass areas with sod.

C. Related Work Specified Elsewhere:

1. Section 31 00 00, Earthwork

1.2 SUBMITTALS

A. General: Submit shop drawings in accordance with Section 013300 of the Contract Specifications.

B. The Contractor shall submit certificates of materials compliance before delivery of material for the following items:

1. Topsoil
2. Seed
3. Fertilizer (10-6-4)
4. Limestone
5. Mulch

PART 2 - PRODUCTS

2.1 TOPSOIL

A. The topsoil shall consist of a fertile, friable, natural top soil of loamy character, without admixtures of subsoil, uniform in quality and shall be free from refuse of any nature, hard clods, stiff clay, sods, hard pan,

pebbles larger than 3/4 inch in diameter, coarse sand, noxious weeds, sticks, brush, or other rubbish.

B. The topsoil shall be taken from a well drained, arable site, preferably one which has been under cultivation at least 5 years previous to the time of removal.

C. The topsoil shall contain not less than 5 percent nor more than 20 percent organic matter, as determined by loss on ignition of oven-dried samples. The samples shall be thoroughly oven-dried to constant weight at a temperature of 221 degrees F.

D. The Hydrogen Ion value of all topsoil shall be not less than 5 and not more than 7. After the testing of the samples of material, if the loam is found to be unsatisfactory for the intended use, the Engineer may require that the Contractor, without additional compensation, add to the top soil proposed by him for use, lime, particular fertilizer or particular humus, as directed in order to make the topsoil suitable.

E. Mechanical Analysis: The sieve analysis on an oven-dried sample shall be as follows:

Sieve Size	% Passing by Weight
1 inch	100
1/4 inch	97-100
# 100	40-60
# 200	40-60

F. Topsoil available on site which meets the specified requirements may be utilized with the permission of the Engineer. The Engineer may require that the Contractor, without additional compensation, add to the topsoil proposed by him for use, lime, particular fertilizer or particular humus, as directed in order to make the topsoil suitable.

G. Imported topsoils or soil blends designed to serve as topsoil may not include the following:

1. Soils defined regionally by the Natural Resources Conservation Service web soil survey (or local equivalent for projects outside the U.S.) as prime farmland, unique farmland, or farmland of statewide or local importance; or

2. Soils from other greenfield sites, unless those soils are a byproduct of a construction process.

H. Restored soil must meet the criteria of reference soils in categories 1–3 and meet the criteria of either category 4 or 5: 1. organic matter; 2.

compaction; 3. infiltration rates; 4. soil biological function; and 5. soil chemical characteristics.

	Soil criterion	Restoration to reference soil conditions	Required
1	Organic matter	Amend soils with mature, stable compost material such that top 12 inches (300 mm) of soil (at minimum) contains at least 3% organic matter OR organic matter levels and organic matter depth are comparable to site's reference soil	Yes
2	Compaction	Ensure bulk densities within 100% of root zone, defined as minimum of 12 inches (300 mm) in depth OR depth comparable to site's reference soil	Yes
3	Infiltration rate	Achieve infiltration rates (inches/hour) or saturated hydraulic conductivity (millimeters/second) comparable to site's reference soil	Yes
4	Biological function	Establish capacity of biotic community to decompose organic matter and release mineral (plant available) nitrogen; potentially mineralizable nitrogen is used as proxy (see Table 7.2-B, SITES Guidelines and Performance Benchmarks 2009)	Meet either or both of 4 or 5
5	Chemistry	Match pH, cation-exchange capacity, and nutrient profiles of original undisturbed soil or site's reference soil; salinity must be suitable for regionally appropriate vegetation	

2.2 SEED

A. General: Grass seed shall be fresh, recleaned seed of the latest crop. Material other than pure live seed shall comprise only nonviable seed, chaff, hulls, harmless inert matter and shall be free from noxious weeds. The mixture shall have less than one quarter (1/4) of one (1) percent weed content. Seed shall be mixed before delivery and shall consist of the mixture specified and in conformity with the following proportions by weight and meeting with the following standards of seed content. The percentage of purity shown on the label will be acceptable. The percentage of germination shall not be less than the minimum specified.

B. Mixtures

	Mixture Tolerance		Germination Tolerance	
Proportions of Mixture	Minus	Plus	Germination	Minus
60% Jaguar Tall Fescue	3%	5%	90%	6%
25% Omega II Perennial Rye Grass	3%	5%	85%	7%
15% Classic Kentucky Bluegrass	3%	5%	80%	7%

The following brand name mixtures are approved substitutes: Manhattan, Pennfine, N.K. 200 or Norlea in the proper percentages of mixture or any other current approved brand name mixture.

C. Packaging: All grass seed shall be delivered in unopened standard size bags of the vendor showing weight, analysis and the name of vendor. It shall be stored in such a manner that its effectiveness will not be impaired.

2.3 SOD

A. Materials

1. Sod shall be nursery grown and at least two years old. It shall be free of insects, grubs, fungus disease and noxious weeds and shall have a pH value of not less than 6.5.

2. The cultivated sod shall be 100% Merion grass sod.

3. Sod shall be a minimum of 1 inch thick and cut in uniform strips 1 foot by 4 feet minimum. Root development shall be capable of supporting sod during handling, transporting and laying. Sod shall not be installed in strips less than 1 foot in width.

4. Top growth shall be thick and matted. The turf shall be green and growing. Prior to cutting and transporting, the sod shall be well irrigated and have been recently mowed.

5. Native soil on the roots of the sod shall be maintained during process of transplanting.

6. Fertilizers shall be suitable commercial types.

B. Method

1. The surfaces of the areas to be covered with sod shall be trimmed, topsoiled to a minimum depth of 4 inches and graded to one inch below finished elevation by cutting and/or filling, as required, and as directed by the Owner.

2. The sod bed shall be raked and all foreign matter shall be removed and disposed of from the site.

3. Soil amendments and fertilizers shall be evenly spread over the prepared area and thoroughly raked in to incorporate it with the soil. Lime shall be incorporated in the soil at the rate of 50 pounds per 1000 square feet and superphosphate at the rate of 25 pounds per 1000 square feet.

4. Sod shall then be laid and set to the required grade on a reasonably moist bed with joints staggered. It shall be laid smoothly, edge to edge, and all openings plugged with sod. After

laying, the sod shall be pressed firmly into contact with the bed by tamping and rolling to eliminate all air pockets and produce a uniform, even surface true to grade.

5. Sod shall be planted within 24 hours from the time of cutting unless tightly rolled or stored (roots to roots) and the stacks kept moist. Storage for a period in excess of five days will, under no circumstance, be permitted. Should the completed sod surface become gullied, eroded, or otherwise damaged, the affected areas shall be re-sodded as required and at the Contractor's expense.
6. The Contractor shall be responsible for proper protection and maintenance of the sodded areas. Where sod fails to grow, the Contractor shall prepare and re-sod these areas at his expense. During dry weather the Contractor shall water the sodded area frequently enough to insure growth.

2.4 COMMERCIAL FERTILIZER

A. Composition: Commercial granular fertilizer shall have the following composition by weight: Nitrogen ten (10) percent; Phosphoric Acid six (6) percent; Potash four (4) percent. The Nitrogen shall be fifty (50) percent organic (from organic sources, e.g., fish meal, dried blood, dried manure, activated sewage sludge castor pomace, cottonseed meal, etc.) and fifty (50) percent inorganic. The elements shall be available according to the methods adopted by the Association of Official Agricultural Chemists.

B. Packaging: Fertilizers shall be packed in the manufacturer's standard containers weighing not over one hundred (100) pounds each with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container.

2.5 GROUND LIMESTONE

A. Composition: Ground limestone (calcium carbonate) shall have the following analysis: At least fifty (50) percent shall pass a two hundred (200) mesh sieve; at least seventy (70) percent shall pass a one hundred (100) mesh sieve; and one hundred (100) percent shall pass a ten (10) mesh sieve. Total carbonates shall not be less than eighty (80) percent or 44.8 percent calcium oxide equivalent; for purposes of calculation, total carbonates shall be considered as calcium carbonate.

B. Packaging: Ground limestone packed in the manufacturer's standard containers shall weigh not over one hundred (100) pounds each with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container. Bulk shipments shall be accompanied by a certificate covering the names, weight and analysis as specified herewith for packaged material.

2.6 MULCH-WOOD FIBER

A. General: Wood fiber suitable for use as mulch for seeding shall be processed so that the fibers will remain in uniform suspension in water under agitation and will blend with grass seed, fertilizer, ground limestone and other additives to form a homogenous slurry. It shall have the characteristics which, upon hydraulic application, shall form a blotter-like ground coating with moisture absorption and percolation properties and the ability to cover and hold grass seed in intimate contact with the soil. Wood fiber shall contain no growth or germination inhibiting factors and shall be dyed green. The wood fiber mulch shall be “Superior Fiber” manufactured by Wolbert Master and Assoc. Inc., “Silva Fiber” as manufactured by Weyerhaeusar or equal.

B. Packaging: Wood fibers shall be supplied in the manufacturer’s unopened standard containers weighing not over one hundred (100) pounds each, with the name of the material, net weight of contents, the manufacturer’s name and the air dry weight of fiber (equivalent to ten [10] percent moisture) appearing on each container.

PART 3 - EXECUTION

3.1 GENERAL

A. When permitted by the Engineer, topsoil excavated under other Sections of this Specification shall be reused to provide a six inch layer of topsoil over the areas required to be seeded. If after backfilling of excavations there are insufficient quantities of top soil conforming to the specified requirements, the Contractor will be required to supply the necessary material to provide a six (6) inch layer of topsoil over the areas to be seeded. Where directed by the Engineer the surface of the subsoil shall be scarified or tilled to a minimum depth of two (2) inches before topsoil or soil is placed to permit bonding of the upper soil layer with the subsoil.

B. When delays in seeding operations carry the work beyond the specified seasons or when conditions of high winds, excessive moisture or frost are such that satisfactory results are not likely to be obtained for any stage of the work, the Engineer will stop the work. The work shall be resumed with the Engineer’s approval when the desired results are likely to be obtained or when approved corrective measures and procedures are adopted.

C. The Contractor shall be liable for any damage to property caused by seeding operations and all areas disturbed shall be restored to their original conditions to the satisfaction of the Engineer.

D. One inch of water per week shall be applied on seeded areas for adequate soil saturation as required by weather conditions and as ordered by the Engineer until final acceptance. Watering shall be continued until final payment. Watering shall be done in a manner which will not cause erosion or other damage to the finished surfaces. Any surfaces which become gullied or otherwise damaged shall be repaired to reestablish the grade and conditions of the soil prior to seeding. After the repairs have been made the areas shall be reseeded as specified. Water for seeding is available on site

3.2 GRASS SEEDING

A. Time of Seeding: Seeding shall be performed from March 1 to April 15 and from August 15 to October 15 unless otherwise approved. The Contractor shall notify the Engineer at least 48 hours in advance of the time he intends to begin seeding and shall not proceed with such work until permission has been granted.

B. Preparation of Areas: The areas to be seeded shall be cultivated and cleaned of all vegetative growth to a depth of six (6) inches except as otherwise directed by the Engineer on designated areas where topsoil has been furnished and placed to a depth of six (6) inches immediately prior to seeding. All weeds, roots, stumps, large stones and debris shall be removed. All washouts or other surface irregularities shall be repaired and additional topsoil shall be placed over the area as required until the entire area to be seeded is covered with a minimum of six (6) inch compacted layer of topsoil. The areas to be seeded shall then be rough graded to conform to the proper elevations as directed by the Engineer.

C. Final Preparations of Seed Bed: The areas to be seeded shall be cultivated with a disc, rototiller or scarifier to a depth of four (4) inches. The areas shall be smoothly graded to the proper elevations, free from all unsightly ridges, depressions or undue irregularities. Areas to be seeded that cannot be cultivated by mechanical means shall be scarified by hand to attain the degree of smoothness and uniformity of adjacent lawn areas. Any soft areas shall be thoroughly compacted with an accepted roller weighing at least 200 pounds.

1. All topsoil not used is to be removed and disposed of.

2. Ground limestone shall be evenly distributed at the rate of one-half (1/2) pound per square yard and worked into the top three (3) inches of the soil during the cultivation required for the final preparation of seed bed.

3. Commercial fertilizer (10-6-4) as specified shall be evenly distributed at the rate of ten (10) pounds per 1,000 square feet

using an approved mechanical spreader and shall be worked into the top one (1) inch of the soil.

4. In the event that it rains between the time the soil on any area is prepared and before it is seeded by any specified method, the soil on all areas to be seeded shall be completely pulvarized to a depth of one inch as determined, directed and approved by the Engineer.

D. Sowing Seed

1. Grass seed shall be sown evenly at the rate of one hundred fifty (150) pounds per acre. All seeding is to be done on dry or moderately dry soil and at times when the wind does not exceed a velocity of five (5) miles per hour.

2. A mechanical seeder may be used such as a Brillion seeder or equal to distribute the seed. Rolling will not be necessary.

3. If the grass seed is to be sown by hand the seed shall be evenly distributed and lightly raked into the top (1/4) inch of soil. After seeding and raking, the soil surface is to be rolled with an accepted roller weighting at least two hundred (200) pounds.

E. Seeding with Erosion Control Fabrics: Erosion control fabrics shall be applied in accordance with the seed manufacturers' instructions as modified, directed and approved by the Engineer.

3.3 ESTABLISHMENT OF SEEDED AREAS

A. The Contractor shall maintain, mow and protect the seeded areas until a uniform stand of grass approximately two and one half (2-1/2) inches high has been obtained (minimum of three cuttings). Any areas which have been damaged or fail to show a uniform stand of grass shall be scarified, refertilized and reseeded with the original seed mixture until all the designated areas are covered with grass.

+ + END OF SECTION + +

SECTION 33 01 30.72

CURED-IN-PLACE PIPE LINING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The Contractor shall furnish all labor, materials, equipment and incidentals and perform all work required for furnishing and installing the cured-in-place pipe liner as shown on the Contract Drawings, as specified herein, as required by job conditions and as required and ordered by the Engineer.

B. Work under this Section shall include, but not be limited to: mobilization/ demobilization, maintenance and protection of traffic, bypassing sewage; preparatory cleaning of the pipe; television inspection and video taping of pipe prior to liner installation; removal of obstructions in the pipe by means of conventional sewer cleaning or internal cutting devices; furnishing and installing the cured-in-place pipe liner; supplying water; tests for leakage; television inspection and video taping of pipe after installation of liner; restoration of damaged facilities; trimming and/or cutting back protruding house connection pipe; internal reconnection of house service connections; and all other work required for the complete installation of the sewer pipe liner subject to acceptance by the Owner, exclusive of the work specified under separate items.

C. The Contractor shall submit to the Owner for approval, shop drawings for liner sizes and thicknesses, equipment to be used for the installation and installation layouts and methods, design calculations for the existing soil and hydraulic loading, and provide material certifications for the liner materials at the time of shipment to the site of the work.

1.2 REFERENCES AND STANDARDS

A. The latest edition and revision of the following specifications and standards are a part of these specifications.

1. American Society for Testing and Materials:

a. F 1216, Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin Impregnated Tube.

b. D 638, Tensile Properties for Plastics, Test for.

c. D 790, Flexural Properties of Plastics and Electrical Insulating Materials, Test for.

d. D 5813, Standard Specification for Cured-in-Place Thermosetting Resin Sewer Pipe.

e. D 2990, Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.

f. D 2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

g. D 3681, Standard Test Method for Strain Corrosion.

2. Occupational Safety and Health Administration (OSHA) Safety and Health Regulations for Construction.

3. NASSCO.

1.3 SAFETY REQUIREMENTS

A. The Contractor's attention is directed to the fact that harmful and toxic vapors may exist within the manholes and sewers and they are, therefore, considered a confined space. These vapors will pose a hazard to workmen within the manhole as well as those in proximity to the manhole at grade. The Contractor shall be required to adhere to all OSHA, NIOSH, etc. regulations as well as applicable health and labor codes throughout the entire duration of work at each manhole. Emphasis shall be placed upon the requirements for entering confined spaces.

B. The Contractor shall furnish all required safety apparatus including fans, ducts, breathing apparatus, safety harnesses, gas detection equipment, tripods and all other equipment required to insure absolutely safe conditions.

1.4 SUBMITTALS

A. The Contractor shall submit to the Owner for approval:

1. Shop Drawings for liner size, material and thickness.

2. Drawings and/or technical information on all materials and equipment to be used for the installation in accordance with the Contract Documents.

3. Design calculations for the existing soil and hydraulic loadings.

4. Provide material certifications for the liner materials at the time of shipment to the site of work.

5. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed materials in compliance with the Contract Documents.

6. Partial, incomplete or illegible submissions will be returned to the Contractor without review for resubmission.

7. Homeowner notification sample.

1.5 QUALITY ASSURANCE

A. The finished pipe liner shall be fabricated from materials which, when installed will be chemically resistant to withstand internal exposure to domestic sewage.

B. To be acceptable, a minimum of 100,000 lf of wastewater collection system installation of the product in the U.S. must be documented.

C. To be acceptable, the installer must have had at least three (3) years active experience in the commercial installation of the product or similar products, and must have installed at least 50,000 lf of the product or similar products in wastewater collection system installations in the State of New York.

D. A list of references for both the product and the installer shall be included with the bid.

E. CCTV/Video inspection work shall be performed by NASSCO certified PACP/MACP and LACD operators.

PART 2 - PRODUCTS

2.1 GENERAL

A. Cured-in-Place Liner:

1. The pipe liner shall be a flexible tube made from one or more layers of polyester felt lined on one side with a polyurethane or polyvinyl chloride membrane materials bonded to the felt and impregnated with a liquid thermosetting resin. The membrane material which is on the exterior of the lining prior to installation becomes the inside surface when the tube lining is turned inside out during the inversion process.

2. The polyester felt shall be fully impregnated with a general purpose, unsaturated, polyester resin and catalyst system in amounts recommended by the manufacturer. When cured the resin shall develop into a hard, impermeable pipe-within-a-pipe. All materials used to fabricate the liner shall, when cured, be chemically resistant to withstand the corrosive effects of the existing domestic sewage.

3. The cured sewer pipe liner shall conform to the minimum structural standards, as listed below.

Cured Liner	Standard	Results
Flexural Strength	ASTM D-790	10,000 psi
Flexural Modulus	ASTM D-790	350,000 psi
Tensile Strength	ASTM D-638	5,500 psi
Compressive Strength	ASTM D-695	4,500 psi
Tensile Elongation	ASTM D-638	5 psi
Chemical Resistance	ASTM D-543	<20% loss

4. The pipe liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the sewer pipe as specified. Allowance shall be made for circumferential stretching during insertion. The liner shall be designed for a “fully deteriorated host pipe” condition at the required external soil and hydrostatic pressures and for internal pressures. The thickness of the liner shall be in accordance with the manufacturer’s recommendations, ASTM and as approved by the Engineer, but in no case shall be less than 6 mm. Ovality of the host pipe shall be considered when calculating required thickness.

5. Curing of the liner shall be accomplished by circulating hot water, steam or to cure the resin into a hard impermeable lining. When cured, the hardened liner shall extend from manhole to manhole in a continuous, tight fitting, watertight pipe-within-a-pipe.

6. The minimum length of the liner shall be that deemed necessary by the Contractor to effectively span the distance from the inlet to the outlet of the respective manholes, and to provide for a tight seal at the manhole connections. The Contractor shall be responsible to verify the existing sewer pipe lengths and diameters in the field prior to the manufacture of the materials.

7. Televised inspection documents of the sewer pipe or pipes to be lined will be made available for review upon request. It is recommended that these documents be reviewed by the Contractor prior to liner fabrication and installation. Should the pre-installation

television inspection reveal the sewer pipes to be in substantially different structural condition than those in the original inspection, the Contractor shall notify the Owner/Engineer in writing of any significant deviations. It should be noted that the televised inspection of the individual sewer lines represents the condition of the pipeline following cleaning. The pipeline must be adequately cleaned by the Contractor prior to liner installation as necessary to, and/or required to, install the liner.

8. The cured-in-place sewer pipe liner shall be Insituform Tube as manufactured by Insituform of North America, Inc., M-Liner as manufactured by Cippcon, Inc. (Entech Corp) or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Cleaning of Sewers

1. In order to prepare the existing sewer pipe for installation of the liner, it shall be the responsibility of the Contractor to remove all internal debris out of the existing sewer pipe as specified herein.

2. The Contractor shall provide all labor, materials and equipment necessary for the proper cleaning of the sewers prior to the relining of the sewer pipe. The equipment selected for cleaning shall be capable of removing dirt, grease, rocks, sand, roots and other deleterious materials and obstructions from the sewer lines.

3. During all sewer cleaning operations, satisfactory precautions shall be taken to protect the sewer lines from damage that might be inflicted by the improper use of cleaning equipment. Whenever hydraulically propelled cleaning tools which depend upon water pressure to provide their cleaning force, or tools which retard the flow of water in the sewer line or high velocity hydrocleaning equipment is used, precautions shall be taken to ensure that the water pressure created does not cause any damage or flooding to public or private property. Any sewer damaged as a result of the Contractor's operation shall be promptly repaired by, and at the expense of the Contractor at no additional cost to the Owner.

4. If freshwater is to be utilized during any part of the Contract, the Contractor must obtain the proper permits from the Port Washington Water District. The Contractor shall include all costs for obtaining permits and costs for water use in the bid price for this Item.

5. All sludge, dirt, sand, rocks, grease, roots and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned and disposed of by the Contractor. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand or damage pumping equipment shall not be permitted. All solids or semisolids resulting from the cleaning operations shall be removed from the site and properly disposed of in a manner approved by the Engineer, and in accordance with the State and local laws by the Contractor at no extra expense to the Owner. In no instance will the material be disposed of at or on Owner's property, or in Owner's sewers. All materials shall be removed from the site not less often than at the end of each workday. Under no circumstances will the Contractor be allowed to accumulate debris, etc., on the site of work beyond the stated time.

6. The equipment selected for cleaning shall be capable of removing dirt, grease, rocks, sand, roots and other deleterious materials and obstructions from the sewer lines. All equipment shall be heavy-duty municipal or industrial type, truck mounted, as approved by the Engineer. If necessary, the contractor shall televise the sewer from each end, when an obstruction or pipe fracture prevents the entire inspection from one manhole.

7. Precautions shall be taken to protect the sewer lines from damage that might be inflicted by the improper use of cleaning equipment. Any sewer damaged as a result of the Contractor's operations shall be promptly repaired by, and at the expense of the Contractor.

8. Prior to the installation of the pipe lining, an inspection of the sewer pipe shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions, which may prevent proper installation of the liner into the pipelines, and shall be noted so that these conditions can be corrected. A video with narrative and suitable log shall be furnished to the Owner for future reference.

9. It shall be the responsibility of the Contractor to clear the existing pipe of minor obstructions such as solids, roots, dropped joints, minor protruding service connections or collapsed pipe that will prevent liner installation or affect the final liner installation (in the opinion of the Engineer).

10. If, however, a protruding service connection (house connection) is considered by the Owner or Engineer to be a major obstruction, which would prevent the Owner from properly maintaining the sewer line, the Owner and/or Engineer may order the trimming and/or cutting-back of the protruding connection to the satisfaction of the Engineer.

B. Televising of Sewer:

1. General

a. The Contractor shall furnish the digital scanning studio, audio-visual digital encoding equipment/software, and other necessary equipment, materials, electricity, labor, technicians, etc., as required to perform the televising of the existing sanitary sewer.

b. The digital scanning equipment used for the work shall be specifically packaged for this purpose, and shall include adequate cable, power control unit, continuous contact reel assembly, a footage meter, capability of taking a still photograph of the picture displayed on the monitor, inspection studio and all appurtenant equipment.

c. The digital scanning equipment shall be capable of inspecting a minimum of 1,250 feet of pipeline, when entry into the pipe can be accessed from the upstream and downstream manhole. When entry is at one end only, the equipment shall be capable of inspecting 1,000 lf by a self-propelled unit. The inspection equipment shall be capable of clearly scanning the interior of an 8-inch diameter pipeline and all larger sizes.

d. The scanning equipment shall be transported in a stable condition through the line under inspection. Throughout the inspection the scanning equipment shall be positioned with the unit directed along the longitudinal axis of the pipe. When the scanning equipment is towed by winch and bond through the line, all winches shall be stable with either locking or ratcheting drums. All winches shall be inherently stable under loaded conditions. The bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment. The bonds shall be oriented in such a manner as to enable unhindered extension or retraction through the conduit. All efforts shall be made to prevent damage to the pipe during the inspection. In the case where damage is caused by the Contractor, for any reason, the cost of repair or remedy shall be borne by the Contractor.

e. The digital inspection equipment shall be of such quality as to enable the following to be achieved:

1) Color: With the monitor adjusted for correct saturation, the six colors plus black and white shall be clearly resolved with the primary and complementary colors in order of decreasing luminance.

2) Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole of picture. The center circle shall appear round and have the correct height/width relationship (± 5%).

3) Resolution: The live picture must be displayed on a digital monitor capable of providing a clear, stable image free of electrical interference with a minimum horizontal resolution not less than 460 lines.

4) Color Consistency: To ensure that the unit shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color consistency no variation in illumination shall take place during the inspection.

5) The inspection monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the distance along the line from the cable calibration point to the lens of the camera. The relative positions of the two points should also be noted. The Contractor shall use a suitable metering device that enables the cable length to be accurately measured; this shall be accurate to ± 1% or 6 inches whichever is greater. The Contractor shall demonstrate that the tolerance is being achieved by wheel measurement between manholes on the surface. This accurate measurement must be included on each computer generated digital assessment report.

f. All audio-visual digital recordings and collected data made during the televised inspection/cleaning shall become the property of the Owner and shall be submitted to the Owner within 10 business days upon completion of the inspection.

2. Digital Scanning Studio:

   a. The studio shall be mounted on a mobile vehicle (truck), which allows safe and orderly movement of the inspection equipment throughout the work site. The central control panel and control shall be located in the studio. The studio shall be large enough to accommodate four people for the purpose of viewing the monitors while the inspection is in progress. The Engineer or his representative shall have access to view the monitor at all times.

   b. The studio shall be insulated against noise and extremes in temperature, and shall be provided with means of controlling external and internal sources of light in a manner capable of ensuring that the monitor screen display is in accordance with the requirements of these Specifications. The inspection studio in the mobile unit shall be heated in the winter months and ventilated in the summer.

   c. The view shall be transmitted to a monitor of not less than 13 inches in size. The equipment shall be capable of receiving and transmitting a picture of not less than 460 Lines of Horizontal Resolution.

3. Digital Scanning Equipment:

   a. The equipment used for the pipe inspection shall be specifically designed and constructed for pipeline inspection and shall be capable of sustaining shock loads. The unit shall be waterproof and shall be operative in any condition that may be encountered in the inspection environment. It shall operate only on bandwidths that are free of interference. The composite signal output shall be adequate to project an image, which is easily and clearly viewed on the television monitor at prevailing light conditions in the viewing studio.

   b. The Contractor shall provide pan and tilt functions to facilitate the inspection of service laterals and pipe defects. The scanning equipment shall be capable of a 360° rotational scan and the tilt arc must not be less than 225° unless otherwise approved by the Engineer. The camera shall be capable of viewing the complete circumference of the pipe. Cameras incorporating mirrors for viewing sides are not acceptable. The scanning unit lens shall be an auto-iris type with remote controlled manual override. It shall be equipped with an externally controlled focus to provide for maximum clarity when viewing various size pipes. A shielded conductor

coaxial cable shall be used for operating the digital scanning equipment from the power control unit. The housing shall be a diameter adequate to pass through 6-inch diameter pipelines. The housing faceplate shall insure a distorted free image.

c. The adjustment of focus and iris shall provide a minimum focal range of 3 inches in front of the scanning unit's lens. The distance along the pipe in focus from the initial point of observation shall be a minimum of twice the vertical height of the pipeline.

d. Lighting for the digital scanning equipment shall be suitable to allow a clear picture for the entire periphery for all pipe sizes 6 inches or larger. The digital scanning equipment's light head shall include a high-intensity side viewing lighting system to allow illumination of internal sections of pipeline connections. The illumination must be such that it will allow an even distribution of the light around the perimeter without the loss of contrast, flare out of picture, or shadowing. The travel speed of the inspection unit (through the pipe) shall be uniform and shall not exceed the maximum speed of 30 feet per minute or as ordered by the Engineer.

4. Digital Audio/Visual Recording:

a. Visual Recording: Continuous digital recordings of the inspection view as it appears on the monitor shall be stored. A digital recording shall be made of the complete pipe inspection. The recording shall also be used as a permanent record of defects. The recording shall be MPEG1 and shall comply with ISO/IEC 11172 MPEG 1 Specifications. The digital encoding shall include both sound and visual information that can be reproduced with an image equal to the quality of the original picture on the monitor. Compression rate shall be 1.5 Mb/s. The replay of the compressed video information, when reviewed on Windows Media Player Version 6.4 or higher and shall be free of electrical interference and shall produce a clear, stable image. The audio portion of the composite digital coding shall be sufficiently free of electrical interference and background noise to produce an oral report that is clear and completely and easily discernible. The operator shall pause the digital recording at any time that there is a delay in the inspection, the pause shall in no way affect, freeze or interrupt the replay of the video and shall not close the video file during the inspection. The operator shall store a single video file for each

inspection. The data shall be time coded using the elapsed time from the video file. The elapsed time specifications shall comply with PACP requirements. The naming of the video file shall be automatic and shall match the inspection file name.

b. The digital audio/video recording depicting all structural deterioration, leaks, cracks, illegal taps, blockages, footage display, irregularities, house connection locations, etc., shall be supplied to the Owner as a permanent inspection record.

c. The recording shall include a sound track stating date of recording, location of the inspection, manhole numbers, and the Contractor's audio/visual technician's name. In addition, the sound track shall describe the pertinent aspects of the inspection, e.g., locations of breaks, pipe deterioration, footage readings, irregularities, etc. The sound track shall be synchronized with the location of the camera at an instant in time. Sound shall describe periodic location along the pipe and the location of each condition encountered. The introduction at each manhole shall include the location, date, size, and type of material of the section being viewed. The digital scanning equipment shall be continuously connected to the monitoring equipment. The digital scanning unit and monitoring equipment shall have the built-in capability to allow the Engineer to instantly review both the audio and visual quality of the recordings at all times during the assessment survey.

d. Separate MPEG files shall be created for each outfall pipe segment. In case of a reverse setup, such inspection shall be stored in a separate MPEG file. MPEG files and the data inspection files shall be written to CD-ROM media for delivery to the Engineer. Multiple MPEGs may exist on each CD-ROM. Each CD-ROM shall be labeled, at a minimum, with the following information: Owner, Engineering Firm, Project Name, Date of CD creation, CD ID, and Contractors Firm.

e. MPEG files shall be named according to the following file specification:

1) [Upstream Outfall Manhole Number].mpg

2) [Upstream Outfall Manhole Number_A].mpg for a Reverse Inspection

f. DVDRs may be substituted for CD-ROMs when applicable.

5. Inspection Reports:

a. Inspection Report: The Contractor shall complete an inspection report covering the inspection and the information acquired. Prior to beginning work, the Contractor shall submit a hardcopy report to the Engineer for approval. The reports shall include an Observation Report, Cross Section Report and a Plan View Report provided by CIMS Data Management Software or equal. A written report depicting all structural deterioration, leaks, cracks, illegal taps, blockages, irregularities, and locations of such, etc., shall be supplied to the Owner as a permanent inspection record. The report shall be made on appropriate forms and shall be delivered to the Owner properly labeled with the following information:

1) Date of report

2) Location of the inspection; list manhole numbers

3) Contractor's audio/visual technician's name.

b. In addition to any paper documents; all inspection reports shall be furnished in electronic format (as per NASSCO). Data files and Digital video files shall be linked on same CD-ROM.

c. Digital Data Display: At the start of each pipe length being surveyed, the length of pipeline from zero up to the cable calibration point shall be recorded and reported in order to obtain a full record of the pipe length. The length entered on the data display must allow for the distance from the start of the survey to the cable calibration point, (preset position), such that the footage at the start of the survey is zero. In the case of surveying through a manhole, the distance shall be set at zero with the digital view focused on the outgoing pipe entrance from the center of the manhole.

d. Inspection Record: At the start of each manhole length a data generator shall electronically generate and clearly display on the viewing monitor and digital recording, a record of data in alphanumeric form containing the information entered.

e. Once the survey of the pipeline is under way, specific data shall be continuously displayed on the viewing monitor and the MPEG1 file. The size and position of the data display shall be such as not to interfere with the main subject of the picture yet shall always be easily readable when the recording is

replayed. It must be possible to move the data on the video screen to ensure continual ability to read the data on the screen. At minimum, the following data shall be displayed:

1) Automatic update of the scanning units position shown in feet

2) Upstream manhole and downstream manhole reference numbers

3) Observations and Defects entered by the Technician during the inspection

f. Each length, i.e., the length of pipe between two consecutive manholes, shall be entered to create a separate data file. Where a Contractor elects to "pass through" a manhole during an Inspection survey he shall start a new data file at the manhole "passed through" and shall re-set the distance to zero.

g. Two copies of the Digital Inspection Report (in DVD format) for each televised section of pipe, shall be submitted to the Owner.

6. Restoring and Cleaning:

The Contractor shall promptly restore and clean to their original condition, all surface areas disturbed during performance of this Contract. This includes pavements, driveways, sidewalks, curbs, fences, lawns, landscaping, trees, structures, and the like. Particular care and restoration shall be required on private property and in easements.

3.2 INSTALLATION

A. Homeowner Notification of Work

1. The Contractor shall notify all affected homeowners and businesses along the project limits of the impending pipe reconstruction. It will be the Contractor's responsibility to provide and distribute written notification describing the reconstruction process, responsibility of homeowners, and estimated time of completion. The Contractor's telephone number should also be provided for homeowner questions. All notices are to be written in both English and Spanish. Three written notices shall be provided to each affected homeowner conforming to the following schedule:

a. Two weeks prior to installation of CIPP.

b. 24 hours prior to installation of CIPP.

c. Immediately upon service reconnection and restored pipe service.

2. A sample of the notification shall be submitted to the District for review and approval.

B. Cured-in-Place Liner:

1. The Contractor shall provide all labor, materials and equipment necessary for maintaining the constant flow of sewage around the section of pipe being lined as specified herein under “Bypassing Sewage.”

2. Prior to the installation of the liner, the Contractor shall prepare the existing sewer pipe as specified herein under “Cleaning of Sewers.”

3. The Contractor shall designate a location where the uncured resin in the original containers and the unimpregnated liner tube will be vacuum impregnated prior to installation. The Contractor shall allow the Engineer to inspect the materials and “wet out” procedure. A resin and catalyst system compatible with the requirements of this method shall be used in the quantities required to provide the required liner thickness.

4. The wet out liner tube shall be inserted through an existing manhole or other approved access by means of an inversion process and the application of a hydrostatic water head pressure or air pressure launching system sufficient to fully extend it to the next designated manhole. The liner tube shall be inserted into the vertical inversion standpipe with the impermeable plastic membrane side out. The inversion pressure will be adjusted to be of sufficient height to cause the impregnated liner tube to invert from manhole to manhole and hold the tube tight to the pipe wall, produce dimples at side connections and flared ends at the manholes. The use of a lubricant is recommended. Care shall be taken during the elevated curing temperature so as not to over stress the felt fiber.

5. After inversion is completed the Contractor shall supply a suitable heat source and water recirculation equipment. The equipment shall be capable of delivering steam or hot water throughout the section to uniformly raise the temperature within the liner above the temperature required to effect a cure of the resin. Records of cure schedule shall be kept. This temperature shall be determined by the resin manufacturer or the catalyst system employed. Contractor

shall follow resin manufacturers curing and cooling time requirements.

6. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply.

7. The finished liner shall be continuous over the entire length of the installation. The liner shall be free as commercially practicable from visual defects, damage, deflection, dry spots, holes, delamination, uncured resin, and the like. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections. Cut-ins and attachments at service connections shall be neat and smooth to the satisfaction of the Engineer.

8. Any defects which will affect the integrity or strength of the linings shall be repaired at the Contractor's expense, in a manner acceptable to the Owner and Engineer.

9. The cost of all labor, materials, equipment and incidentals, whether or not here specified, necessary for the testing, retesting and repairing of the sewer system consistent with the intent of this Section is deemed included under the contract Item for furnishing and installing the sewer pipe liner being tested.

C. Reconnection of Existing Services

1. Reconnections of existing services shall be made using an internal, remote-controlled cutting device, after the lining has been cured. It is the Contractor's responsibility to make sure that all service connections are reconnected. It is the intent of these Specifications that this shall be done without excavation, and in the case of no man entry pipes, from the interior of the line by means of a remotely controlled cutting device monitored by a television camera. No additional payment will be made for excavations for the purpose of reopening connections. The Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

3.3 TESTING

A. All sanitary sewer pipe liners shall be tested for watertightness throughout their entire length.

B. The Contractor will furnish all necessary and approved material, equipment, labor and other facilities required to satisfactorily perform the tests and shall make all necessary repairs or replacements and retests, as required, as his own expense.

C. An exfiltration test shall be performed by filling the lined pipe with water to provide a positive differential head of at least 2' above the exterior crown of the pipe at the highest point of the line under test. If groundwater levels are found or known to be above the exterior crown of this pipe, but not as much as 2' above, the positive differential head referred to above shall be 2' above the elevation of the groundwater. The test shall be carried out for a period acceptable to the Engineer, but will in no case be less than two hours in duration. The use of the recirculating curing water may be utilized if demonstrated to be acceptable to the Engineer, for compliance with the testing identified herein.

D. The maximum allowable quantity of exfiltration or leakage out of the section under test shall be 200 gallons per inch of internal diameter per mile of pipe per day (.1578 gal/100 lf/inch/hr).

E. Two plate sample tests shall be performed of the liner in accordance with ASTM D638 and ASTM D790 every 2,000 ft., or as directed by Engineer. Testing shall be performed by an independent testing laboratory at no additional cost to the Owner.

F. If the measured exfiltration exceeds the specified allowance, the necessary repairs or replacements shall be made immediately and as approved by the Engineer. The tests shall be repeated as many times as necessary, at no additional cost, until the requirements hereinbefore specified have been met.

G. When a section under test fails to meet the specified requirements and therefore must be retested, the retest shall not extend beyond the portion of the sewer tested in the original test.

H. Final testing of the liner shall be performed by a closed circuit television inspection for the entire length of each section of sewer pipe liner installed.

+ + END OF SECTION + +

SECTION 33 05 16

DRAINAGE STRUCTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Contractor shall furnish all labor, materials, equipment and incidentals necessary to provide all precast concrete drainage structures including leaching pools, manholes, sampling manholes, and similar structures as shown, specified, and otherwise required to complete the Work.

B. General: Structures shall conform in shape, size, dimensions, materials, and other respects to the details shown on the Drawings.

C. Related Work Specified Elsewhere:

1. Section 03 11 00, Concrete Formwork

2. Section 03 20 00, Concrete Reinforcing

3. Section 03 30 00, Cast-in-Place Concrete

4. Section 04 05 13, Mortar

5. Section 31 00 00, Earthwork

D. Codes and Standards

1.2 QUALITY ASSURANCE

A. General:

1. The Contractor shall give the Engineer 24 hours written notice plus travel time prior to the commencement of any manufacturing process or testing procedures for precast concrete leaching pools.

2. At the point of manufacture and after delivery to the site, the Engineer reserves the right to inspect and test all precast concrete products.

3. In addition, at the place of manufacture of precast concrete products, the Engineer reserves the right at all times:

a. To inspect the materials, the processes of manufacture, and the records of analysis and tests.

b. To select test specimens.

4. All precast concrete leaching pools delivered to the site shall be clearly marked at the factory with the date of manufacture and the manufacturer's identification. Omission of this information may be cause for rejection of the leaching pools.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 32, Sewer and Manhole Brick (made from clay or shale).

2. ASTM C 139, Concrete Masonry Units for Construction of Catch Basins and Manholes.

3. ASTM C 140, Sampling and Testing Concrete Masonry Units.

4. ASTM C 207, Hydrated Lime for Masonry Purposes.

5. ASTM C 478, Precast Reinforced Concrete Manhole Sections.

6. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Uses as a Mineral Admixture in Portland Cement Concrete.

7. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

8. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars.

9. Standard Practice ACI 226.R1, Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete.

1.3 SUBMITTALS

A. Samples: Submit for approval samples of brick, block and accessories, if any, for the structures.

B. Shop Drawings: Submit for approval Shop Drawings showing design and construction of all precast concrete including, but not limited to, the following:

1. Size and spacing of steel reinforcement.
2. Wall and slab thicknesses.
3. Concrete cover over steel reinforcement.
4. Concrete mix design including design compressive strength.
5. Leaching pool frame dimensions.
6. Height of frame and leveling course.
7. Grade elevation at each catch basin.
8. Certificates of compliance with the referenced specifications.

PART 2 - PRODUCTS

2.1 PRECAST PRODUCTS

A. Where shown or otherwise approved by the Engineer, precast concrete shall be used for items such as manholes, catchbasins, etc. Layout and details shall be as shown and specified. Design shall be adequate to withstand all loads imposed including earth pressure, vehicle loads and construction loading.

B. Manholes and catchbasins shall be of sufficient strength to safely support an AASHTO H-20 loading. All steel reinforcement shall meet the requirements as specified in Section 032000, Concrete Reinforcing. All concrete shall meet the requirements of Section 033000, Cast-in-Place Concrete.

2.2 MISCELLANEOUS METALS

A. Metal frames, covers, grates, troughs, steps and similar required items shall be provided as shown and in accordance with Section 055600, Castings.

2.3 AREA DRAIN

A. Inlet casting shall be Josam Model 32226 floor drain with vandal-proof screws. Inlet casting shall be rated for H-20 loading and shall be installed in accordance with the plans.

PART 3 – EXECUTION

3.1 PREPARATION

A. All excavation and shoring required for the construction of drainage structures shall be performed in accordance with Section 31 23 16, Excavation.

B. Excavation shall be to the required depth. Over-excavated areas shall be backfilled with select fill material properly compacted as specified in Section 31 23 16, Excavation.

3.2 INSTALLATION

A. Set drainage structures at the proper elevation with proper bearing on a suitable foundation. Catch basins shall be level and oriented to receive all incoming and outgoing pipes.

B. Brick stacks shall be used for all precast structures where required. They shall be a maximum of 12 inches in height, constructed on the top surface on which the frame will be placed. The brick stack shall bring the frame to the proper grade.

C. Brick shall be satisfactorily wet when being laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The joints shall not be wider than 3/8-inch, except when the bricks are laid radially, in which case the narrowest part of the joint shall not exceed 1/4-inch.

D. An approved watertight joint shall be provided for each pipe entering and exiting each leaching pool.

+ + END OF SECTION + +

SECTION 33 05 19

DUCTILE IRON PIPE FOR STORM SEWERS

PART 1 – GENERAL

1.1 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals as shown on the Contract Drawings, specified and required to install and place in satisfactory service Ductile Iron Pipe (DIP) for storm sewers.

2. The extent of piping is shown on the Contract Drawings.

B. Coordination:

1. Review installation procedures under other Sections and Contracts and coordinate with the Work that is related to this Section.

C. Related Work Specified Elsewhere:

1. Section 31 40 00, Shoring and Underpining

2. Section 31 00 00, Earthwork

3. Section 31 23 33, Trenching and Backfilling

1.2 DESCRIPTION

A. Under this item, the Contractor shall provide all labor, materials and equipment necessary to furnish, deliver, install and test all ductile iron pipe to be used for storm sewers as indicated on the plans. Included hereunder is excavation and backfill; connections to existing and proposed structures; granular bedding; disposal of excess materials; sheeting and shoring; dewatering; protection of existing structures; saw cutting and removal of pavements; temporary asphalt pavement; and exfiltration testing. Ductile iron pipe class 54 shall be used for all storm sewers reflected on plans.

B. Source Quality Control: Obtain each type of pipe and fittings from one manufacturer.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Detailed procedures to be used in jointing and installing piping system, including manufacturer's recommendations.

2. Bill of materials indicating material composition of pipe, pressure rating, nominal size and its location on the piping installation drawings.

3. Catalogue cuts of piping and fittings.

1.4 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Storage: All Pipe materials shall be stored off the ground in an area approved by the engineer. Do not store pipe in sunlight.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Ductile Iron Pipe shall be 60-42-10 grade and Class 54 pipe conforming to the requirements of AWWA C151.

B. All pipe shall be coated inside and outside with a bituminous material approximately 1 mil thick. The finished coating shall be continuous smooth neither brittle when cold nor sticky when exposed to sun, and shall be strongly adherent to the pipe

C. All joints for ductile iron pipe shall be push-on joint type meeting the requirements of ANSI Standard A21.51 or latest revision.

D. The joints shall be internally locked, not requiring thrust blocks or tie rods, and shall be made in accordance with manufacturer's instruction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not place pipes until trench bottoms have been inspected and approved by the Engineer nor until trenches are free from water.

B. All storm and sanitary sewer pipe shall be installed in accordance with the detailed drawings.

C. Lay all pipe true to line and grade as indicated on the Drawings and in a manner to make all surfaces at the invert and throughout the full length of the pipe aligned and smooth. Install pipes with full and uniform support, eliminate irregularities in trench bottoms by placing suitable and approved materials.

+ + END OF SECTION + +

SECTION 33 05 20

BURIED PIPING INSTALLATION

PART 1 – GENERAL

1.1 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals as shown on the Contract Drawings, specified and required to furnish, install and test all buried piping, fittings, specials and appurtenances. The Work includes, but is not limited to, the following:

   a. All types and sizes of buried piping, except as specified under other Sections. These include, but are not limited to: ductile iron, carbon steel, copper, and thermoplastic.

   b. Supports, restraints, and thrust blocks.

   c. Testing.

   d. Cleaning and disinfecting.

   e. Also included are installation of all jointing and gasketing materials, specials, couplings, flexible couplings, sleeves, tie rods, corrosion protection, and all other Work required to complete buried piping installation.

   f. All valves, specials, sleeves and wall pipes shown or specified shall be incorporated into the piping system as required and as specified in the appropriate section of Division 22.

   g. Unless otherwise shown or specified, buried piping installation includes all buried piping Work required, beginning at the outside face of structure or building foundation.

B. Coordination:

1. Review installation procedures under other Sections and coordinate with the Work that is related to this Section, including concrete, valves, ventilation and electrical.

2. The installation of all buried piping materials specified in Division 22. Coordinate with these Sections.

C. Related Work Specified Elsewhere:

1. Section 03 30 00, Cast-In-Place Concrete

2. Section 31 00 00, Earthwork

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with applicable requirements of UL and other authorities having jurisdiction.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ASTM D 2774, Underground Installation of Thermoplastic Pressure Piping.

2. AWWA C111 (ANSI A21.11), Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

3. AWWA C600, Installation of Ductile-Iron Water Mains and Appurtenances.

4. AWWA M23, PVC Piping.

5. ANSI B31.2, Fuel Gas Piping.

6. NFPA 54, National Fuel Gas Code.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval Shop Drawings showing the following:

1. Laying schedules and detailed drawings in plan and profile for all piping.

2. Full details of piping, valves, specials, joints, harnessing and connections to pipes and structures.

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Submit copies of all test results.

C. Certificate: Submit certificate of compliance with referenced standards.

D. Record Drawings: Submit in accordance with the requirements, Project Record Documents.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle all pipe, fittings and accessories carefully with approved handling devices. Do not drop or roll pipe off delivery vehicle. Do not otherwise drop,

roll or skid pipe. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved.

B. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

C. Pipe, fittings and specials shall be unloaded and stored in areas designated on the drawings. Interiors shall be kept completely free from dirt and foreign matter.

D. No material furnished under this specification shall be shipped to the job site until all submittals have been approved.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe bedding and backfill in accordance with Section 312000 Earthwork.

B. Pipe materials required are listed in the Piping Schedules. Refer to applicable Sections for detailed materials Specifications.

C. General:

1. Pipe Marking:

a. Each piece of pipe or fitting shall be clearly marked with a designation which shall conform with designations shown on the Shop Drawings.

b. Class designation shall be cast or painted on each piece of pipe or fitting 4 inches in diameter and larger.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:

1. All piping shall be sloped to avoid high spots and low spots and to facilitate drainage.

2. Proper and suitable tools and appliances for the safe, convenient handling and laying of pipe shall be used.

3. Install piping as shown on the Contract Drawings, specified and as recommended by the manufacturer.

4. Request instructions from Engineer before proceeding if there is a conflict between the manufacturer's recommendations and the Contract Drawings or Specifications.

5. Pipe, fittings and accessories that are cracked, damaged or in poor condition or with damaged linings will be rejected. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the contractor at his expense.

6. Minimum cover over buried piping shall be 4 feet unless otherwise shown or approved by Engineer.

7. Section 31 23 16, Excavation

B. Bedding Pipe:

1. Bed pipe with materials as specified below and as shown on the Contract Drawings.

a. Trenches shall not be excavated below the pipe bottom. All loose and unsuitable material shall be removed from the trench bottom and backfilled with compacted select fill.

b. Pipe embedment material shall be sand(?) placed in accordance with the requirements of Section 31 23 16, Excavation, within the following limits:

1) From the bottom of the pipe to 12 inches above the crown of the pipe for all pipe sizes.

c. Pipe embedment shall be placed in maximum 6-inch layers and compacted for the full width of the trench. Recesses in the embedment shall be provided around each joint to allow space for making joints and inspection.

2. Carefully and thoroughly compact all pipe bedding and fill.

3. No piping shall be laid until Engineer approves the bedding condition.

4. No pipe shall be brought into position until the preceding length has been bedded and secured in its final position.

C. Laying Pipe:

1. Conform to manufacturer's instructions and to AWWA C600, and AWWA M23 where applicable.

2. Install unless otherwise approved by Engineer. Remove all pipe accurately to line and grade shown and relay pipes that are not laid correctly.

3. Slope piping uniformly between elevations given.

4. Ensure that water level in trench is at least 6 inches below bottom of pipe. Do not lay pipe in water. Maintain dry trench until jointing and backfilling are complete.

5. Start laying pipe at lowest point and proceed towards the higher elevations, unless otherwise approved by Engineer.

6. Place bell and spigot pipe so that bells face upstream unless otherwise approved by Engineer.

7. Excavate around joints in bedding and lay pipe so that only the barrel receives bearing pressure from the trench bottom.

8. Permissible deflections at joints shall not exceed 75 percent of the amount allowed by manufacturer and in no case exceed AWWA standards.

9. Prior to laying pipe, every precaution shall be taken to ensure that no foreign material enters the piping.

10. All pipe and fittings shall be carefully examined for cracks, damage or other defects while suspended above the trench, before installation. Defective materials shall be immediately removed from site.

11. Interior of all pipe and fittings shall be inspected and all dirt, gravel, sand, debris or other foreign material shall be completely removed from pipe interior before it is moved into the trench. Bell and spigot mating surfaces shall be thoroughly wire brushed and wiped clean and dry immediately before pipe is laid.

12. Every time that pipe laying is not actively in progress the open ends of pipe shall be closed by a watertight plug.

13. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe or lining, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

14. Blocking under piping shall not be permitted unless specifically excepted by Engineer for special conditions. If permitted, conform to requirements of AWWA C600.

15. Repair protective coatings and linings in a satisfactory manner prior to backfilling. Refer to specific pipe specifications for coating systems required.

D. Jointing Pipe:

1. Clean completely all jointing surfaces and adjacent areas immediately before making joint.

2. Lubricate and adjust gaskets and "O"-rings as recommended by manufacturer.

3. After "O"-rings are compressed and before pipe is brought fully home, each gasket shall be carefully checked for proper position around full circumference of the joint.

4. Conform to AWWA C111 and to all applicable manufacturers recommendations pertaining to jointing pipe.

5. For mechanical joints the plain end shall be centered and pushed into the bell and the gasket shall be firmly pressed evenly into the bell. The gland shall be slid to the bell for bolting. All bolts with oiled threads shall be alternately torque tightened 180 degrees opposite to each other to seat the gasket evenly. The maximum torque shall be as follows:

Bolt Size (inches)	Applied Torque (ft-lbs)
5/8	50
3/4	80
1	90
1 1/4	150

All bolts and nuts shall be heavily coated with an approved bituminous or epoxy coating.

6. Solder Joints:

a. Ream or file pipe to remove burrs.

b. Clean and polish contact surfaces of joints.

c. Apply flux to both male and female ends.

d. Insert end of tube into fittings full depth of socket.

e. Heat joint evenly.

f. Apply continuous solder bead around entire circumference of joint.

7. Use hexagon head nuts and bolts on all flanged joints. Bolts shall neither project more than 1/4-inch from, nor fall short of the end of the nut.

8. Use ring gaskets unless otherwise specified or approved by Engineer. Maximum gasket thickness shall not exceed 1/8 inch. Gaskets shall be suitable for service intended in accordance with manufacturers ratings and instructions.

9. Clean and lubricate bolt threads and gasket faces for flanged joints.

10. All bolts and nuts for underground service on valves, mechanical joint fittings, pipe joint and other ferrous metal appurtenances shall be packed in an asphaltic material. After the joint has been made and the bolts drawn to the proper tension, the joint, including glands, flanges, bolt heads and nuts shall be packed to a minimum thickness of one inch over all surfaces with Talcote, or other equal asphaltic material. Alternatively coat all joint areas and fasteners with two heavy coats of coal tar epoxy.

E. Concrete Trust Blocks:

1. Provide concrete trust blocks as shown, required, or otherwise approved by Engineer.

F. Transitions from One Type of Pipe to Another:

1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

G. Closures:

1. Provide all closure pieces shown or required to complete the Work.

2. Locate closures in straight runs of pipe.

H. Backfilling:

1. Conform to applicable requirements of Section 02200 - Earthwork.

2. Backfill by hand until pipe is covered by at least 1 foot of fill.

3.2 WORK AFFECTING EXISTING PIPING

A. Location of Existing Piping:

1. Locations of existing piping shown shall be considered approximate.

2. Contractor is responsible for determining exact location of existing piping to which he must make connections, or which he may disturb during earth moving operations, or which may be affected by his work in any way.

B. Work on Existing Pipelines:

1. Do not take pipelines out of service except where specified or approved by Engineer.

2. Cut or tap pipes as shown or required with machines specifically designed for this work.

3. Install temporary plugs to keep out all mud, dirt, water and debris.

4. Provide all necessary adapters, fittings, pipe and appurtenances required.

5. Refer to Section 312000, Earthwork for additional requirements.

6. The Contractor shall provide a temporary thrust restraint system for existing pipes wherever the installation of new pipes disturbs the existing pipe's thrust restraint. Upon completion of new pipe installation, the Contractor shall restore the existing pipe thrust restraint system to its condition at the onset of the job.

3.3 TESTING OF PIPING

A. General:

1. Test all piping as specified below except as otherwise authorized by Engineer.

2. Notify Engineer 48 hours in advance of testing

3. Provide all testing apparatus, including pumps, hoses, gages, and fittings.

4. Unless otherwise noted, pipelines shall hold the specified test pressure for a period of 2 hours.

5. Pipelines which fail to hold specified test pressure or which exceed the allowable leakage rate shall be repaired and retested.

6. Test pressures required are at the lowest elevation of the pipeline section being tested unless otherwise specified.

7. All gas piping shall be tested in accordance with NFPA 54.

8. Unless otherwise approved, conduct all tests in the presence of the Engineer.

9. All pipe shall be tested between valves.

B. Schedule of Pipeline Tests:

1. For pressure test values see “Piping Schedule.”

2. Piping not on the schedule shall be tested at 1.5 times the maximum working pressure or 10 psi, whichever is greater.

C. Pressure Test Procedure (Except for Fuel Oil Piping and Gravity Sewer Pipe):

1. Backfill and compaction shall be completed at least to the pipe centerline before testing, unless otherwise required or approved by Engineer. Backfill and compact around all blocking before testing and as required to assure restraint by harnessed joints.

2. Allow concrete for blocking to reach design strength before testing.

3. Fill section to be tested slowly with water and expel all air. Install corporation cocks, if necessary, to remove all air.

4. Test only one section of pipe at a time.

5. Maintain the test pressure for at least 2 hours.

6. Allowable Leakage Rates (in gallons per hour per 1,000 feet per inch diameter) except as otherwise noted:

a. Buried Ductile iron and PVC - as specified herein and as specified in AWWA C.600 - Section 4 - Hydrostatic Testing.

Nominal Pipe Diameter (inch)	Allowable Leakage Rate Per 1000 ft of Pipeline (gph)
4	0.34
6	0.50
8	0.67
10	0.84
12	0.01

b. Exposed Ductile iron and PVC and pipe in tunnels: No leakage.

c. Copper, steel and Thermoplastic: No leakage.

d. Sodium hypochlorite and caustic Solution: No leakage.

7. All visible leaks shall be made tight regardless of the amount of leakage or results of the leakage tests. If the pipes tested do not meet the leakage requirements of the leakage tests, they shall be repaired and retested as necessary until the leakage requirement is met.

8. All Work found defective shall be repaired or replaced at the expense of the Contractor.

D. Test Procedure for Gravity Sewer Piping:

1. Backfill and compaction shall be completed at least to the pipe centerline before testing, unless otherwise required or approved by the Engineer.

2. After pipe trenches have been satisfactorily backfilled to the required depth, piping shall be checked by the Engineer to determine if any displacement of pipe has occurred. A bright light shall be flashed between manholes. If the illuminated interior of the pipe shows displaced pipe, improper alignment or any other defects, the defect shall be corrected as determined by the Engineer. Upon satisfactory completion of the displacement test, the pipe shall be tested for leakage.

3. The Contractor shall test each section of gravity sewer pipe between manholes for watertightness individually. No continuous sections shall be tested simultaneously.

4. The Contractor shall plug the downstream end of the pipeline under test and all outlets discharging into the upstream manhole.

5. The upstream manhole and the section of pipeline under test shall be filled by the Contractor with water. The elevations to which the manholes shall be filled is a minimum of 2 feet above the crown of the pipe, or at least 2 feet above existing groundwater, whichever is higher.

6. The pipe shall remain filled for an initial 1 hour period to allow for stabilization. Following the stabilization period, water shall be added to the required elevation.

7. Leakage loss shall be measured over a period of 4 hours. After the stabilization period, the Engineer will take 3 readings of the water level in the manhole, and 4 hours later, take 3 more readings. An average of the readings will be used by the Engineer to calculate leakage.

8. If the measured rate of leakage is less than or equal to the allowable leakage rate, the section of pipeline tested is acceptable. If the test

fails, the section of pipe must be repaired or replaced at the expense of the Contractor, and retested by the same procedures. Regardless of the results of the leakage test, all visible leaks shall be repaired.

9. The maximum allowable leakage rate for any section of pipeline under testing shall not exceed 200 gallons per inch of internal diameter per mile of pipe per day.

10. At the conclusion of the test, clean all pipelines by flushing with water or other means, and remove any debris which may have entered the pipeline during construction.

3.4 CLEANING AND DISINFECTION

A. All piping shall be thoroughly cleaned and flushed prior to placing in service in a manner approved by Engineer.

B. Disinfection:

1. Disinfect all potable water piping wherever installed or relocated.

2. Completely clean interior of all piping and flush piping smaller than 12 inches prior to disinfection with water at a minimum velocity of 2 1/2 feet per second.

3. Conform to procedures described in AWWA C651 except that the tablet method will not be permitted unless otherwise approved by the Engineer.

4. Water for flushing, testing and chlorination shall be furnished by the Contractor.

5. Chlorine shall be supplied by Contractor.

6. Bacteriologic tests shall be performed by Contractor. A certified test laboratory report shall be submitted for approval by the Engineer.

7. Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 parts per million will be left after a 24-hour retention period. The operation shall be repeated as necessary to provide complete disinfection.

+ + END OF SECTION + +

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SECTION 33 05 39

REINFORCED CONCRETE DRAINAGE PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Contractor shall furnish all labor, materials, equipment and incidentals as shown, specified and required to provide site drainage pipe and fittings for the Work.

2. The extent of piping is shown on the Drawings.

B. Related Work Specified Elsewhere:

1. Section 03 21 00, Reinforcing Steel

2. Section 03 30 00, Cast-in-Place Concrete

3. Section 31 00 00, Earthwork

4. Section 33 05 16, Drainage Structures

5. Section 33 05 20, Buried Piping Installation

1.2 QUALITY CONTROL

A. General:

1. The Contractor shall give the Engineer 24 hours written notice plus travel time prior to the commencement of any manufacturing process or testing procedures for reinforced concrete pipe.

2. At the point of manufacture and after delivery to the site, the Engineer reserves the right to inspect and test all the concrete pipe. At any time the pipes can be subject to rejection in the field by the Engineer if they do not meet the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture.

3. In addition, at the place of manufacture, the Engineer reserves the right at all times:

a. To inspect the materials, the processes of manufacture, and the records of analysis and tests.

b. To select test specimens.

4. Pipes rejected by the Engineer shall be marked for identification and immediately removed from the site.

B. Source Quality: Obtain each type of pipe and fittings from no more than one manufacturer. All piping shall be specifically manufactured for this project.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ASTM C 76, Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

2. ASTM C 443, Joints for Circular Sewer and Culvert Pipe, Using Rubber Gaskets.

3. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Uses as a Mineral Admixture in Portland Cement Concrete

4. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete

5. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars

6. Standard Practice ACI 226.R1, Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete

D. Identification: In addition to the requirements of Section 15051, the date and place of manufacture shall be clearly marked on each pipe.

E. Manufacturer's Testing:

1. Tests on reinforced concrete pipe may be witnessed by the Engineer. All pipe for testing purposes shall be selected at random by the Engineer from the stock of the manufacturer. Test specimens shall be pipe which would not otherwise be rejected under these Specifications.

2. Reinforced concrete pipe shall be tested in accordance with ASTM C76, C443, and C497.

3. The following test shall be made for each size and class of RCP:

   a. Crushing strength test by the three-edge bearing method.

   b. Compression test on cores cut from the pipe.

   c. Absorption test.

   d. Hydrostatic test.

4. For hydrostatic testing, two (2) sections of pipe shall be randomly selected from each lot to undergo concurrent pressure testing of the pipe and their common joint. The hydrostatic testing shall be conducted in accordance with the requirements of ASTM C443 as modified herein.

   a. The two (2) straight pipe sections shall be properly connected in a straight alignment in accordance with the joint design. The outer ends of the two (2) joined pipe sections shall be adequately bulkheaded. Prior to the application of the test pressure, the pipe assembly shall be allowed to stand under a pressure of ten (10) psi for a minimum of three (3) hours and a maximum of twenty-four (24) hours. After the period, the test pressure shall be increased to thirteen (13) psi and held at that level for ten (10) minutes. The pipe shall withstand this pressure without cracking and without any leakage on the exterior surface or through the rubber gasket joint.

   b. Upon completion of the test in straight alignment, the test sections shall be deflected to create a position one-half (1/2) inch wider than the assembled position on one (1) side of the outside perimeter of each joint and shall be subjected to an internal hydrostatic pressure of ten (10) psi for ten (10) minutes. The pipe shall withstand this pressure without cracking and without any leakage on the exterior surface or through the rubber gasket joint.

   c. Moisture appearing on the surface of the pipe or joint in the form of patches or beads adhering to the surface will not be considered as leakage. Slow forming beads of water that result in minor dripping which can be proved to seal and dry up upon retesting under the prescribed test pressure will be considered acceptable. No more than one (1) retest will be permitted.

d. The manufacturer, at his option, shall be permitted to perform the above two (2) tests simultaneously. The test shall be performed with the joint in the one-half (1/2) inch deflected position and shall withstand thirteen (13) psi for ten (10) minutes, meeting all the leakage criteria described above.

e. Compliance with these test requirements shall constitute acceptance of the entire lot of pipe insofar as hydrostatic tests are concerned. In the event that a pipe section of pipe joint fails to withstand the required tests, either or both pieces of pipe will be rejected, and from the same lot, two (2) additional assemblies, each consisting of two (2) sections of pipe and their common joint, will be tested. If these two assemblies successfully pass the test, the remainder of pipe in the lot will be accepted, with the exception of these that have been previously rejected. If either or both assemblies fail, the entire lot shall be rejected, except that the manufacturer may, at his option, elect to test all those pipe sections previously untested, in the same manner as described above. Those satisfactorily passing the hydrostatic test will be accepted for use in this Contract. All rejected pipe shall be clearly identified to assure they are not incorporated in the work of this Contract.

f. Shipping of pipe prior to attaining the specified 28 day concrete strength is at the Contractor's risk. The Contractor shall remove for the site all pipes which do not achieve the 28 day strength or have been damaged.

g. No pipe shall be installed prior to the acceptance of the 28 day test results by the Engineer.

h. Any pipe at the site of the work found damaged in shipment, or pipe found not to fit properly or otherwise not meeting the Specifications will be rejected, regardless of any former acceptance or approval.

i. A lot as used herein is defined for pipe smaller than thirty (30) inches in diameter as two hundred (200) length of pipe or less, of identical type, class and size manufactured on one machine. For pipe thirty (30) inches in diameter and larger, a lot is defined as one hundred (100) length of pipe or less, of identical type, class and size.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval detailed drawings and data on pipe including class, reinforcing, joints, gaskets, specials, and method of manufacture. Submit these with Shop Drawings required under Section 15051.

B. Certificates: With the Shop Drawings submit certificates of compliance with the referenced standards.

C. Tests: Prior to the shipment of the pipe submit certified test reports.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle all pipe, fittings and accessories carefully with approved handling devices. Do not drop or roll pipe off trucks. Do not otherwise drop, roll or skid pipe. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved.

B. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

C. Pipe, fittings and accessories shall be unloaded opposite to or as close to the place where it is to be laid as is practical to avoid unnecessary handling. Interior shall be kept completely free from dirt and foreign matter.

PART 2 - PRODUCTS

2.1 DRAINAGE PIPING

A. Concrete pipe and fittings shall conform to ASTM C 76 Wall B latest revision. The pipe strength classification shall be Class IV except where shown otherwise on the Drawings.

B. Concrete pipe shall be designed to meet the strength class requirements listed in this Section or for greater strength because of excessive trench loads caused by the Contractor’s operations. All pipe shall be designed:

1. For an external live loading including impact, equal to AASHTO H 20 truck loading with earth cover as shown on the Drawings and as will exist during construction.

2. For the maximum trench loading encountered using a minimum soil density of 125 pcf.

C. The pipe interior shall be smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. The concrete mass shall be dense and uniform. Pipe shall be free of fractures.

D. Pipe lengths shorter than the standard lengths shall be supplied by the manufacturer to make connections to manholes and catch basins.

E. Joints shall be formed concrete bell and spigot joints with groove on the spigot for an O-ring rubber gasket. Joints and gaskets shall conform to ASTM C 443. The gasket shall be the sole element depended upon to make the joint flexible and watertight. Provide bell and spigot ends formed by steel joint rings where required for connection to other types of pipe and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install piping as shown and specified and in accordance with applicable requirements of Section 15051 and a recommended by the manufacturer.

2. Pipe, fittings and accessories that are bent, damaged, or not identified will be rejected.

3. Support existing drainage piping where shown on the drawings or where ordered by the Engineer.

4. Construct and maintain temporary site drainage pumpings, bypasses and piping so:

   a. The flow of storm water is not interrupted.

   b. The work is kept dry.

5. Contractor shall:

   a. Remove

   b. Reinstall

   c. Field cut

   existing site drainage piping where shown on the drawings or where ordered by the Engineer.

6. Contractor shall regulate equipment movement and construction operations so that the loading on new and existing pipe does not exceed the design loads for the pipe. Any pipe damaged during the construction operations shall be replaced at the Contractor's expense.

+ + END OF SECTION + +

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SECTION 33 14 17

SITE WATER UTILITY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Water Services, as shown on the Plans.

PART 2 – PRODUCTS

2.1 CORPORATION STOPS:

A. Corporation stops shall be Mueller "H-15000", or approved equal, and shall be equipped with the standard AWWA C800-66 inlet thread.

B. The maximum size corporation stop permitted in the barrel of Gray-Iron or Ductile- Iron Pipe, without the use of service clamps, shall be as follows:

Watermain Pipe Size (inches)	4	6	8	10	12	16
Tap Size (inches)	3/4	3/4	1	1-1/2	1-1/2	2

C. Connections larger than those appearing in the above table shall be made with a service clamp.

D. Service clamps shall be Mueller "Single Strap Mueller Corporation Stop Thread", or equal, for services 1-inch and smaller and Mueller "Double Strap Mueller Corporation Stop Thread", or equal, for service 1-1/4 inch and larger.

2.2 COPPER TUBING:

A. A continuous length of copper tubing shall be used between the corporation and curb stop, between curb stops, or between the curb stop and the blowoff, unless specifically permitted by the Engineer.

B. Copper Tubing shall be seamless, Type K, soft drawn, conforming to ASTM B88, and shall be used for all general water service connections in the nominal sizes of 3/4", 1", 1-1/2" and 2" unless otherwise specified.

Couplings for joining copper tubing shall be a Mueller "H15405", or approved equal.

2.2 PVC IRRIGATION PIPING:

A. PVC pipe shall be, SDR-PR; (Standard Dimension Ratio-Pressure Rated): ASTM D 2241, SDR-21

2.3 SERVICE BOXES:

A. Service boxes used with curb stops of 1-1/4-inch size and smaller shall be Buffalo type, Mueller “H-10350”, or approved equal.

B. All service boxes shall be telescopic and shall have a collapsed length of 4 feet and a fully extended length of at least 5-1/2 feet. Covers shall be furnished with the word "WATER" cast in and provided with a cover bolt.

C. Curb stops shall be the Mark II Oriseal type as manufactured by the Mueller Company, "H-15204", or approved equal.

2.4 PLASTIC FITTINGS

A. Provide fittings of the same size and pressure rating as the pipe to which they are connected.

B. Provide fittings as recommended by the pipe manufacturer to comply with the following: PVC Socket Type, Schedule 40: ASTM D 2466.

2.5 SOLVENT CEMENT AND JOINTS

A. Solvent Cement for Joining PVC Pipe and Fittings: ASTM D 2564.

B. Rubber Gasketed Joints: ASTM D 3139.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect pipe and fittings before installation. Remove defective materials from the site.

3.2 GENERAL

A. Install pipe in accordance with the manufacturer’s recommendations.

B. Underground Pipe: Install in accordance with ASTM D 2774.

C. PVC Pipe with Solvent Cemented Joints: Install in accordance with ASTM D 2855.

D. Pipe with Heat Fused Joints: Install in accordance with ASTM D 2657.

3.3 INSTALLATION

A. Install pipe as indicated on the Drawings.

B. Pipe in Trenches:

1. Keep trenches free from water.

2. Grade and shape trench bottom to insure a firm uniform bearing for the entire trench length. Provide a minimum cover of 4'-6" to finished grade unless otherwise shown on the drawings.

3. Cut pipe as recommended by the manufacturer.

4. Lay pipe on a continuously rising grade from low points to high points at service lines, air release valves or hydrants.

5. At each joint, dig a bell hole sufficiently wide and deep to allow the pipe barrel to bear uniformly on the trench bottom.

6. Construct concrete thrust blocks behind bends, tees, caps and plugs as shown on the drawings. Cast concrete against undisturbed earth.

3.4 PROTECTING PIPE

A. During the progress of the Work keep pipe clean from all sediment, debris, and other foreign material.

B. Close all open ends of pipes and fittings securely with removable plugs at end of Work day, during storms, when the Work is left at any time, and at such times as the Director's Representative may direct.

3.6 PERFORMANCE

A. Description: Before testing, backfill or otherwise brace the pipe barrels between joints to prevent movement under pressure.

B. Hydrostatic Test: Before testing, backfill or otherwise brace the pipe barrels between joints to prevent movement under pressure.

1. After the water main has been disinfected and before the pipe joints, fittings, valves, or other appurtenances are covered, expel and test

the water main for two hours at 1.5 times the pressure rating(s) listed for the various types of pipe specified in Part 2.

2. Remove all defective pipe, fittings, valves and appurtenances and replace with sound pipe, fittings, valves, or appurtenances, and repair all joints showing visible leaks until tight and repeat the test until satisfactory to the Director's Representative.

C. Leakage Test:

1. Conduct a leakage test after the pressure test has been satisfactorily completed.

2. Leakage is defined as the quantity of water to be supplied into the laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

3. The duration of each leakage test shall be two hours.

4. During the leakage test subject the pipe to its rated pressure.

5. No pipe installation will be accepted until the leakage is not more than the number of gallons per hour as determined by the following formula:

$$\frac{L - ND \times \text{the square root of } P}{7400}$$

in which:

L = allowable leakage in gallons per hour

N = number of joints in length of pipe line tested

D = nominal diameter of pipe, inches

P = average test pressure during the leakage test (PSI)

6. Should any test of pipe disclose leakage greater than that computed by the above formula, locate and repair the defects so that the leakage is within the specified allowance. The hydrostatic and leakage tests shall be made on such lengths of pipe and in such manner as the Director's Representative shall direct and in their presence. Keep trenches free from water to the satisfaction of the Director's Representative until the completion of the tests.

D. Connections:

1. Make connections between the pipe lines installed under this contract and the existing pipe lines or structures shown on the drawings. Should it be impossible to make a connection shown on the drawings because the pipe with which the connection is shown to be made has not yet been installed, lay the pipe to a point directed by the Engineer and plug or cap the end in a satisfactory manner; identify the terminal point with a stake extending above ground marked to indicate the pipe size and service.

+ + END OF SECTION + +

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SECTION 33 41 00

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 – GENERAL

1.1 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals as shown on the Contract Drawings, specified and required to install and place in satisfactory service polyvinyl chloride (PVC) conveyance pipe, high density polyethylene (HDPE) corrugated drainage pipe, polyethylene (PE) pressure pipe, fittings and specials.

2. The extent of piping is shown on the Contract Drawings..

B. Coordination:

1. Review installation procedures under other Sections and Contracts and coordinate with the Work that is related to this Section.

C. Related Work Specified Elsewhere:

1. Section 33 05 20, Buried Piping Installation

1.2 QUALITY ASSURANCE

A. Source Quality Control: Obtain each type of pipe and fittings from one manufacturer.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM D 1598, Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.

2. ASTM D 1599, Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings.

3. ASTM D 1784, Rigid Poly (Vinyl Chloride) PVC Compounds and Chlorinated Poly (Vinyl Chloride) PVC Compounds.

4. ASTM D 1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.

5. ASTM D 2122, Determining Dimensions of Thermoplastic Pipe and Fittings.

6. ASTM D 2467, Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

7. ASTM D 2564, Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

8. ASTM D 2774, Underground Installation of Thermoplastic Pressure Piping.

9. ASTM F 405, Standard Specification for Corrugated Polyethylene Pipe and Fittings.

10. ASTM F 667, Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.

11. ASTM D 2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

12. ASTM D 2513, Specifications for Thermoplastic Gas Pressure Systems.

13. Standard No. 14, National Sanitation Foundation.

14. American National Standards Institute (ANSI).

C. Shop Tests:

1. Piping manufacturer shall maintain a continuous quality control program. All PVC materials used to manufacture pipe and fittings under this Section shall be tested for conformance to the requirements of ASTM D 1784. All PE materials used to manufacture pipe and fittings under this section shall be tested for conformance to the requirements of ASTM D 2513. Contractor shall furnish the Engineer with certified test results.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Detailed procedures to be used in jointing and installing piping system, including manufacturer's recommendations.

2. Bill of materials indicating material composition of pipe, pressure rating, nominal size and its location on the piping installation drawings.

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Submit copies of all test reports.

C. Certificates: Submit certificates of compliance with referenced standards.

1.4 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Storage: All Pipe materials shall be stored off the ground in an area approved by the engineer. Do not store pipe in sunlight.

PART 2 - PRODUCTS

2.1 PVC GRAVITY DRAIN PIPE

A. All pipe, unless otherwise shown, shall be polyvinyl chloride (PVC) gravity pipe. Polyvinyl chloride pipe shall be made from Class 12454-B materials or better in accordance with ANSI/ASTM D1784. Pipe and fittings shall have an SDR classification of 35. PVC pipe and accessories shall conform to the requirements of ANSI/ASTM D3034 with a minimum pipe stiffness of 46 psi at a maximum deflection of 5%.

B. Polyvinyl chloride fittings and couplings shall conform to the requirements of the PVC pipe for classification and size. Rubber gaskets for elastomeric joints shall conform to ANSI/ASTM F477. Lubricant for the joints shall be furnished by the pipe manufacturer. The rubber gaskets shall be factory installed in the bell of the pipe, fittings and couplings. The plain end of the pipe shall be marked by the manufacturer to show the depth of penetration into the bell or coupling.

C. Provisions shall be made at the ends of each individual pipe length to receive and make the joint, as required.

D. Pipe shall be laid with bells up grade.

E. In laying the pipe, it shall be carefully lowered into the trench. Just prior to lowering the pipes, the surfaces of the joint rings shall be wiped clean and the joint rings and rubber gasket shall be liberally lubricated with an approved type of vegetable oil soap. The spigot end, with the gasket placed in the groove, shall be entered into the bell of the pipe already laid, making sure that both pipes are properly aligned. The pipe shall then be forced "home." Before the joint is fully "home" the position of the gasket in the joint shall be determined by means of a suitable feeler gauge supplied by the pipe manufacturer. If the gasket is found not to be in the proper position, the pipes shall be separated and the damaged gasket replaced.

F. Immediately after the pipe is brought to final position, it shall be thoroughly secured and properly bedded, and ample support shall be provided to prevent settlement or disturbances. If a laying box is employed in lieu of sheeting, care should be exercised to prevent disturbing the bedding and position of pipe when moving the box.

G. Manufacturer:

1. CertainTeed Corp.

2. Or approved equal.

2.2 CORRUGATED HDPE GRAVITY DRAIN PIPE

A. All high-density polyethylene (HDPE) drain pipe, unless otherwise shown, shall be corrugated, gravity, smooth wall pipe in accordance with ASTM F 405. Pipe shall exhibit a Manning's flow coefficient of 0.012, at a maximum. The pipe shall exhibit a minimum pipe stiffness of 40 psi and shall be rated for H-20 and E80 live loads at a burial depth of 24 inches below grade, in accordance with AASHTO procedures.

B. HDPE fittings shall be manufactured to the same standards as piping. Loading criteria for fittings shall meet standards established for piping.

C. Piping runs and fittings shall be coupled with factory-fabricated couplers, equipped with neoprene gaskets at each face. The couplers shall be equipped with coupling bands at each end and shall be installed and torqued to manufacturer's specifications and recommendations.

D. Immediately after the pipe is brought to final position, it shall be thoroughly secured and properly bedded, and ample support shall be provided to prevent settlement or disturbances. If a laying box is employed in lieu of sheeting, care should be exercised to prevent disturbing the bedding and position of pipe when moving the box.

E. Manufacturer:

1. Advanced Drainage Systems, Inc.

2. Or approved equal.

2.3 IDENTIFICATION

A. All pipe line materials shall be permanently marked with the following:

1. Name of manufacturer.

2. Date of manufacture.

3. Operating design pressure at operating design temperatu`0re.

4. Mark number to match Shop Drawings.

5. Type of pipe and nominal size.

6. Manufacturer's part number.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall inspect all piping to ensure that piping is free of defects in material and workmanship. The compatibility of all pipe, fittings and coating shall be verified.

+ + END OF SECTION + +

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SECTION 33 42 36

TRENCH DRAINS

PART 1 - GENERAL

1.1 REALTED WORK SPECIFIED ELSEWHERE

A. Cast-in-Place Concrete - Section 03 30 00.

1.2 SUBMITTALS

A. Shop Drawings: Show a schematic plan of the total drainage system including fabrication details.

B. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each item specified.

C. Samples: 6 inch long section of trench drain and grate.

D. Product Data:

1. Concrete Design Mix: Submit proposed concrete design mix together with name and location of batching plant at least 28 days prior to the start of concrete work.

2. Portland Cement: Brand and Manufacturer’s name.

3. Air-entraining Admixture: Brand and manufacturer’s name.

4. Water-reducing or High Range Water-reducing Admixture: Brand and manufacturer’s name.

5. Curing and Anti-Spalling Compound: Manufacturer’s specifications and application instructions.

E. Contract Closeout Submittals: Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director's Representative.

1.3 QUALITY ASSURANCE

A. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

PART 2 PRODUCTS

2.1 TRENCH DRAIN SYSTEM

A. Manufacturer

1. Trench drain shall be DuraTrench as manufactured by Eric'sons, 574C Industrial Way N., Dallas, GA 30132 - (770-505-6575), or approved equal.

B. Trench Body

1. The trench drain body shall be composed of polyester fiber reinforced polymer concrete. The trench shall have a 2" clear open throat and have a rounded or flat bottom as indicated in details. The trench body shall be gray in color to closely resemble the color of concrete and have a smooth interior for improved flow rates and reduced debris build-up. Sections shall be straight and 96" long (typical) and have a 2" receiving flange on the upstream end for receiving and sealing the trench sections together. Each of the sections shall be labeled to indicate proper flow and placement. The trench body shall mate to the frame and form a grate seat that shall accept the specified grate. The body shall be supplied with a factory fit top for rail alignment and fastening of the channels in the field ensuring that the rails are cast in a coplanar manner. The trench body shall have the following properties: 12,600 psi minimum tensile strength per ASTM C307, 12,000 psi. minimum compressive strength per ASTM C579, 26,500 psi minimum flexural strength per ASTM C580, less than 0.35% water absorption, shall be frost proof, salt proof, and be resistant to dilute acids and alkalis per ASTM C267. Trench drain shall be DuraTrench as manufactured by Eric'sons, 574C Industrial Way N., Dallas, GA 30132 - (770-505-6575), or approved equal.

C. Grating

Grating shall be Model 03E24SSB heel proof and ADA compliant stainless steel perforated grate. The perforations shall be no more than 1/4" diameter making the grate heel proof and compliant with the requirements of the Americans with Disabilities Act handbook section 4.5.4. The grate shall be made of 12 gauge, T304 or T316 stainless steel per ASTM-A240. The grate shall be 2.875" wide x 24" long x 0.5" thick and have a minimum load rating of DIN Class B.

D. Frame

1. Heavy duty load bearing frame constructed of 1/8" thick T304 or T316 stainless steel to accept 1/2" thick grates. Frames shall have 2"

x 1/4" diameter headed concrete anchors at 18" O.C. and shall have rigid metal installation devices securely affixed to the frame for leveling and aligning of the trench drain system. Frames shall provide for a minimum of 27.5 square inches of bearing area per grate. Frame shall conform to ASTM A-240. The frame is rated to support grates up to load class D.

E. Grate Locks

1. Grates shall be securely locked to frame with corrosion resistant stainless steel bolt and locking toggle.

F. Outlets

1. Trench shall outlet without restriction into a 2" pipe in the bottom of the trench.

G. Cast-In-Place Concrete: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi with a minimum of 611 pounds of cement per cubic yard, at the end of 28 days.

1. Design Air Content: ASTM C 260, and on the New York State Department of Transportation's current "Approved List"; 6 percent by volume plus or minus 1.5 percent.

2. Cement: ASTM C 150 Type I or II Portland cement. Minimum 6.5 bags or 611 pounds per cubic yard.

3. Water: Potable.

4. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the site. Except when a water-reducing admixture is used, maximum slump shall be 6 inches and when a high range water reducing admixture is used maximum slump shall be 8 inches.

5. Water-reducing Admixture: ASTM C 494 / C 494M-04 Type A and on the New York State Department of Transportation's current "Approved List".

6. High Range Water-reducing Admixture: ASTM C 494 / C 494M-04 Type F and on the New York State Department of Transportation's current "Approved List".

7. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting, and on the New York State Department of Transportation's current "Approved List".

PART 3 EXECUTION

3.1 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed instructions.

B. Concrete Placement: Protect grates and channel interior during pouring of concrete. Place concrete in a manner that will not dislodge the channels. Concrete shall be at finished level or 1/8" above the top of the channel to ensure efficient drainage and adequate channel edge protection.

C. Finishing and Clean-up: Following final set of concrete, remove grate protection, place grates in final position and engage locking bolts in correct location.

+ + END OF SECTION + +

APPENDIX I – GEOTECHNICAL REPORT - 2019

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Geotechnical Report

Westchester County
Playland Pool Rehabilitation

1 Playland Parkway
Rye, New York

September 4, 2019
Updated November 14, 2019

Prepared for:

Charles A. Manganaro Consulting Engineers, P.C.
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Tarrytown, NY 10591

and

D&B Engineers and Architects, P.C.
4 W Red Oak Ln Suite 315
White Plains, NY 10604

Prepared by:

SKYLANDS ENGINEERING, LLC
124 Milton Road
Sparta, NJ 07871

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11-14-19

Eugene J. Schwarzrock, Professional Engineer — Date
New York License No. 077007-1

TABLE OF CONTENTS

INTRODUCTION

This project consists of the design and rehabilitation of the existing pool at Playland Park, located at 1 Playland Parkway, in the City of Rye, Westchester County, New York. Also included in this project may be the design and construction of a new vehicular beach access ramp just south of the existing Playland bathhouse.

The existing pool has extensive cracking along the bottom and Westchester County desires to replace it entirely. The new pool will be similar size, 75 ft. wide x 150 ft. long x 0 ft. - 4.5 ft. deep, and will be located 25 ft. west of the existing pool. The site is generally flat, however grades surrounding the pool deck drop off ±2-3 ft. to the south, and ±2-5 ft. to the north. It is recommended to support the new pool on 40 ton piles supported on the underlying bedrock to preclude any future settlement and cracking of the new pool. In addition to the new pool, ancillary structures including a pool deck, retaining walls, a new pool equipment room, and surge tank will also be constructed as part of this project.

The proposed ramp will be constructed between an existing asphalt sidewalk leading from the parking lot down to the beach level. Currently a stone seawall topped by a fence supports and separates the sidewalk from the beach. This seawall appears to be ±10 ft. tall, based on aerial imagery. The new ramp will connect to the existing asphalt sidewalk, and run parallel to the seawall.

This Geotechnical Report presents the findings of a subsurface investigation program prepared and conducted by others, as well as recommendations for design and construction of the new pool, ancillary structures, and beach access ramp.

GEOLOGY

Based on our review of topographic maps and published geologic data for this area of Rye, including the *Surficial Geologic Map of New York - Lower Hudson Sheet*, 1989, by Cadwell, Connally, et. al. this site is expected to be underlain by glacial till consisting of a mixture of grain sizes ranging from clay and silt, to sand, cobbles and boulders. Underlying bedrock is expected to consist of hard gneiss of the Harrison formation, based on the Bedrock Geology of the Mamaroneck Quadrangle, N.Y., 1977, by Pelligrini. Bedrock is also expected to be relatively shallow, with outcrops visible nearby onshore and offshore.

SUBSURFACE INVESTIGATIONS

Soiltesting, Inc. of Oxford, CT performed a total of nine (9) borings during two (2) separate subsurface investigations to identify the subsurface conditions present around the pool and at the beach access ramp. On August 5 and 6, 2019 borings BP-1 through BP-4 were performed using a 4-¼ in. hollow stem auger on an asphalt path surrounding the top of the pool. These borings were sampled nearly continuously from the ground surface to the top of bedrock or auger refusal. Borings BR-1, BR-1A and BR-2 were drilled on the beach in the location of the proposed ramp, ±15 ft. east of the seawall, using a tripod rig and 2-⅜ in. steel casing. These borings were sampled generally at 5 ft. intervals beginning at existing grade.

On September 19, 2019 borings BP-5 and BP-6 were performed using a tripod rig from within the existing pool. The concrete slab was cored, then continuous split-spoon samples were collected to until spoon refusal was encountered.

Soil sampling was performed using a 2 in. O.D. split spoon sampler driven by a 140 lb. hammer with a 30 in. drop and the number of blows for each 6 in. increment was recorded, in accordance with procedures outlined in ASTM D1586, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. Bedrock was cored from all four (4) pool borings using an N-size core barrel in accordance with ASTM D 2113 - Standard Practice for Rock Core Drilling and Sampling. Soil samples were classified by an experienced geologist, generally in accordance with D.M. Burmister's "Suggested Test Methods for Identification of Soils" (ASTM, 1958). Bedrock samples were also classified by a geologist according to their geologic origin and measured rock quality designation (RQD). The borings were terminated at depths ranging from 14 ft. to 23 ft. at the pool, and 10.33 ft. to 13 ft. at the ramp.

Groundwater was recorded at each boring when it was first encountered since all the borings were performed without the introduction of water.

A Boring Location Plan and the boring logs are presented in the Appendix. The boring logs were amended by Skylands Engineering to include bedrock core recoveries and/or ground elevations, when available.

SUBSURFACE CONDITIONS

The soils encountered around the perimeter of the pool generally consist of between ±2 ft. and ±11.25 ft. of loose to dense, granular fill consisting of silty sands with gravel, and sporadic asphalt and cobbles. Standard penetration test (SPT) N-value ranged from 6 blows per foot (bpf) to 29 bpf. Underlying native soils generally consist of loose to dense, brown and gray medium to fine gravelly sand with minor amounts of silt. Bedrock is estimated to be present at depths ranging from ±9 ft. to ±18 ft. beneath the asphalt path. This determination is based on review of auger refusal, and bedrock core results.

The two (2) borings performed within the pool were located ±4 ft. below the asphalt path and encountered ±2.5 ft. of dark brown, loose to dense sandy gravelly silt. Boring BP-5 encountered dark brown, loose to dense coarse to fine sand beneath the silt. Spoon refusal, possibly indicating cobbles, boulders, or weathered bedrock, was encountered at a depth of 5.2 ft. and 2.9 ft. at borings BP-5 and BP-6, respectively. These depths are ±9.2 ft. and ±10 ft. below the elevation of the surrounding asphalt paths, which generally relates well with borings BP-1 through BP-4.

Reviewing the above boring logs, and considering the pool borings were advanced by split-spoon sampler only and the surrounding borings were advanced using an auger, we believe the bedrock surface appears shallowest in the southeast boring (B-4), then dropped in counterclockwise rotation around the pool. This is not a typical pattern for bedrock surfaces, and is believed to indicate a very erratic top of bedrock surface. Bedrock core recoveries ranged from 65% to 88%, with an average of 79.5%, which is considered to be good recovery for gneiss bedrock. Rock quality designations (RQDs) ranged from 13% to 67%, with an average of ±40%, which is considered to be poor quality. Groundwater was not encountered at any of the pool borings prior to the start of rock coring.

At the access ramp, the in situ soils consisted generally of loose to medium dense, light brown coarse to fine sand with fine gravel. Dark brown organic silt was encountered in boring BR-1A between the depths of ±9 ft. to ±10 ft., with light brown sandy silt continuing below this organic silt to casing refusal/ probable top-of-bedrock. Approximately 1 ft. of brown sandy silt was encountered at a depth of ±8 ft. in boring BR-2. Bedrock is estimated to be present at depths of 13 ft. and 10.33 ft, respectively, at borings

BR-1/1A and BR-2. This determination is based on casing refusal during installation. Groundwater was encountered at a depth of 2.5 ft. in both borings during drilling.

DESIGN RECOMMENDATIONS

POOL & ANCILLARY STRUCTURES

Based on the findings of the above-described subsurface investigation program, it is recommended that piles founded on or in bedrock may be used to support the new pool. The underlying gneissic bedrock will easily support 40 ton piles, thereby eliminating the possibility of future settlement. Piles will also eliminate the need to remove and remediate the deep and variable fills which exist beneath the pool. Depending on construction constraints, either 10 in. H-piles or drilled-in minipiles or micropiles are considered suitable for design. For design of end-bearing piles, an allowable bearing capacity of 20 tsf (F.S.=2) is recommended based on the reported rock type, core recoveries and RQD.

For rock-socketed minipiles/micropiles, an ultimate grout-to ground bond capacity of 300 psi is recommended for design, assuming the grout is placed only under gravity, without excess pressure. A minimum factor of safety of 2 for compression and 3 for any uplift is recommended to account for possible weak zones or jointing in the rock. The top 24 in. of rock should also be ignored to account for possibly highly fractured rock near the bedrock surface. A minimum rock socket length of 5 ft. below the top of bedrock surface is also recommended, with center-to-center spacing of micropiles a minimum of 3 times the nominal micropile diameter or 18 in., whichever is larger. End bearing should be ignored if rock sockets are used since the amount of settlement required to engage base capacity is much larger than that required to engage side capacity. The recommended frost depth for this area of New York is 42 in. below final exterior grade; therefore, the bottoms of pile caps should be constructed at, or below, this depth.

Based on these recommendations, it is estimated that 6 in. diam. gravity-grouted (Type A) micropiles designed in accordance with the New York State 2015 Building Code will develop sufficient compressive capacity of at least assuming a minimum embedment of 5 ft. into the bedrock. Actual micropile capacities shall be designed and demonstrated by the micropile subcontractor during the construction phase, and higher capacities may be achieved by simply increasing the length and/or diameter of the micropiles. Foundation and pool design should include consideration that groundwater may rise to the elevation of high tide. Standard corrosion protection by means of centralizers, dense grout mix, and adequate grout cover over reinforcing steel is considered sufficient to handle the expected mildly-corrosive environment given the proximity to saltwater intrusion. Minimum grout covers of 1 in. in soil, and 0.5 in bedrock are recommended, with centralizers spaced every 10 ft., and also within 5 ft. of the top and bottom of the reinforcement bar(s). Load tests of installed piles shall be performed, as required, in accordance with section 1810.3.3.1.2 of the Code.

Estimated settlements are expected to be negligible, with maximum total and differential settlements of <⅛ in. for properly sized piles. Settlement will be elastic (instantaneous), and mostly associated with pile shortening; no long term creep of the underlying bedrock is expected.

If the existing pool deck is performing satisfactorily and settlements are nonexistent or manageable thru grouting/lifting, then the new pool deck may be economically designed as a slab(s)-on-grade following removal of the top 24 in. of fill, compaction of the remaining fills, and placement of structural fill back

up to required grade. The subgrade should be compacted using a minimum double-drum walk-behind vibratory roller. A minimum of four (4) passes should be made with the compactor atop the underlying granular soils/fills, and until no further settlement is visible. This will compact the subgrade to a uniform density, and provide suitable and uniform support for the deck. Following these recommendations, a modulus of subgrade reaction, k, equal to 150 pci be used for design of the slabs on grade. If the pool deck has also experienced excessive movement and cracking, then smaller capacity micropiles are recommended to support the new deck.

Other ancillary structures such as new retaining walls, pool equipment room, and surge tank may be founded on conventional spread footings constructed at or below frost depth (42 in.). Surficial fill soils are present to varying depths around the new pool, therefore should the bottom of footing excavation end in fill soils, it is recommended to remove 1 ft. of the underlying fill, compact the bottom of the footings until no further settlement is observed, and then replace the over excavation with structural fill or compacted, clean crushed stone. The exception to this is the footings for the new surge tank, which should be founded on virgin soils expected to be present at the anticipated bottom of footings. If such virgin soils are deeper than these footings, then the existing fill soils should be removed and replaced with compacted structural fill. Footings constructed atop such improved subgrades, as well as all footings founded in virgin soils may be designed using an allowable bearing capacity of 2 tsf and a friction factor of 0.45. Settlement of these footings will be elastic (instantaneous) and are expected to be less than ¾ in. Otherwise, retaining walls and small building footings may be designed using the following soil properties:

<u>Fill</u>

Moist unit weight of soil,	γ_t = 115 pcf
Angle of internal friction,	ϕ = 28°
Lateral earth pressure coefficients:	K_a = 0.36
	K_p = 2.77

<u>Virgin soils</u>

Moist unit weight of soil,	γ_t = 115 pcf
Angle of internal friction,	ϕ = 32°
Lateral earth pressure coefficients:	K_a = 0.31
	K_p = 3.25

In accordance with the provisions of Section 1613.3.2 of the New York 2015 Building Code, and ASCE 7-16 Chapter 20, a seismic site class of C, very dense soil and soft rock, is recommended for design of the grandstand, based on the average conditions encountered below the pool, and assumed bedrock conditions present to a depth of 100 ft. Based on the project location, in conjunction with the above site class, the following seismic parameters follow from the Code:

S_s = 0.28	S_1 = 0.06
F_a = 1.3	F_v = 1.5
S_{MS} = 0.364	S_{M1} = 0.089
S_{DS} = 0.243	S_{D1} = 0.06

Seismic Design Category Based on Short Period Response Accelerations = B*
Seismic Design Category Based on 1-sec Period Response Accelerations = B*
* based on Risk Category III

There is no evidence of past slope instability and none is expected under static or seismic loading.

The soils at this site are non-liquefiable based on their suitably high relative density, silt content, and the depth to groundwater.

BEACH ACCESS RAMP

Based on the proximity of the proposed ramp to tidal waters subject to inundation, wave action, and scour, it is recommended the new ramp be supported on piles. While normally driven treated timber or coated H-piles would be suitable, the very shallow depth to bedrock will preclude their use here. Instead, small diameter drilled shafts are recommended since they may be socketed into the underlying bedrock to resist failure during severe scour events.

In order to finalize these recommendations, additional borings and bedrock cores are required to be obtained at the location of the proposed ramp. However, for estimating purposes only, assuming similar bedrock conditions exist here as were encountered beneath the pool, then similar design recommendations as listed above would be suitable for design of the proposed ramp foundation. Minimum shaft diameters will be dictated by moment forces on the shafts during full scour condition, and socket lengths should be evaluated against both axial capacity and lateral deflection requirements. Notwithstanding any contrary hydraulics data, it is recommended that scour to the top of bedrock be considered as one of the design cases.

CONSTRUCTION RECOMMENDATIONS

Pile design and installation should be performed by a qualified contractor with suitable experience on similar size projects.

The need for dewatering during construction of the pool may be minimal, based on the findings of no groundwater above bedrock.

Pile caps and footings shall not be constructed on frozen or overly wet subgrade materials. All frozen or saturated subgrade soil should be removed and replaced with compacted structural fill, or clean crushed stone, as required. In areas where the rock is within ±5 ft. of the bottom of the pool, it should first be removed by hydraulic rock equipment, hoe-rams, etc. so that pile and grade beam construction is not impeded.

During construction of the new pool deck, the subgrade should be inspected for the presence of overly loose or collapsible fill, wood, or other large deleterious material and any such material should be removed prior to placing structural fill.

Cobbles were only sporadically encountered throughout the area of work at the pool. Any cobbles or boulders encountered during construction should be removed so that no part protrudes into the bottom or sides of foundation excavations. Excavated cobbles and boulders may be placed in areas of general site fill, if any, so that they are deeper than 3 ft. below final grade. During such burial, they should be placed so that sufficient space is provided to achieve satisfactory compaction of additional soil fill around them.

If organic soils are encountered during excavation, they should be removed completely from beneath the limits of the pool and deck, and be replaced with compacted structural fill. Organic soils should not be used as structural or site fill, but should be either placed in areas of general site fill, or removed offsite.

Compacted structural fill should consist of predominately well-graded, coarse to fine sand and/or gravel with a maximum 10% non-plastic fines (material passing a No. 200 sieve) and be free of organics and other deleterious materials. Aggregate size should be no larger than 3 in. in the largest dimension to facilitate proper compaction. None of the near-surface fills are recommended for re-use due to the high silt content. Representative samples of any proposed fill material should be tested for gradation and moisture-density relationship prior to use to confirm its suitability.

Structural fill material should be placed in maximum 12 in. loose lifts and compacted to 95% of its maximum dry density at optimum moisture content as determined by the Modified Proctor Density Test (ASTM D1557). These operations should be performed under full-time geotechnical inspection and testing by either the Sand Cone Method (ASTM D1556), Nuclear Density Gauge (ASTM D2922 and D3012), or other moisture/density test methods. These density tests should be performed by an experienced geotechnical inspector at sufficient frequency and spacing to ensure proper compaction, with the following criteria suggested as guidelines:

Location	Minimum Frequency of Testing
Structural fill beneath foundations, adjacent to structures, beneath slabs-on-grade	1 test per lift every 2,500 SF (slabs-on-grade) 1 test per lift every 100 SF (col. footings) 1 test per lift every 25-50 LF (wall footings)
Utility trenches	1 test per lift every 50-100 LF min. 3 tests per day
General site fill (beyond building limits)	1 test each lift every 5,000 SF

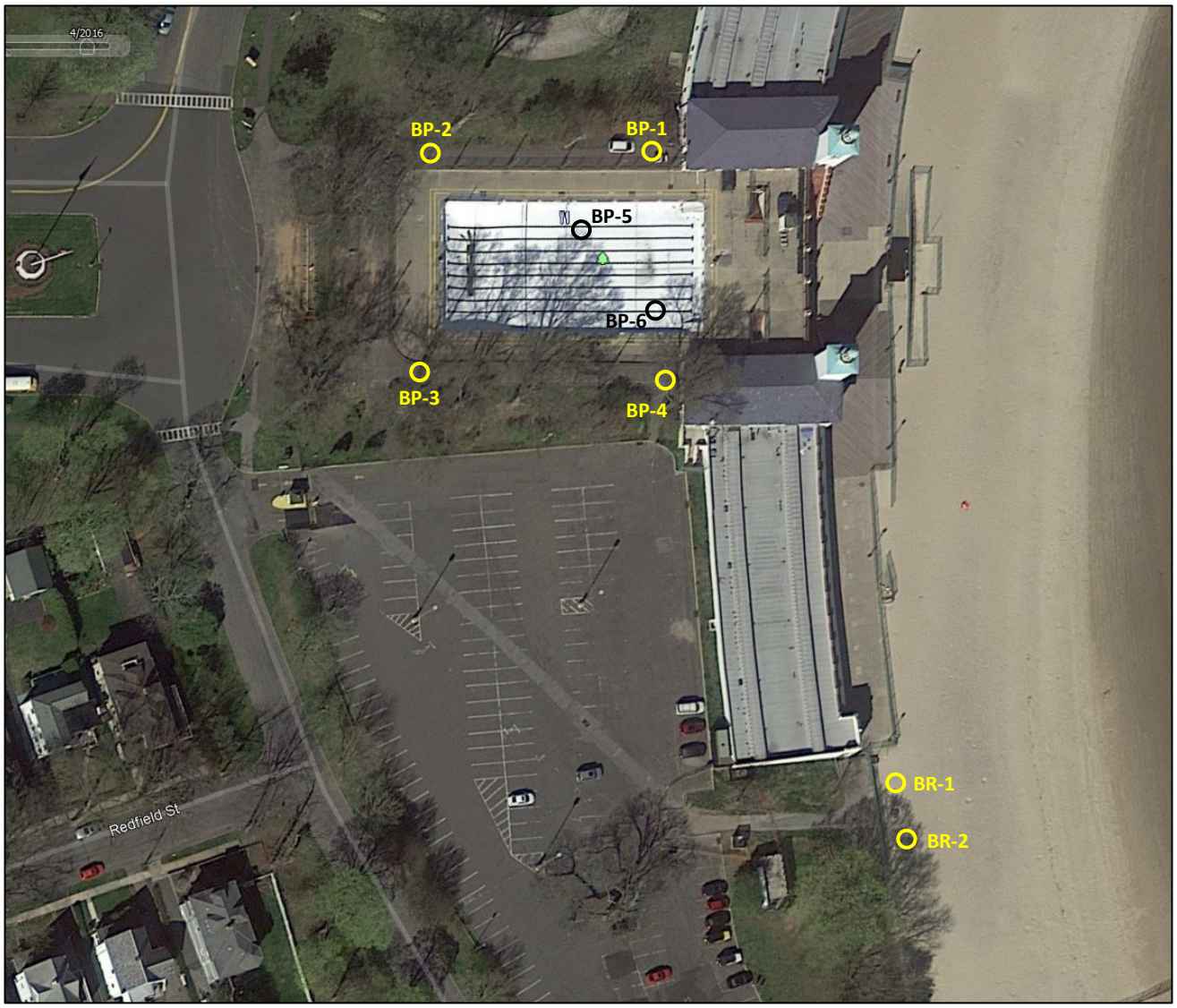
For excavations that extend deeper than 5 ft., sheeting, shoring, sloping, or benching of the excavation sidewalls is required per OSHA standards. Considering the anticipated space at this site during construction, all systems of support of excavation may be feasible for this project. While an OSHA-competent person has to confirm and assign soil type(s) during construction, for estimating and scheduling purposes the soils present on site may be assumed to be Type C and therefore would need to be sloped back at a 1.5H:1V (34°), per OSHA requirements. The range of soil parameters listed above under ancillary structures are recommended for the design of temporary sheeting or shoring.

All sheeting, shoring and bracing shall be designed by a professional engineer licensed in the State of New York. Shorter, unbraced excavations will likely experience localized instability (i.e., sloughing) if left open for more than a few hours due to the open gradation of some of the fill material and expected rapid loss of moisture.

It is recommended that all pile installation and subgrade preparation procedures be inspected by a qualified geotechnical engineer experienced with this type of construction.

APPENDIX

N



LEGEND

B-1 BORING

SCALE

N.T.S.

NOTES:

1. BASE IMAGERY © GOOGLE EARTH PRO, 8-26-2019

BORING LOCATION PLAN

PLAYLAND POOL REHABILITATION

1 PLAYLAND PARKWAY
RYE, NEW YORK

SKYLANDS ENGINEERING, LLC

124 MILTON ROAD
SPARTA, NJ 07871
CERTIFICATE OF AUTHORIZATION NO. 0013524

DATE: 10-9-2019

Boring Logs

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers	SHEET 1 OF 1 HOLE NO. BP-1
	PROJECT NO. G126-1319-19	
	PROJECT NAME #1 Playland Parkway	BORING LOCATIONS per Plan
FOREMAN - DRILLER MK/ao	LOCATION Rye NY	
INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING HSA, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 4 ¼", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	DATE START 8/6/19 DATE FINISH 8/6/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	14"	2'0"	5	7			dry		3" Asphalt
							11	11			compact		BlkBrn FM SAND, sm silt, lit FC gravel (fill)
		2	ss	24"	6"	4'0"	8	7			dry		SAME (fill)
							6	7			compact		
5		3	ss	24"	16"	6'0"	1	3			dry		GreyBrn F SAND, sm silt, tr F gravel (fill)
							3	4			loose		
		4	ss	24"	16"	8'0"	3	5			dry		SAME (fill)
							2	5			loose		
		5	ss	24"	8"	10'0"	8	7			moist		GreyBrn FMC SAND, sm FC gravel,tr silt, tr roots (fill)
10							8	6			compact		Brn F SAND & SILT, tr F gravel, brick fragments (fill)
		6	ss	24"	14"	12'0"	6	6			moist	11'3"	
							7	7			compact		Brn FMC SAND , lit silt, tr F gravel
		7	ss	24"	16"	15'0"	11	14			dry		Brn F SAND, tr FC gravel
15							15	59			compact		
		8	ss	4"	3"	15'4"	100/4"				dry		SAME
											v dense	17'6"	
												18'0"	Fractured BEDROCK Auger refusal
		1	c	60"	39"	23'0"	RQD= 15%			2			BEDROCK (Gniess) with partly decomposed layers
20							Rec.=65%			3			
										2			
										3			
										2		23'0"	
25													E.O.B 23'0"
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BP-1**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers PROJECT NO. G126-1319-19 PROJECT NAME #1 Playland Parkway LOCATION Rye NY	SHEET 1 OF 1 HOLE NO. BP-2 BORING LOCATIONS per Plan
FOREMAN - DRILLER MK/ao INSPECTOR		
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT __FT AFTER __HOURS	TYPE: CASING HSA, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 4 ¼", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	OFFSET DATE START 8/6/19 DATE FINISH 8/6/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	24"	2'0"	8 / 9		dry		3" Asphalt
							14 / 49		compact		Blk FMC SAND, sm silt, sm FC gravel (fill)
		2	ss	3"	3"	2'3"	100/3"		dry		Grey FMC SAND, sm FC gravel, cobbles
									v dense		
5		3	ss	24"	14"	6'0"	8 / 8		dry		Brn FM SAND, s, FC gravel, tr silt
							10 / 12		compact		
		4	ss	13"	10"	7'1"	14 / 3		moist		GreyBrn FMC SAND, lit FC gravel, tr silt
							50/1"		v dense		
		1	c	60"	0"	12'6"	RQD= 0%	2		8'6"	Auger refusal
10								1			Fractured partially weathered BEDROCK or boulders
								2			
								3			
								1			
		5	ss	1"	0"	12'6"	100/1"		v dense		No recovey
15										15'0"	
		2	c	60"	49"	20'0"	RQD=47%	2			BEDROCK (Gniess)
							Rec.=82%	3			
								2			Set 3" FW Casing at 15'
								3			
20								2		20'0"	
											E.O.B 20'0"
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. BP-2

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers	SHEET 1 OF 1 HOLE NO. BP-3
	PROJECT NO. G126-1319-19	
	PROJECT NAME #1 Playland Parkway	BORING LOCATIONS per Plan
FOREMAN - DRILLER MK/ao	LOCATION Rye NY	
INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING HSA, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 4 ¼", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	DATE START 8/5/19 DATE FINISH 8/5/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	8"	4"	0'8"	3	50/2"			dry		3" Asphalt
													BlkGrey FM SAND, lit FC gravel
		2	ss	24"	12"	4'0"	15	10			dry		BlkBrn FM SAND, sm FC gravel, tr cobbles (fill)
							14	10			compact		
5		3	ss	24"	18"	6'0"	29	37			dry		Brn FM SAND, sm FC gravel
							18	11			v dense		SAME
		4	ss	24"	20"	8'0"	18	9			moist		
							11	8			compact		GreyBrn FM SAND, sm FC gravel, tr silt
		5	ss	24"	16"	10'0"	11	22			moist		
10							17	24			dense		
		6	ss	9"	8"	10'9"	40	50/3"			dry		SAME
												12'0"	Auger refusal
		1	c	60"	53"	17'0"	RQD= 13%			2			BEDROCK (Gniess)
							Rec.=88%			3			
15										2			
										3			
										2		17'0"	
													E.O.B 17'0"
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BP-3**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers	SHEET 1 OF 1 HOLE NO. BP-4
	PROJECT NO. G126-1319-19	
	PROJECT NAME #1 Playland Parkway	BORING LOCATIONS per Plan
FOREMAN - DRILLER MK/ao	LOCATION Rye NY	
INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING HSA, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 4 ¼", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	DATE START 8/5/19 DATE FINISH 8/5/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	18"	2'0"	8 / 14		dry compact		3" Asphalt BlkBrn FM SAND, sm FC gravel, tr concrete/asphalt (fill)
							15 / 17		dry	3'0"	
		2	ss	24"	16"	4'0"	30 / 25		dense		Brn FM SAND, sm FC gravel
							18 / 14		dry		Brn FM SAND, sm FC gravel, tr silt
5		3	ss	24"	16"	6'0"	12 / 17		compact		
							10 / 22			7'0"	Brn FM SAND, sm FC gravel, tr cobbles
		4	ss	15"	12"	7'3"	62 / 27				cobbles, boulders, &/or fractured BEDROCK
							50/3"			9'0"	Auger refusal
		5	ss	2"	1"	8'2"	100/2"				BEDROCK (Gniess)
10		1	c	60"	50"	14'0"	RQD=67 %				
							Rec.=83%			14'0"	
15											E.O.B 14'0"
20											
25											
30											
35											
40											

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BP-4**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers PROJECT NO. G126-1319-19 PROJECT NAME #1 Playland Parkway LOCATION Rye NY	SHEET 1 OF 1 HOLE NO. BP-5 BORING LOCATIONS per Plan
FOREMAN - DRILLER JK/nk INSPECTOR		
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT __FT AFTER __HOURS		OFFSET DATE START 9/16/19 DATE FINISH 9/19/19 SURFACE ELEV. _____ * GROUND WATER ELEV.

	CASING	SAMPLER	CORE BAR
TYPE		SS	NQ2
SIZE I.D.		1 3/8"	2"
HAMMER WT.		140#	BIT
HAMMER FALL		30"	dia

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
													8" Concrete Slab
		1	ss	24"	3"	2'8"	10	25			dry		DkBrnBlk SILT, sm F sand, sm F gravel
							10	3			dense		DkBrnBlk FMC SAND & FC GRAVEL
		2	ss	21"	11"	4'5"	5	6			dry		DkBrn FMC SAND, sm F gravel, tr silt (weathered rock frags in tip)
5							24	50/3"			compact		
		3	ss	9"	5"	5'2"	50	50/3"				5'2"	Spoon refusal
													E.O.B 5'2"
10													
15													
20													
25													
30													
35													* Approx 4' below patio level
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BP-5**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers PROJECT NO. G126-1319-19 PROJECT NAME #1 Playland Parkway LOCATION Rye NY	SHEET 1 OF 1 HOLE NO. BP-6 BORING LOCATIONS per Plan
FOREMAN - DRILLER JK/nk INSPECTOR		
GROUND WATER OBSERVATIONS AT none FT AFTER 0 HOURS AT FT AFTER HOURS		

	CASING	SAMPLER	CORE BAR
TYPE	HSA	SS	NQ2
SIZE I.D.	4 ¼"	1 3/8"	2"
HAMMER WT.		140#	BIT
HAMMER FALL		30"	dia

OFFSET
DATE START 9/16/19
DATE FINISH 9/19/19
SURFACE ELEV. *
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC.	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
													8" Concrete slab
		1	ss	24"	12"	2'8"	7	5			moist		DkBrn SILT, sm F sand, tr cinders, tr F gravel
							3	2			loose		DkBrnBlk SILT lit F sand, tr F gravel (weathered rock frags in tip)
		2	ss	3"	3"	2'11"	50/3"				moist	2'11"	Spoon refusal
5													E.O.B 2'11"
10													
15													
20													
25													
30													
35													* Approx 4' below patio level
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BP-6**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS C = COARSE

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER M = MEDIUM

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50% F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers	SHEET 1 OF 1 HOLE NO. BR-1
	PROJECT NO. G126-1319-19	
	PROJECT NAME #1 Playland Parkway	BORING LOCATIONS per Plan
FOREMAN - DRILLER JK/sd	LOCATION Rye NY	
INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT 2'6" FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING BW, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 2 3/8", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	DATE START 8/5/19 DATE FINISH 8/5/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	BR-1	1	ss	24"	12"	2'0"	1	2			dry v loose		LtBrn FM SAND
							2	4				2'6"	Casing refusal
5													possible fill E.O.B 2'6"
	BR-1A												BR-1A (5' East of BR-1)
												3'0"	Casing refusal
5													possible fill E.O.B 3'0"
10													
	BR-1B												BR-1B (5' East of BR-1A
													LtBrn FMC SAND & F GRAVEL
5													
		2	ss	27"	10"	7'0"	6	8			wet compact		LtBrn FMC SAND & F GRAVEL
							11	13					
												9'0"	
10												10'0"	DkBrn organic SILT
		3	ss	24"	14"	12'0"	7	5			wet compact		LtBrn SILT, lit F sand
							7	7				13'0"	Casing refusal
15													E.O.B 13'0"
20													
25													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BR-1**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 90 DONOVAN RD. OXFORD, CT 06478 CT (203) 262-9328 NY (914) 946-4850	CLIENT: Charles A. Manganaro Consulting Engineers PROJECT NO. G126-1319-19 PROJECT NAME #1 Playland Parkway LOCATION Rye NY	SHEET 1 OF 1 HOLE NO. BR-2 BORING LOCATIONS per Plan 25' from wall
FOREMAN - DRILLER JK/sd INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT 2'6" FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING BW, SAMPLER SS, CORE BAR NQ2 SIZE I.D.: 2 ⅜", 1 3/8", 2" HAMMER WT.: 140#, BIT HAMMER FALL: 30", dia	DATE START 8/5/19 DATE FINISH 8/5/19 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12- 18	CORE TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	13"	2'0"	1	2			dry		LtBrn FM SAND, lit C sand
							4	12			loose		
5		2	ss	24"	8"	7'0"	47	24			wet		LtBrn FMC SAND & F GRAVEL
							18	14			dense		
												8'0"	
		1 wash sample 8-9'										9'0"	LtBrn sandy SILT
10													LtBrn FM SAND, lit weathered/decomposed rock fragments
		3	ss	2"	2"	10'2"	100/2"				wet	10'4"	Casing refusal
15													E.O.B 10'4"
20													
25													
30													
35													
40													

NOTE: Subsoil conditions revealed by this investigation represent conditions at specific locations and may not represent conditions at other locations or times.

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. **HOLE NO. BR-2**

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PROPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE

M = MEDIUM

F = FINE

Rock Core Photo

Figure 1 - Rock Core Samples - B-4 C-1, B-3 C-1, B-1 C-1, B-2 C-1

NO TEXT ON THIS PAGE

APPENDIX II – SOIL SAMPLE LABORATORY ANALYSIS

NO TEXT ON THIS PAGE

Berkshire Environmental
Services & Technology, LLC

REVISED
September 29, 2020

Mr. James DeAngelis
Soiltesting, Inc.
90 Donovan Road
Oxford, Connecticut 06478

Re: Soil Sample Laboratory Analysis
1 Playland Park, Rye, New York

Dear Mr. DeAngelis,

Berkshire Environmental Services & Technology, LLC (Berkshire) was retained by Soiltesting, Inc. (Soiltesting) to submit soil samples for laboratory analysis and prepare an analytical summary letter in accordance with Berkshire's proposal dated September 12, 2019. Berkshire submitted two (2) soil samples for laboratory analysis from two (2) soil borings completed by Soiltesting.

Soil samples were submitted for analysis of volatile organic compounds (VOCs) via EPA Method 8260 and semi-volatile organic compounds (SVOCs) via EPA Method 8270.

Analytical data for soil samples collected from the soil borings were compared to the Soil Cleanup Objectives (SCOs) as outlined in §375-6 of the New York State Department of Environmental Conservation (NYSDEC) Remedial Program Soil Cleanup Objectives and NYSDEC Soil Cleanup Guidance Policy CP-51.

Two (2) soil borings (BP-5 and BP-6) were advanced on the Site by Soiltesting. Soil borings were conducted utilizing a tripod-mounted drilling system. Split spoon samples were collected at 2-foot intervals to a pre-determined depth or spoon refusal by Soiltesting. Each split spoon soil sample was field screened with a photoionization detector (PID) for the presence of volatile organic compounds. No PID responses were recorded in any of the soil samples. Soiltesting personnel also recorded soil lithologies and specific boring information.

Soil samples were subsequently submitted for laboratory analysis to Phoenix Environmental Laboratories (Phoenix) of Manchester, Connecticut under proper chain of custody protocol. Phoenix is a New York-certified laboratory (Certification #11301). One (1) grab soil sample from each boring was submitted from discrete intervals based on field observations and submitted for analysis of volatile organic compounds (VOCs) via EPA Method 8260. One (1) composite sample from each boring was also submitted for analysis of semi-volatile organic compounds (SVOCs) via EPA Method 8270.

Representative samples submitted for analysis of VOCs were selected based on visual observations of the soil collected. Soil samples submitted for VOC analysis were discrete grab samples collected with disposable core samplers. The samples were subsequently placed into pre-weighed, laboratory-

preserved vials containing methanol and deionized water in accordance with EPA Method 5030 / 5035. All soil samples were placed into a cooler and maintained at 4°C until pick-up by laboratory courier under proper chain of custody protocol.

The laboratory analytical results were compared to the NYSDEC Soil Cleanup Objectives (SCOs) for Unrestricted Use, as defined in 6NYCRR Part 375-6.3 and tabulated in Part 375-6.8 as well as the Supplemental SCOs tabulated in Table 1 of the NYSDEC CP-51/Soil Cleanup Guidance.

Numerous VOCs and SVOCs were detected in the samples collected from soil borings BP-5 and BP-6. The analytical results revealed that the detected concentrations VOCs and SVOCs were all below the SCOs with the exception of Chloroform. Chloroform was detected in sample BP-5 at a concentration of 950 micrograms per kilogram (µg/kg) and at a concentration of 640 µg/kg in sample BP-6, which exceed the SCO of 370 µg/kg.

A summary of the laboratory analytical results is outlined on Table 1. Table 1 and the completed laboratory analytical report are attached.

Thank you for the opportunity to be of service to you. If you have any questions or require additional information please contact me at your earliest convenience

Sincerely yours,
Berkshire Environmental Services & Technology, LLC

Matthew Prelli
Principal / Project Manager

REVISED: September 29, 2020 – Original Letter Report dated September 30, 2019.

attachments

Z:\Projects 11200-11250\11229 - Soil Testing (Rye)\2754-Soiltestletter-REV1.docx

Table 1
Soil Sample Results Summary
1 Playland Park
Rye, New York

Sample Identification	Unrestricted Use SCO	BP-5	BP-6
Sample Depth		**0-4.5'**	**0-2.5'**
Sample Date		**9/16/2019**	**9/16/2019**
VOCs (µg/kg)			
1,2,4-Trimethylbenzene	3,600	230	ND<4.7
Acetone	50	29	ND<24
Chloroform	370	**950**	**640**
Total Xylenes	260	7.4	ND<4.7
Tetrahydrofuran	NE	34	18
SVOCs (µg/kg)			
Benzo(a)anthracene	1,000	ND<250	280
Bis(2-ethylhexyl)phthalate	50,000	15,000	14,000
Chrysene	1,000	ND<250	300
Fluoranthene	30,000	340	600
Phenanthrene	100,000	280	500
Pyrene	100,000	270	480

Notes:
ug/kg = micrograms per kilogram = parts per billion = ppb
SCO = Soil Clean-up Objective from 6NYCRR Subpart 375-6 and CP-51
ND<3.0 - not detected at or above the specified laboratory analytical concentration
NE = not established in Subpart 375-6 or CP-51
Bold = Concentration exceeds SCO

Berkshire Environmental Services & Technology, LLC

PHOENIX
Environmental Laboratories, Inc.

Sunday, September 29, 2019

Attn: Matt Prelli
Berkshire Environmental
214 East Elm Street
Torrington, CT 06790

Project ID: PLAYLAND PARK POOL
SDG ID: GCE13166
Sample ID#s: CE13166 - CE13169

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Sample Id Cross Reference

September 29, 2019

SDG I.D.: GCE13166

Project ID: PLAYLAND PARK POOL

Client Id	Lab Id	Matrix
BP-5	CE13166	SOIL
BP-6	CE13167	SOIL
TRIP BLANK HL	CE13168	SOIL
TRIP BLANK LL	CE13169	SOIL

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

September 29, 2019

FOR: Attn: Matt Prelli
Berkshire Environmental
214 East Elm Street
Torrington, CT 06790

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		09/19/19	9:40
Location Code:	BERK-ENV	Received by:	SW	09/19/19	15:38
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCE13166
Phoenix ID: CE13166

Project ID: PLAYLAND PARK POOL
Client ID: BP-5

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Solid	92		%		09/19/19	VT	SW846-%Solid
Soil Extraction for SVOA	Completed				09/20/19	V/R/UL	SW3545A
Volatiles							
1,1,1,2-Tetrachloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,1-Trichloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,2-Trichloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloroethene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloropropene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,3-Trichloropropane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,4-Trimethylbenzene	230	170	ug/Kg	50	09/22/19	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dibromoethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichlorobenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichloroethane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichloropropane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3-Dichlorobenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3-Dichloropropane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,4-Dichlorobenzene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
2,2-Dichloropropane	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
2-Chlorotoluene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C
2-Hexanone	ND	29	ug/Kg	1	09/22/19	JLI	SW8260C
2-Isopropyltoluene	ND	5.7	ug/Kg	1	09/22/19	JLI	SW8260C 1

Project ID: PLAYLAND PARK POOL
Client ID: BP-5

Phoenix I.D.: CE13166

Parameter	Result		RL/ PQL	Units	Dilution	Date/Time	By	Reference	
4-Chlorotoluene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
4-Methyl-2-pentanone	ND		29	ug/Kg	1	09/22/19	JLI	SW8260C	
Acetone	29	S	29	ug/Kg	1	09/22/19	JLI	SW8260C	
Acrylonitrile	ND		11	ug/Kg	1	09/22/19	JLI	SW8260C	
Benzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromobenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromochloromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromodichloromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromoform	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromomethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon Disulfide	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon tetrachloride	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chlorobenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroform	950		430	ug/Kg	50	09/22/19	JLI	SW8260C	
Chloromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,2-Dichloroethene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,3-Dichloropropene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromochloromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromomethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dichlorodifluoromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Ethylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Hexachlorobutadiene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Isopropylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
m&p-Xylene	7.4		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl Ethyl Ketone	ND		29	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl t-butyl ether (MTBE)	ND		11	ug/Kg	1	09/22/19	JLI	SW8260C	
Methylene chloride	ND		11	ug/Kg	1	09/22/19	JLI	SW8260C	
Naphthalene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Butylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Propylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
o-Xylene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
p-Isopropyltoluene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
sec-Butylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Styrene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
tert-Butylbenzene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrachloroethene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrahydrofuran (THF)	34		11	ug/Kg	1	09/22/19	JLI	SW8260C	1
Toluene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Total Xylenes	7.4		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,2-Dichloroethene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,3-Dichloropropene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,4-dichloro-2-butene	ND		11	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichloroethene	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorofluoromethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorotrifluoroethane	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Vinyl chloride	ND		5.7	ug/Kg	1	09/22/19	JLI	SW8260C	
QA/QC Surrogates									
% 1,2-dichlorobenzene-d4	108			%	1	09/22/19	JLI	70 - 130 %	

Ver 1

Project ID: PLAYLAND PARK POOL
Client ID: BP-5

Phoenix I.D.: CE13166

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
% Bromofluorobenzene	89		%	1	09/22/19	JLI	70 - 130 %
% Dibromofluoromethane	93		%	1	09/22/19	JLI	70 - 130 %
% Toluene-d8	100		%	1	09/22/19	JLI	70 - 130 %
% 1,2-dichlorobenzene-d4 (50x)	99		%	50	09/22/19	JLI	70 - 130 %
% Bromofluorobenzene (50x)	95		%	50	09/22/19	JLI	70 - 130 %
% Dibromofluoromethane (50x)	95		%	50	09/22/19	JLI	70 - 130 %
% Toluene-d8 (50x)	101		%	50	09/22/19	JLI	70 - 130 %
Semivolatiles							
1,2,4,5-Tetrachlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
1,2,4-Trichlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
1,2-Dichlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
1,2-Diphenylhydrazine	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
1,3-Dichlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
1,4-Dichlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,4,5-Trichlorophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,4,6-Trichlorophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,4-Dichlorophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,4-Dimethylphenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,4-Dinitrophenol	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
2,4-Dinitrotoluene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2,6-Dinitrotoluene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2-Chloronaphthalene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2-Chlorophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2-Methylnaphthalene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2-Methylphenol (o-cresol)	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
2-Nitroaniline	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
2-Nitrophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
3,3'-Dichlorobenzidine	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
3-Nitroaniline	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
4,6-Dinitro-2-methylphenol	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
4-Bromophenyl phenyl ether	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
4-Chloro-3-methylphenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
4-Chloroaniline	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
4-Chlorophenyl phenyl ether	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
4-Nitroaniline	ND	570	ug/Kg	1	09/22/19	PS	SW8270D
4-Nitrophenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Acenaphthene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Acenaphthylene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Acetophenone	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Aniline	ND	360	ug/Kg	1	09/22/19	PS	SW8270D
Anthracene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benz(a)anthracene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzidine	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzo(a)pyrene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzo(b)fluoranthene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzo(ghi)perylene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzo(k)fluoranthene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D
Benzoic acid	ND	710	ug/Kg	1	09/22/19	PS	SW8270D

Project ID: PLAYLAND PARK POOL
Client ID: BP-5

Phoenix I.D.: CE13166

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Benzyl butyl phthalate	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Bis(2-chloroethoxy)methane	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Bis(2-chloroethyl)ether	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Bis(2-chloroisopropyl)ether	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Bis(2-ethylhexyl)phthalate	15000	2500	ug/Kg	10	09/23/19	PS	SW8270D	
Carbazole	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Chrysene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Dibenz(a,h)anthracene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Dibenzofuran	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Diethyl phthalate	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Dimethylphthalate	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Di-n-butylphthalate	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Di-n-octylphthalate	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Fluoranthene	340	250	ug/Kg	1	09/22/19	PS	SW8270D	
Fluorene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Hexachlorobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Hexachlorobutadiene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Hexachlorocyclopentadiene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Hexachloroethane	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Indeno(1,2,3-cd)pyrene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Isophorone	ND	2100	ug/Kg	1	09/22/19	PS	SW8270D	
Naphthalene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Nitrobenzene	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
N-Nitrosodimethylamine	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
N-Nitrosodi-n-propylamine	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
N-Nitrosodiphenylamine	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Pentachloronitrobenzene	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Pentachlorophenol	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
Phenanthrene	280	250	ug/Kg	1	09/22/19	PS	SW8270D	
Phenol	ND	250	ug/Kg	1	09/22/19	PS	SW8270D	
Pyrene	270	250	ug/Kg	1	09/22/19	PS	SW8270D	
Pyridine	ND	360	ug/Kg	1	09/22/19	PS	SW8270D	
QA/QC Surrogates								
% 2,4,6-Tribromophenol	50		%	1	09/22/19	PS	30 - 130 %	
% 2-Fluorobiphenyl	56		%	1	09/22/19	PS	30 - 130 %	
% 2-Fluorophenol	51		%	1	09/22/19	PS	30 - 130 %	
% Nitrobenzene-d5	59		%	1	09/22/19	PS	30 - 130 %	
% Phenol-d5	64		%	1	09/22/19	PS	30 - 130 %	
% Terphenyl-d14	53		%	1	09/22/19	PS	30 - 130 %	
% 2,4,6-Tribromophenol (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
% 2-Fluorobiphenyl (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
% 2-Fluorophenol (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
% Nitrobenzene-d5 (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
% Phenol-d5 (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
% Terphenyl-d14 (10x)	Diluted Out		%	10	09/23/19	PS	30 - 130 %	
Field Extraction	Completed				09/19/19		SW5035A	1

Project ID: PLAYLAND PARK POOL
Client ID: BP-5

Phoenix I.D.: CE13166

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

S - Laboratory solvent, contamination is possible.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

September 29, 2019

Reviewed and Released by: Phyllis Shiller, Laboratory Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

September 29, 2019

FOR: Attn: Matt Prelli
Berkshire Environmental
214 East Elm Street
Torrington, CT 06790

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		09/19/19	8:36
Location Code:	BERK-ENV	Received by:	SW	09/19/19	15:38
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCE13166
Phoenix ID: CE13167

Project ID: PLAYLAND PARK POOL
Client ID: BP-6

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Percent Solid	86		%		09/19/19	VT	SW846-%Solid
Soil Extraction for SVOA	Completed				09/20/19	V/R/UL	SW3545A
Volatiles							
1,1,1,2-Tetrachloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,1-Trichloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1,2-Trichloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloroethene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,1-Dichloropropene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,3-Trichloropropane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dibromoethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,2-Dichloropropane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3-Dichlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,3-Dichloropropane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
1,4-Dichlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
2,2-Dichloropropane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
2-Chlorotoluene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C
2-Hexanone	ND	24	ug/Kg	1	09/22/19	JLI	SW8260C
2-Isopropyltoluene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C

1

Project ID: PLAYLAND PARK POOL
Client ID: BP-6

Phoenix I.D.: CE13167

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
4-Chlorotoluene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
4-Methyl-2-pentanone	ND	24	ug/Kg	1	09/22/19	JLI	SW8260C	
Acetone	ND	24	ug/Kg	1	09/22/19	JLI	SW8260C	
Acrylonitrile	ND	9.4	ug/Kg	1	09/22/19	JLI	SW8260C	
Benzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromochloromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromodichloromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromoform	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromomethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon Disulfide	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon tetrachloride	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chlorobenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroform	640	320	ug/Kg	50	09/24/19	JLI	SW8260C	
Chloromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,2-Dichloroethene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,3-Dichloropropene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromochloromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromomethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Dichlorodifluoromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Ethylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Hexachlorobutadiene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Isopropylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
m&p-Xylene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl Ethyl Ketone	ND	24	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl t-butyl ether (MTBE)	ND	9.4	ug/Kg	1	09/22/19	JLI	SW8260C	
Methylene chloride	ND	9.4	ug/Kg	1	09/22/19	JLI	SW8260C	
Naphthalene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Butylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Propylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
o-Xylene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
p-Isopropyltoluene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
sec-Butylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Styrene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
tert-Butylbenzene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrachloroethene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrahydrofuran (THF)	18	9.4	ug/Kg	1	09/22/19	JLI	SW8260C	1
Toluene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Total Xylenes	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,2-Dichloroethene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,3-Dichloropropene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,4-dichloro-2-butene	ND	9.4	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichloroethene	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorofluoromethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorotrifluoroethane	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
Vinyl chloride	ND	4.7	ug/Kg	1	09/22/19	JLI	SW8260C	
QA/QC Surrogates								
% 1,2-dichlorobenzene-d4	110		%	1	09/22/19	JLI	70 - 130 %	

Ver 1

Project ID: PLAYLAND PARK POOL
Client ID: BP-6

Phoenix I.D.: CE13167

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
% Bromofluorobenzene	85		%	1	09/22/19	JLI	70 - 130 %
% Dibromofluoromethane	101		%	1	09/22/19	JLI	70 - 130 %
% Toluene-d8	101		%	1	09/22/19	JLI	70 - 130 %
% 1,2-dichlorobenzene-d4 (50x)	100		%	50	09/24/19	JLI	70 - 130 %
% Bromofluorobenzene (50x)	100		%	50	09/24/19	JLI	70 - 130 %
% Dibromofluoromethane (50x)	98		%	50	09/24/19	JLI	70 - 130 %
% Toluene-d8 (50x)	100		%	50	09/24/19	JLI	70 - 130 %
Semivolatiles							
1,2,4,5-Tetrachlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
1,2,4-Trichlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
1,2-Dichlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
1,2-Diphenylhydrazine	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
1,3-Dichlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
1,4-Dichlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,4,5-Trichlorophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,4,6-Trichlorophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,4-Dichlorophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,4-Dimethylphenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,4-Dinitrophenol	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
2,4-Dinitrotoluene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2,6-Dinitrotoluene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2-Chloronaphthalene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2-Chlorophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2-Methylnaphthalene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2-Methylphenol (o-cresol)	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
2-Nitroaniline	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
2-Nitrophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
3,3'-Dichlorobenzidine	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
3-Nitroaniline	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
4,6-Dinitro-2-methylphenol	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
4-Bromophenyl phenyl ether	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
4-Chloro-3-methylphenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
4-Chloroaniline	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
4-Chlorophenyl phenyl ether	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
4-Nitroaniline	ND	610	ug/Kg	1	09/22/19	WB	SW8270D
4-Nitrophenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Acenaphthene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Acenaphthylene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Acetophenone	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Aniline	ND	380	ug/Kg	1	09/22/19	WB	SW8270D
Anthracene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benz(a)anthracene	280	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzidine	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzo(a)pyrene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzo(b)fluoranthene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzo(ghi)perylene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzo(k)fluoranthene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D
Benzoic acid	ND	760	ug/Kg	1	09/22/19	WB	SW8270D

Project ID: PLAYLAND PARK POOL
Client ID: BP-6

Phoenix I.D.: CE13167

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Benzyl butyl phthalate	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Bis(2-chloroethoxy)methane	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Bis(2-chloroethyl)ether	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Bis(2-chloroisopropyl)ether	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Bis(2-ethylhexyl)phthalate	14000	2700	ug/Kg	10	09/23/19	WB	SW8270D	
Carbazole	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Chrysene	300	270	ug/Kg	1	09/22/19	WB	SW8270D	
Dibenz(a,h)anthracene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Dibenzofuran	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Diethyl phthalate	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Dimethylphthalate	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Di-n-butylphthalate	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Di-n-octylphthalate	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Fluoranthene	600	270	ug/Kg	1	09/22/19	WB	SW8270D	
Fluorene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Hexachlorobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Hexachlorobutadiene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Hexachlorocyclopentadiene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Hexachloroethane	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Indeno(1,2,3-cd)pyrene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Isophorone	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Naphthalene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Nitrobenzene	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
N-Nitrosodimethylamine	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
N-Nitrosodi-n-propylamine	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
N-Nitrosodiphenylamine	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Pentachloronitrobenzene	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Pentachlorophenol	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
Phenanthrene	500	270	ug/Kg	1	09/22/19	WB	SW8270D	
Phenol	ND	270	ug/Kg	1	09/22/19	WB	SW8270D	
Pyrene	480	270	ug/Kg	1	09/22/19	WB	SW8270D	
Pyridine	ND	380	ug/Kg	1	09/22/19	WB	SW8270D	
QA/QC Surrogates								
% 2,4,6-Tribromophenol	66		%	1	09/22/19	WB	30 - 130 %	
% 2-Fluorobiphenyl	52		%	1	09/22/19	WB	30 - 130 %	
% 2-Fluorophenol	47		%	1	09/22/19	WB	30 - 130 %	
% Nitrobenzene-d5	47		%	1	09/22/19	WB	30 - 130 %	
% Phenol-d5	54		%	1	09/22/19	WB	30 - 130 %	
% Terphenyl-d14	52		%	1	09/22/19	WB	30 - 130 %	
% 2,4,6-Tribromophenol (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
% 2-Fluorobiphenyl (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
% 2-Fluorophenol (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
% Nitrobenzene-d5 (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
% Phenol-d5 (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
% Terphenyl-d14 (10x)	Diluted Out		%	10	09/23/19	WB	30 - 130 %	
Field Extraction	Completed				09/19/19		SW5035A	1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
September 29, 2019
Reviewed and Released by: Phyllis Shiller, Laboratory Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

September 29, 2019

FOR: Attn: Matt Prelli
Berkshire Environmental
214 East Elm Street
Torrington, CT 06790

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		09/19/19	9:40
Location Code:	BERK-ENV	Received by:	SW	09/19/19	15:38
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCE13166
Phoenix ID: CE13168

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK HL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Volatiles								
1,1,1,2-Tetrachloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1,1-Trichloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1,2,2-Tetrachloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1,2-Trichloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1-Dichloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1-Dichloroethene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,1-Dichloropropene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2,3-Trichlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2,3-Trichloropropane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2,4-Trichlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2,4-Trimethylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2-Dibromo-3-chloropropane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2-Dibromoethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2-Dichlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2-Dichloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,2-Dichloropropane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,3,5-Trimethylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,3-Dichlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,3-Dichloropropane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
1,4-Dichlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
2,2-Dichloropropane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
2-Chlorotoluene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
2-Hexanone	ND	1300	ug/Kg	50	09/22/19	JLI	SW8260C	
2-Isopropyltoluene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	1
4-Chlorotoluene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
4-Methyl-2-pentanone	ND	1300	ug/Kg	50	09/22/19	JLI	SW8260C	

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK HL

Phoenix I.D.: CE13168

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Acetone	ND	5000	ug/Kg	50	09/22/19	JLI	SW8260C	
Acrylonitrile	ND	500	ug/Kg	50	09/22/19	JLI	SW8260C	
Benzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Bromobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Bromochloromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Bromodichloromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Bromoform	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Bromomethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Carbon Disulfide	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Carbon tetrachloride	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Chlorobenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Chloroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Chloroform	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Chloromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
cis-1,2-Dichloroethene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
cis-1,3-Dichloropropene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Dibromochloromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Dibromomethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Dichlorodifluoromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Ethylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Hexachlorobutadiene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Isopropylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
m&p-Xylene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Methyl Ethyl Ketone	ND	3000	ug/Kg	50	09/22/19	JLI	SW8260C	
Methyl t-butyl ether (MTBE)	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Methylene chloride	ND	500	ug/Kg	50	09/22/19	JLI	SW8260C	
Naphthalene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
n-Butylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
n-Propylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
o-Xylene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
p-Isopropyltoluene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
sec-Butylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Styrene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
tert-Butylbenzene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Tetrachloroethene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Tetrahydrofuran (THF)	ND	500	ug/Kg	50	09/22/19	JLI	SW8260C	1
Toluene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Total Xylenes	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
trans-1,2-Dichloroethene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
trans-1,3-Dichloropropene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
trans-1,4-dichloro-2-butene	ND	500	ug/Kg	50	09/22/19	JLI	SW8260C	
Trichloroethene	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Trichlorofluoromethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Trichlorotrifluoroethane	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
Vinyl chloride	ND	250	ug/Kg	50	09/22/19	JLI	SW8260C	
QA/QC Surrogates								
% 1,2-dichlorobenzene-d4 (50x)	101		%	50	09/22/19	JLI	70 - 130 %	
% Bromofluorobenzene (50x)	96		%	50	09/22/19	JLI	70 - 130 %	
% Dibromofluoromethane (50x)	96		%	50	09/22/19	JLI	70 - 130 %	

Ver 1

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK HL

Phoenix I.D.: CE13168

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
% Toluene-d8 (50x)	101		%	50	09/22/19	JLI	70 - 130 %	
Field Extraction	Completed				09/19/19		SW5035A	1

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

TRIP BLANK INCLUDED.

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
September 29, 2019
Reviewed and Released by: Phyllis Shiller, Laboratory Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

September 29, 2019

FOR: Attn: Matt Prelli
Berkshire Environmental
214 East Elm Street
Torrington, CT 06790

Sample Information		Custody Information		Date	Time
Matrix:	SOIL	Collected by:		09/19/19	9:40
Location Code:	BERK-ENV	Received by:	SW	09/19/19	15:38
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCE13166
Phoenix ID: CE13169

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK LL

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Volatiles								
1,1,1,2-Tetrachloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1,1-Trichloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1,2,2-Tetrachloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1,2-Trichloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1-Dichloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1-Dichloroethene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,1-Dichloropropene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2,3-Trichlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2,3-Trichloropropane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2,4-Trichlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2,4-Trimethylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2-Dibromoethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2-Dichlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2-Dichloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,2-Dichloropropane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,3,5-Trimethylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,3-Dichlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,3-Dichloropropane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
1,4-Dichlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
2,2-Dichloropropane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
2-Chlorotoluene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
2-Hexanone	ND	25	ug/Kg	1	09/22/19	JLI	SW8260C	
2-Isopropyltoluene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	1
4-Chlorotoluene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
4-Methyl-2-pentanone	ND	25	ug/Kg	1	09/22/19	JLI	SW8260C	

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK LL

Phoenix I.D.: CE13169

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Acetone	ND	25	ug/Kg	1	09/22/19	JLI	SW8260C	
Acrylonitrile	ND	10	ug/Kg	1	09/22/19	JLI	SW8260C	
Benzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromochloromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromodichloromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromoform	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Bromomethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon Disulfide	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Carbon tetrachloride	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Chlorobenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloroform	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Chloromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,2-Dichloroethene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
cis-1,3-Dichloropropene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromochloromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Dibromomethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Dichlorodifluoromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Ethylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Hexachlorobutadiene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Isopropylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
m&p-Xylene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl Ethyl Ketone	ND	25	ug/Kg	1	09/22/19	JLI	SW8260C	
Methyl t-butyl ether (MTBE)	ND	10	ug/Kg	1	09/22/19	JLI	SW8260C	
Methylene chloride	ND	10	ug/Kg	1	09/22/19	JLI	SW8260C	
Naphthalene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Butylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
n-Propylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
o-Xylene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
p-Isopropyltoluene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
sec-Butylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Styrene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
tert-Butylbenzene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrachloroethene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Tetrahydrofuran (THF)	21	10	ug/Kg	1	09/22/19	JLI	SW8260C	1
Toluene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Total Xylenes	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,2-Dichloroethene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,3-Dichloropropene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
trans-1,4-dichloro-2-butene	ND	10	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichloroethene	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorofluoromethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Trichlorotrifluoroethane	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
Vinyl chloride	ND	5.0	ug/Kg	1	09/22/19	JLI	SW8260C	
QA/QC Surrogates								
% 1,2-dichlorobenzene-d4	99		%	1	09/22/19	JLI	70 - 130 %	
% Bromofluorobenzene	95		%	1	09/22/19	JLI	70 - 130 %	
% Dibromofluoromethane	96		%	1	09/22/19	JLI	70 - 130 %	

Ver 1

Project ID: PLAYLAND PARK POOL
Client ID: TRIP BLANK LL

Phoenix I.D.: CE13169

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
% Toluene-d8	102		%	1	09/22/19	JLI	70 - 130 %	
Field Extraction	Completed				09/19/19		SW5035A	1

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

TRIP BLANK INCLUDED.

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

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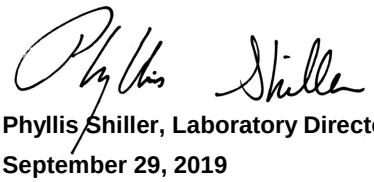

Phyllis Shiller, Laboratory Director
September 29, 2019
Reviewed and Released by: Phyllis Shiller, Laboratory Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

QA/QC Report

September 29, 2019

QA/QC Data

SDG I.D.: GCE13166

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 497875 (ug/kg), QC Sample No: CE14533 (CE13166, CE13167)											
Semivolatiles - Soil											
1,2,4,5-Tetrachlorobenzene	ND	230	53	48	9.9	50	47	6.2	30 - 130	30	
1,2,4-Trichlorobenzene	ND	230	53	45	16.3	50	48	4.1	30 - 130	30	
1,2-Dichlorobenzene	ND	180	43	33	26.3	45	44	2.2	30 - 130	30	
1,2-Diphenylhydrazine	ND	230	62	61	1.6	51	53	3.8	30 - 130	30	
1,3-Dichlorobenzene	ND	230	37	27	31.3	41	39	5.0	30 - 130	30	l,r
1,4-Dichlorobenzene	ND	230	41	28	37.7	44	42	4.7	30 - 130	30	l,r
2,4,5-Trichlorophenol	ND	230	75	69	8.3	57	59	3.4	30 - 130	30	
2,4,6-Trichlorophenol	ND	130	71	67	5.8	55	55	0.0	30 - 130	30	
2,4-Dichlorophenol	ND	130	66	63	4.7	60	56	6.9	30 - 130	30	
2,4-Dimethylphenol	ND	230	70	66	5.9	55	53	3.7	30 - 130	30	
2,4-Dinitrophenol	ND	230	77	75	2.6	32	17	61.2	30 - 130	30	m,r
2,4-Dinitrotoluene	ND	130	73	71	2.8	59	61	3.3	30 - 130	30	
2,6-Dinitrotoluene	ND	130	67	64	4.6	55	55	0.0	30 - 130	30	
2-Chloronaphthalene	ND	230	61	55	10.3	52	53	1.9	30 - 130	30	
2-Chlorophenol	ND	230	56	52	7.4	58	52	10.9	30 - 130	30	
2-Methylnaphthalene	ND	230	57	52	9.2	54	50	7.7	30 - 130	30	
2-Methylphenol (o-cresol)	ND	230	65	59	9.7	61	57	6.8	30 - 130	30	
2-Nitroaniline	ND	330	105	103	1.9	93	95	2.1	30 - 130	30	
2-Nitrophenol	ND	230	58	57	1.7	56	54	3.6	30 - 130	30	
3&4-Methylphenol (m&p-cresol)	ND	230	70	66	5.9	65	59	9.7	30 - 130	30	
3,3'-Dichlorobenzidine	ND	130	54	37	37.4	65	68	4.5	30 - 130	30	r
3-Nitroaniline	ND	330	73	70	4.2	67	70	4.4	30 - 130	30	
4,6-Dinitro-2-methylphenol	ND	230	82	82	0.0	49	29	51.3	30 - 130	30	m,r
4-Bromophenyl phenyl ether	ND	230	69	64	7.5	57	56	1.8	30 - 130	30	
4-Chloro-3-methylphenol	ND	230	68	69	1.5	61	58	5.0	30 - 130	30	
4-Chloroaniline	ND	230	51	46	10.3	61	54	12.2	30 - 130	30	
4-Chlorophenyl phenyl ether	ND	230	65	61	6.3	55	55	0.0	30 - 130	30	
4-Nitroaniline	ND	230	67	67	0.0	56	59	5.2	30 - 130	30	
4-Nitrophenol	ND	230	80	83	3.7	65	65	0.0	30 - 130	30	
Acenaphthene	ND	230	63	57	10.0	53	54	1.9	30 - 130	30	
Acenaphthylene	ND	130	58	55	5.3	50	51	2.0	30 - 130	30	
Acetophenone	ND	230	51	49	4.0	53	49	7.8	30 - 130	30	
Aniline	ND	330	32	26	20.7	42	40	4.9	30 - 130	30	l
Anthracene	ND	230	67	64	4.6	56	57	1.8	30 - 130	30	
Benz(a)anthracene	ND	230	67	64	4.6	55	56	1.8	30 - 130	30	
Benzidine	ND	330	<10	<10	NC	19	24	23.3	30 - 130	30	l,m
Benzo(a)pyrene	ND	130	66	63	4.7	54	54	0.0	30 - 130	30	
Benzo(b)fluoranthene	ND	160	68	68	0.0	54	54	0.0	30 - 130	30	
Benzo(ghi)perylene	ND	230	69	66	4.4	52	54	3.8	30 - 130	30	
Benzo(k)fluoranthene	ND	230	73	67	8.6	59	58	1.7	30 - 130	30	
Benzoic Acid	ND	330	42	26	47.1	<10	<10	NC	30 - 130	30	l,m,r

QA/QC Data

SDG I.D.: GCE13166

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Benzyl butyl phthalate	ND	230	69	69	0.0	58	58	0.0	30 - 130	30	
Bis(2-chloroethoxy)methane	ND	230	59	55	7.0	55	55	0.0	30 - 130	30	
Bis(2-chloroethyl)ether	ND	130	47	41	13.6	49	47	4.2	30 - 130	30	
Bis(2-chloroisopropyl)ether	ND	230	39	35	10.8	41	40	2.5	30 - 130	30	
Bis(2-ethylhexyl)phthalate	ND	230	74	72	2.7	60	62	3.3	30 - 130	30	
Carbazole	ND	230	68	67	1.5	56	56	0.0	30 - 130	30	
Chrysene	ND	230	69	66	4.4	56	56	0.0	30 - 130	30	
Dibenz(a,h)anthracene	ND	130	75	71	5.5	56	58	3.5	30 - 130	30	
Dibenzofuran	ND	230	65	59	9.7	53	54	1.9	30 - 130	30	
Diethyl phthalate	ND	230	68	66	3.0	54	56	3.6	30 - 130	30	
Dimethylphthalate	ND	230	67	63	6.2	54	55	1.8	30 - 130	30	
Di-n-butylphthalate	ND	670	69	67	2.9	58	57	1.7	30 - 130	30	
Di-n-octylphthalate	ND	230	68	67	1.5	56	58	3.5	30 - 130	30	
Fluoranthene	ND	230	68	64	6.1	51	52	1.9	30 - 130	30	
Fluorene	ND	230	65	62	4.7	55	55	0.0	30 - 130	30	
Hexachlorobenzene	ND	130	70	65	7.4	56	59	5.2	30 - 130	30	
Hexachlorobutadiene	ND	230	49	37	27.9	48	46	4.3	30 - 130	30	
Hexachlorocyclopentadiene	ND	230	32	21	41.5	17	15	12.5	30 - 130	30	l,m,r
Hexachloroethane	ND	130	36	25	36.1	41	37	10.3	30 - 130	30	l,r
Indeno(1,2,3-cd)pyrene	ND	230	74	71	4.1	55	58	5.3	30 - 130	30	
Isophorone	ND	130	54	51	5.7	49	48	2.1	30 - 130	30	
Naphthalene	ND	230	54	49	9.7	52	50	3.9	30 - 130	30	
Nitrobenzene	ND	130	55	50	9.5	57	55	3.6	30 - 130	30	
N-Nitrosodimethylamine	ND	230	44	38	14.6	41	42	2.4	30 - 130	30	
N-Nitrosodi-n-propylamine	ND	130	57	53	7.3	57	53	7.3	30 - 130	30	
N-Nitrosodiphenylamine	ND	130	67	66	1.5	54	55	1.8	30 - 130	30	
Pentachloronitrobenzene	ND	230	65	62	4.7	54	53	1.9	30 - 130	30	
Pentachlorophenol	ND	230	115	115	0.0	79	76	3.9	30 - 130	30	
Phenanthrene	ND	130	69	64	7.5	55	54	1.8	30 - 130	30	
Phenol	ND	230	59	56	5.2	58	53	9.0	30 - 130	30	
Pyrene	ND	230	67	65	3.0	53	54	1.9	30 - 130	30	
Pyridine	ND	230	23	18	24.4	30	31	3.3	30 - 130	30	l
% 2,4,6-Tribromophenol	51	%	75	73	2.7	55	56	1.8	30 - 130	30	
% 2-Fluorobiphenyl	53	%	55	50	9.5	46	47	2.2	30 - 130	30	
% 2-Fluorophenol	54	%	49	45	8.5	49	46	6.3	30 - 130	30	
% Nitrobenzene-d5	53	%	50	48	4.1	52	49	5.9	30 - 130	30	
% Phenol-d5	58	%	59	55	7.0	57	52	9.2	30 - 130	30	
% Terphenyl-d14	51	%	56	54	3.6	46	46	0.0	30 - 130	30	

Comment:

Additional 8270 criteria: 20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

QA/QC Batch 498140 (ug/kg), QC Sample No: CE13166 (CE13166, CE13167, CE13169)

Volatiles - Soil (Low Level)

1,1,1,2-Tetrachloroethane	ND	5.0	91	99	8.4				70 - 130	30	
1,1,1-Trichloroethane	ND	5.0	88	97	9.7				70 - 130	30	
1,1,2,2-Tetrachloroethane	ND	3.0	92	105	13.2				70 - 130	30	
1,1,2-Trichloroethane	ND	5.0	88	99	11.8				70 - 130	30	
1,1-Dichloroethane	ND	5.0	94	102	8.2				70 - 130	30	
1,1-Dichloroethene	ND	5.0	90	96	6.5				70 - 130	30	
1,1-Dichloropropene	ND	5.0	91	97	6.4				70 - 130	30	
1,2,3-Trichlorobenzene	ND	5.0	90	98	8.5				70 - 130	30	
1,2,3-Trichloropropane	ND	5.0	91	101	10.4				70 - 130	30	

QA/QC Data

SDG I.D.: GCE13166

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
1,2,4-Trichlorobenzene	ND	5.0	89	97	8.6				70 - 130	30
1,2,4-Trimethylbenzene	ND	1.0	89	97	8.6				70 - 130	30
1,2-Dibromo-3-chloropropane	ND	5.0	92	105	13.2				70 - 130	30
1,2-Dibromoethane	ND	5.0	88	98	10.8				70 - 130	30
1,2-Dichlorobenzene	ND	5.0	86	94	8.9				70 - 130	30
1,2-Dichloroethane	ND	5.0	94	102	8.2				70 - 130	30
1,2-Dichloropropane	ND	5.0	98	106	7.8				70 - 130	30
1,3,5-Trimethylbenzene	ND	1.0	89	97	8.6				70 - 130	30
1,3-Dichlorobenzene	ND	5.0	88	96	8.7				70 - 130	30
1,3-Dichloropropane	ND	5.0	92	101	9.3				70 - 130	30
1,4-Dichlorobenzene	ND	5.0	84	92	9.1				70 - 130	30
2,2-Dichloropropane	ND	5.0	101	108	6.7				70 - 130	30
2-Chlorotoluene	ND	5.0	87	96	9.8				70 - 130	30
2-Hexanone	ND	25	90	103	13.5				70 - 130	30
2-Isopropyltoluene	ND	5.0	95	104	9.0				70 - 130	30
4-Chlorotoluene	ND	5.0	87	95	8.8				70 - 130	30
4-Methyl-2-pentanone	ND	25	98	111	12.4				70 - 130	30
Acetone	ND	10	77	85	9.9				70 - 130	30
Acrylonitrile	ND	5.0	103	118	13.6				70 - 130	30
Benzene	ND	1.0	92	99	7.3				70 - 130	30
Bromobenzene	ND	5.0	84	93	10.2				70 - 130	30
Bromochloromethane	ND	5.0	91	100	9.4				70 - 130	30
Bromodichloromethane	ND	5.0	94	102	8.2				70 - 130	30
Bromoform	ND	5.0	91	101	10.4				70 - 130	30
Bromomethane	ND	5.0	96	106	9.9				70 - 130	30
Carbon Disulfide	ND	5.0	90	96	6.5				70 - 130	30
Carbon tetrachloride	ND	5.0	93	97	4.2				70 - 130	30
Chlorobenzene	ND	5.0	89	95	6.5				70 - 130	30
Chloroethane	ND	5.0	96	103	7.0				70 - 130	30
Chloroform	ND	5.0	89	98	9.6				70 - 130	30
Chloromethane	ND	5.0	100	105	4.9				70 - 130	30
cis-1,2-Dichloroethene	ND	5.0	89	102	13.6				70 - 130	30
cis-1,3-Dichloropropene	ND	5.0	96	104	8.0				70 - 130	30
Dibromochloromethane	ND	3.0	94	103	9.1				70 - 130	30
Dibromomethane	ND	5.0	91	99	8.4				70 - 130	30
Dichlorodifluoromethane	ND	5.0	104	109	4.7				70 - 130	30
Ethylbenzene	ND	1.0	91	97	6.4				70 - 130	30
Hexachlorobutadiene	ND	5.0	88	98	10.8				70 - 130	30
Isopropylbenzene	ND	1.0	87	96	9.8				70 - 130	30
m&p-Xylene	ND	2.0	91	97	6.4				70 - 130	30
Methyl ethyl ketone	ND	5.0	90	105	15.4				70 - 130	30
Methyl t-butyl ether (MTBE)	ND	1.0	98	107	8.8				70 - 130	30
Methylene chloride	ND	5.0	77	85	9.9				70 - 130	30
Naphthalene	ND	5.0	94	106	12.0				70 - 130	30
n-Butylbenzene	ND	1.0	92	100	8.3				70 - 130	30
n-Propylbenzene	ND	1.0	89	96	7.6				70 - 130	30
o-Xylene	ND	2.0	92	99	7.3				70 - 130	30
p-Isopropyltoluene	ND	1.0	89	97	8.6				70 - 130	30
sec-Butylbenzene	ND	1.0	96	105	9.0				70 - 130	30
Styrene	ND	5.0	92	100	8.3				70 - 130	30
tert-Butylbenzene	ND	1.0	88	96	8.7				70 - 130	30
Tetrachloroethene	ND	5.0	90	97	7.5				70 - 130	30
Tetrahydrofuran (THF)	ND	5.0	105	119	12.5				70 - 130	30

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Toluene	ND	1.0	91	99	8.4				70 - 130	30	
trans-1,2-Dichloroethene	ND	5.0	87	93	6.7				70 - 130	30	
trans-1,3-Dichloropropene	ND	5.0	97	107	9.8				70 - 130	30	
trans-1,4-dichloro-2-butene	ND	5.0	104	118	12.6				70 - 130	30	
Trichloroethene	ND	5.0	89	98	9.6				70 - 130	30	
Trichlorofluoromethane	ND	5.0	95	100	5.1				70 - 130	30	
Trichlorotrifluoroethane	ND	5.0	93	99	6.3				70 - 130	30	
Vinyl chloride	ND	5.0	90	95	5.4				70 - 130	30	
% 1,2-dichlorobenzene-d4	99	%	101	102	1.0				70 - 130	30	
% Bromofluorobenzene	96	%	102	103	1.0				70 - 130	30	
% Dibromofluoromethane	99	%	97	99	2.0				70 - 130	30	
% Toluene-d8	102	%	101	102	1.0				70 - 130	30	

Comment:

The Low Level MS/MSD are not reported for this batch.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 498140H (ug/kg), QC Sample No: CE13166 50X (CE13166 (50X) , CE13168 (50X))

Volatiles - Soil (High Level)

1,1,1,2-Tetrachloroethane	ND	250	93	96	3.2	92	92	0.0	70 - 130	30	
1,1,1-Trichloroethane	ND	250	91	94	3.2	92	91	1.1	70 - 130	30	
1,1,2,2-Tetrachloroethane	ND	150	96	100	4.1	100	98	2.0	70 - 130	30	
1,1,2-Trichloroethane	ND	250	92	93	1.1	97	94	3.1	70 - 130	30	
1,1-Dichloroethane	ND	250	94	99	5.2	96	94	2.1	70 - 130	30	
1,1-Dichloroethene	ND	250	90	93	3.3	67	67	0.0	70 - 130	30	m
1,1-Dichloropropene	ND	250	94	99	5.2	98	98	0.0	70 - 130	30	
1,2,3-Trichlorobenzene	ND	250	99	102	3.0	96	97	1.0	70 - 130	30	
1,2,3-Trichloropropane	ND	250	94	99	5.2	98	95	3.1	70 - 130	30	
1,2,4-Trichlorobenzene	ND	250	100	104	3.9	97	99	2.0	70 - 130	30	
1,2,4-Trimethylbenzene	ND	50	95	99	4.1	NC	NC	NC	70 - 130	30	
1,2-Dibromo-3-chloropropane	ND	250	90	96	6.5	99	97	2.0	70 - 130	30	
1,2-Dibromoethane	ND	250	92	95	3.2	100	96	4.1	70 - 130	30	
1,2-Dichlorobenzene	ND	250	93	96	3.2	94	93	1.1	70 - 130	30	
1,2-Dichloroethane	ND	250	95	98	3.1	93	90	3.3	70 - 130	30	
1,2-Dichloropropane	ND	250	102	105	2.9	100	100	0.0	70 - 130	30	
1,3,5-Trimethylbenzene	ND	50	95	100	5.1	140	110	24.0	70 - 130	30	m
1,3-Dichlorobenzene	ND	250	96	100	4.1	99	98	1.0	70 - 130	30	
1,3-Dichloropropane	ND	250	95	97	2.1	99	95	4.1	70 - 130	30	
1,4-Dichlorobenzene	ND	250	93	95	2.1	95	93	2.1	70 - 130	30	
2,2-Dichloropropane	ND	250	99	102	3.0	97	97	0.0	70 - 130	30	
2-Chlorotoluene	ND	250	94	100	6.2	98	99	1.0	70 - 130	30	
2-Hexanone	ND	1300	93	97	4.2	100	91	9.4	70 - 130	30	
2-Isopropyltoluene	ND	250	101	105	3.9	110	100	9.5	70 - 130	30	
4-Chlorotoluene	ND	250	93	97	4.2	96	95	1.0	70 - 130	30	
4-Methyl-2-pentanone	ND	1300	99	102	3.0	98	91	7.4	70 - 130	30	
Acetone	ND	500	73	76	4.0	53	49	7.8	70 - 130	30	m
Acrylonitrile	ND	250	103	107	3.8	110	100	9.5	70 - 130	30	
Benzene	ND	50	96	99	3.1	99	98	1.0	70 - 130	30	
Bromobenzene	ND	250	90	95	5.4	98	96	2.1	70 - 130	30	
Bromochloromethane	ND	250	90	96	6.5	96	91	5.3	70 - 130	30	
Bromodichloromethane	ND	250	93	94	1.1	93	92	1.1	70 - 130	30	
Bromoform	ND	250	88	89	1.1	81	82	1.2	70 - 130	30	
Bromomethane	ND	250	76	80	5.1	54	56	3.6	70 - 130	30	m

QA/QC Data

SDG I.D.: GCE13166

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Carbon Disulfide	ND	250	84	87	3.5	62	62	0.0	70 - 130	30	m
Carbon tetrachloride	ND	250	87	91	4.5	85	89	4.6	70 - 130	30	
Chlorobenzene	ND	250	94	97	3.1	96	93	3.2	70 - 130	30	
Chloroethane	ND	250	30	30	0.0	22	22	0.0	70 - 130	30	l,m
Chloroform	ND	250	91	93	2.2	86	82	4.8	70 - 130	30	
Chloromethane	ND	250	96	100	4.1	85	83	2.4	70 - 130	30	
cis-1,2-Dichloroethene	ND	250	91	94	3.2	100	94	6.2	70 - 130	30	
cis-1,3-Dichloropropene	ND	250	98	99	1.0	100	99	1.0	70 - 130	30	
Dibromochloromethane	ND	150	93	93	0.0	92	91	1.1	70 - 130	30	
Dibromomethane	ND	250	90	92	2.2	94	92	2.2	70 - 130	30	
Dichlorodifluoromethane	ND	250	97	101	4.0	91	91	0.0	70 - 130	30	
Ethylbenzene	ND	50	95	99	4.1	110	98	11.5	70 - 130	30	
Hexachlorobutadiene	ND	250	95	101	6.1	95	97	2.1	70 - 130	30	
Isopropylbenzene	ND	50	92	97	5.3	100	99	1.0	70 - 130	30	
m&p-Xylene	ND	100	96	100	4.1	130	100	26.1	70 - 130	30	
Methyl ethyl ketone	ND	250	87	91	4.5	84	76	10.0	70 - 130	30	
Methyl t-butyl ether (MTBE)	ND	50	99	103	4.0	86	82	4.8	70 - 130	30	
Methylene chloride	ND	250	82	85	3.6	66	63	4.7	70 - 130	30	m
Naphthalene	ND	250	98	102	4.0	NC	NC	NC	70 - 130	30	
n-Butylbenzene	ND	50	100	105	4.9	130	100	26.1	70 - 130	30	
n-Propylbenzene	ND	50	94	100	6.2	110	100	9.5	70 - 130	30	
o-Xylene	ND	100	98	101	3.0	130	100	26.1	70 - 130	30	
p-Isopropyltoluene	ND	50	95	100	5.1	110	100	9.5	70 - 130	30	
sec-Butylbenzene	ND	50	102	108	5.7	110	110	0.0	70 - 130	30	
Styrene	ND	250	98	100	2.0	100	97	3.0	70 - 130	30	
tert-Butylbenzene	ND	50	92	98	6.3	99	98	1.0	70 - 130	30	
Tetrachloroethene	ND	250	95	97	2.1	100	100	0.0	70 - 130	30	
Tetrahydrofuran (THF)	ND	250	106	109	2.8	99	94	5.2	70 - 130	30	
Toluene	ND	50	97	99	2.0	110	100	9.5	70 - 130	30	
trans-1,2-Dichloroethene	ND	250	89	94	5.5	76	75	1.3	70 - 130	30	
trans-1,3-Dichloropropene	ND	250	98	99	1.0	99	96	3.1	70 - 130	30	
trans-1,4-dichloro-2-butene	ND	250	105	109	3.7	99	97	2.0	70 - 130	30	
Trichloroethene	ND	250	94	97	3.1	97	96	1.0	70 - 130	30	
Trichlorofluoromethane	ND	250	28	28	0.0	20	23	14.0	70 - 130	30	l,m
Trichlorotrifluoroethane	ND	250	95	100	5.1	78	75	3.9	70 - 130	30	
Vinyl chloride	ND	250	78	83	6.2	68	68	0.0	70 - 130	30	m
% 1,2-dichlorobenzene-d4	101	%	99	100	1.0	98	98	0.0	70 - 130	30	
% Bromofluorobenzene	96	%	103	101	2.0	106	103	2.9	70 - 130	30	
% Dibromofluoromethane	95	%	97	92	5.3	95	96	1.0	70 - 130	30	
% Toluene-d8	101	%	100	100	0.0	99	98	1.0	70 - 130	30	

Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 498432H (ug/kg), QC Sample No: CE13167 50X (CE13167 (50X))

Volatiles - Soil (High Level)

Chloroform	ND	250	85	82	3.6	NC	NC	NC	70 - 130	30	
% 1,2-dichlorobenzene-d4	100	%	99	101	2.0	101	101	0.0	70 - 130	30	
% Bromofluorobenzene	99	%	101	101	0.0	101	100	1.0	70 - 130	30	
% Dibromofluoromethane	97	%	99	99	0.0	97	101	4.0	70 - 130	30	
% Toluene-d8	100	%	101	101	0.0	100	100	0.0	70 - 130	30	

QA/QC Data

SDG I.D.: GCE13166

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

l = This parameter is outside laboratory LCS/LCSD specified recovery limits.
m = This parameter is outside laboratory MS/MSD specified recovery limits.
r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
September 29, 2019

Sunday, September 29, 2019

Criteria: NY: 375, CP51S

State: NY

Sample Criteria Exceedances Report

GCE13166 - BERK-ENV

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CE13166	$8260SMRNY	Chloroform	NY / 375-6.8 Volatiles / Unrestricted Use Soil	950	430	370	370	ug/Kg
CE13167	$8260SMRNY	Chloroform	NY / 375-6.8 Volatiles / Unrestricted Use Soil	640	320	370	370	ug/Kg

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

September 29, 2019 SDG I.D.: GCE13166

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

SVOA Narration

CHEM05 09/22/19-1: CE13166, CE13167

For 8270 full list, the DDT breakdown and pentachlorophenol & benzidine peak tailing were evaluated in the DFTPP tune and were found to be in control.
For 8270 BN list, benzidine peak tailing was evaluated in the DFTPP tune and was found to be in control.

The following Initial Calibration compounds did not meet recommended response factors: Hexachlorobenzene 0.087 (0.1)
The following Initial Calibration compounds did not meet minimum response factors: None.

The following Continuing Calibration compounds did not meet recommended response factors: Hexachlorobenzene 0.088 (0.1)
The following Continuing Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

VOA Narration

CHEM26 09/22/19-1: CE13166, CE13167, CE13168, CE13169

The following Initial Calibration compounds did not meet RSD% criteria: Acetone 29% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.
The following Initial Calibration compounds did not meet recommended response factors: Tetrachloroethene 0.167 (0.2)
The following Initial Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

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ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

NY Temperature Narration

September 29, 2019

SDG I.D.: GCE13166

The samples in this delivery group were received at 2.2°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

Cooler: Yes [X] No [ ]
Coolant: IPK [ ] ICE [X] No [ ]
Temp 2.2°C Pg of

PHOENIX Environmental Laboratories, Inc.

NY/NJ CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Contact Options:
[ ] Fax:
[ ] Phone:
[X] Email: mpinelli@bestenv.com

Customer: Berkshire Environmental Services & Technology LLC
Address: 214 East Elm St. Torrington CT 06790
Project: Playland Park Pool
Report to: Matt Prelli
Invoice to: Same
Project P.O:

This section MUST be completed with Bottle Quantities.

Sampler's Signature: [signature] Date: 9-19-19

Client Sample - Information - Identification

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe
OIL=Oil **B**=Bulk **L**=Liquid

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Analysis Request: 8260 Full List	8270 Full List	Soil VOA Vials [X] methanol [X] H2O	GL Soil container (8) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml	PL HNO3 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is
13166	BP-5	S	9-19-19	0940	X	X		3	1								
13167	BP-6	S	9-19-19	0836	X	X		3	1								
13168	Trip High	L	9-19-19		X			1									
13169	Trip low	L	9-19-19		X			1									

Relinquished by:	Accepted by:	Date:	Time:
[signature]	Krystal Hall	9/19/19	1638

Comments, Special Requirements or Regulations:
Site: Playland Park Pool Rye, NY
*TB rcvd without custody seal (KH)
*1-low rcvd

Turnaround:
[ ] 1 Day*
[ ] 2 Days*
[ ] 3 Days*
[ ] 5 Days
[X] 10 Days
[ ] Other
* SURCHARGE APPLIES

NJ
[ ] Res. Criteria
[ ] Non-Res. Criteria
[ ] Impact to GW Soil Cleanup Criteria
[ ] Impact to GW soil screen Criteria
[ ] GW Criteria

What State were samples collected? NY

NY
[ ] TOGS GW
[X] CP-51 SOIL
[X] 375SCO Unrestricted Soil
[ ] 375SCO Residential Soil
[ ] 375SCO Residential
[ ] 375SCO Commercial Soil
[ ] 375SCO Industrial Soil
[ ] Subpart 5 DW

Data Format
[X] Phoenix Std Report
[ ] Excel
[X] PDF
[ ] GIS/Key
[ ] EQuIS
[ ] NJ Hazsite EDD
[ ] NY EZ EDD (ASP)
[ ] Other

Data Package
[ ] NJ Reduced Deliv. *
[ ] NY Enhanced (ASP B) *
[ ] Other

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APPENDIX III – LIMITED HAZARDOUS MATERIALS ASSESSMENT REPORT

NO TEXT ON THIS PAGE

Westchester gov.com

George Latimer, Westchester County Executive
County Board of Legislator

LIMITED HAZARDOUS MATERIALS ASSESSMENT REPORT FOR PLAYLAND PARK

PLAYLAND PARK
RYE, NEW YORK

August 2019
Updated May 2020

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
Division of Engineering

D&B Engineers and Architects, P.C.

LIMITED HAZARDOUS MATERIALS ASSESSMENT REPORT
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK

Prepared for:

WESTCHESTER COUNTY

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.
WOODBURY, NEW YORK

AUGUST 2019
UPDATED MAY 2020

LIMITED HAZARDOUS MATERIALS ASSESSMENT REPORT
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK

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1.0 INTRODUCTION

D&B Engineers and Architects, P.C. (D&B) was retained by Westchester County to perform a limited hazardous materials assessment of the pool complex located at Playland Park in Rye, New York. The assessment included the pool and surrounding area, interior and exterior portions of the vendor spaces adjacent to the pool and the bathhouse, which contains restrooms, showers, locker rooms, utility rooms and a pool filtration room, and the adjacent southern building which includes shops and an event space. It is D&B's understanding that Westchester County is planning to renovate and rehabilitate the structures. The objective of this limited hazardous materials assessment is to determine the presence, extent and condition of any hazardous materials that may be present within the pool area, bathhouse, adjacent vendor spaces and adjacent southern building at the time of the field inspection.

The field activities associated with this limited hazardous materials assessment were performed on July 1 and 2, 2019, March 2, 2020 and May 7, 2020.

The findings contained within this report are consistent with accepted principles and practices established and prescribed by the United States Environmental Protection Agency (USEPA) and the New York State Department of Labor (NYSDOL) with respect to asbestos and lead-based paint surveys and reporting. In addition, the waste management procedures outlined herein are consistent with the regulations established by the USEPA and the New York State Department of Environmental Conservation (NYSDEC).

Section 2.0 of this report contains a physical description of the property, buildings located on-site and the limits of the survey. Section 3.0 of this report contains the methodology employed during the performance of this assessment. The findings of the assessment are presented in Section 4.0, and the conclusions and recommendations of the assessment are presented in Sections 5.0 and 6.0, respectively.

1.1 Limitations

D&B assumes no responsibility, liability or risk for the use of this report for any purpose other than as an assessment to be used for informational purposes only. The contents of this report, including the findings, results, conclusions and recommendations presented herein, are based on information available at the time of the actual on-site survey. This assessment included the pool and surrounding area, the southern event space and adjacent shops, the interior and exterior portions of the north and south vendor spaces adjacent to the pool and the bathhouse, which is comprised of restrooms, showers, locker rooms, utility rooms, a pool filtration room, and a tunnel from the bathhouse to the beach. The adjacent building located north of the bathhouse, which included shops and a children's museum, was not included as part of this assessment. Destructive activities to identify concealed asbestos-containing material (ACM) were not performed in order to avoid compromising the weather-tight condition of the structures. Furthermore, due to the potential for concealed ACM to be present (e.g., electric wiring, pipe insulation in walls, etc.), this report should not be construed to represent all ACM located at the facility; all quantities of ACM identified and all dimensions referenced in this report shall be considered approximate and shall be verified on-site.

The lead-based paint survey performed as part of this assessment was intended to determine whether lead-based paint is present within the surveyed area for waste management purposes only (only one sample was collected per coated building component). The lead-based paint survey was not performed to satisfy the requirements of a lead-based paint survey per USEPA or the United States Department of Housing and Urban Development (HUD). In addition, the lead-based paint survey was not performed to identify lead-containing materials for the purpose of complying with the United States Department of Labor Occupational Safety and Health Administration's (OSHA's) "Lead in Construction" Rule (29 CFR 1926.62).

1.2 Qualifications

D&B Engineers and Architects, P.C. has the experience and certifications necessary to perform a limited hazardous materials survey for the buildings located on the subject property.

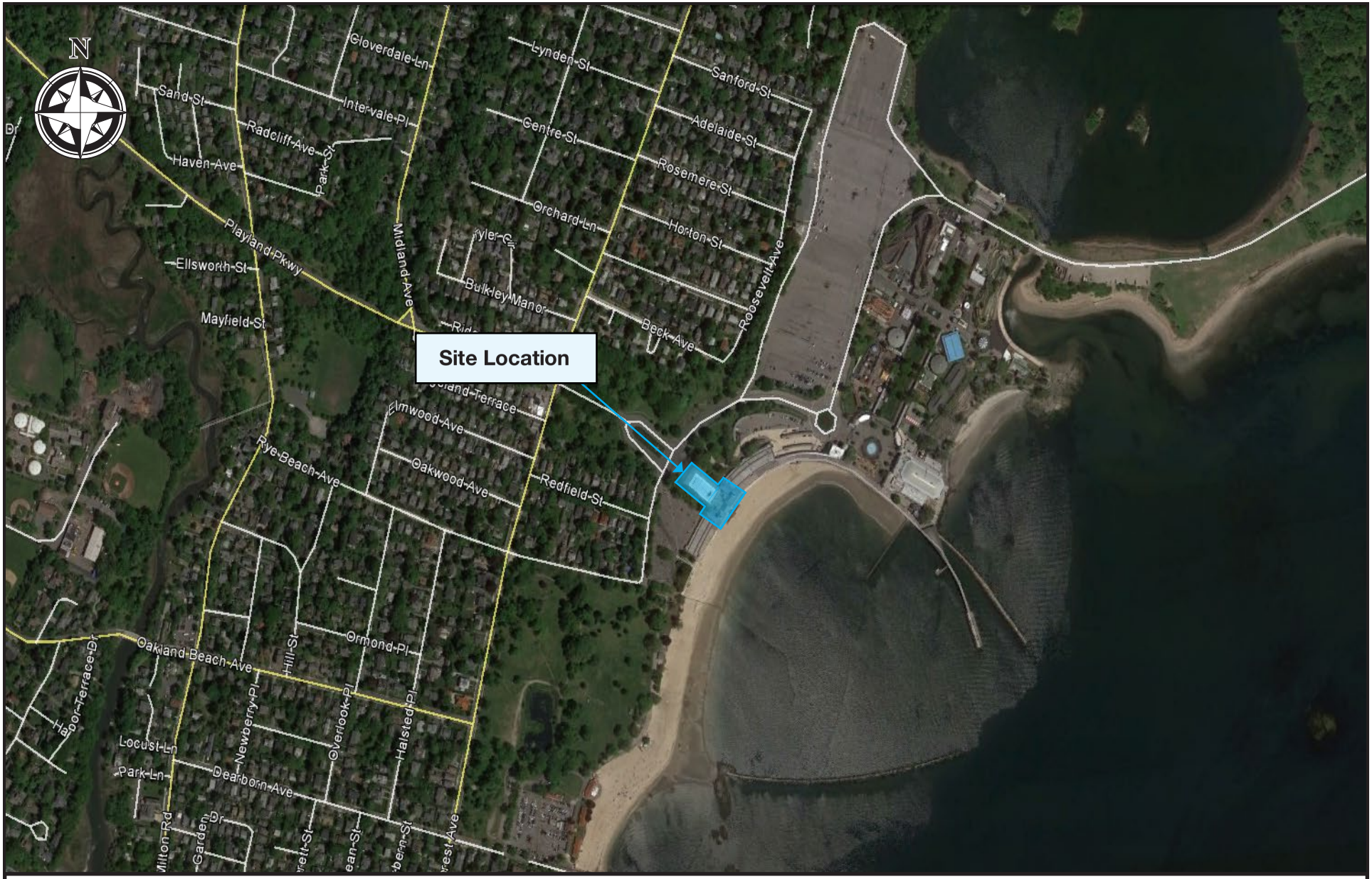
Specifically, D&B is in possession of a New York State Department of Labor (NYSDOL) Asbestos Handling License (License No. 28587), as well as a lead-based paint certification issued by the United States Environmental Protection Agency (USEPA) (Certification No. NY-I-17775-2). In addition, the individuals performing the survey are certified inspectors under the NYSDOL asbestos inspection program and the USEPA lead assessment program. Lastly, the inspectors have the training and experience necessary to identify waste materials that require special handling under the USEPA and NYSDEC environmental regulations. Copies of the applicable asbestos licenses are presented in Appendix A of this report.

2.0 FACILITY DESCRIPTION

The Playland Park pool complex is located on the southern side of Playland Park in the City of Rye, Westchester County, New York, along the Long Island Sound, east of Playland Parkway (see Figure 2-1).

The project site consists of a 150-foot long, 75-foot wide concrete pool located adjacent to a bathhouse building. The bathhouse building includes men's and women's locker rooms and a pool filtration room located on the beach boardwalk level. Two buildings (vendor spaces) are located on the pool level. The bathhouse and vendor spaces were constructed circa 1929. The north vendor space includes a concession area, kitchen and seating. The south vendor space includes a storage area, a lifeguard office and chlorine storage. A concrete plaza located between the north and south vendor spaces is used as a pool deck and seating area. Stairs from the pool plaza deck provide access to the men's and women's locker rooms. Stairs from the eastern side of the plaza deck provide access to the boardwalk. A small elevator located in the plaza deck provides access to the bathhouse entrance area. Both the men's and women's locker rooms contain a shower area, restroom space, lockers and changing rooms. Other areas of the bathhouse include a pool filtration room, and electrical and mechanical rooms. Direct access to the beach from the locker rooms is provided through a tunnel located beneath the boardwalk. This tunnel has not been used in several years and is routinely flooded with water, sand and debris. The tunnel entrance at the beach is secured with metal gates that allow both sand and water to enter the tunnel during storms. The bathhouse is adjoined by two buildings to the north and south that were constructed circa 2009. The building located to the north was not assessed as part of this project.

This limited hazardous materials assessment was performed for the pool and surrounding area, interior and exterior portions of the vendor spaces adjacent to the pool, and the bathhouse, which contains restrooms, showers, locker rooms, utility rooms, a pool filtration room and a tunnel providing access to the beach, and the interior and exterior portions of the building adjacent to the south which contains an event space and shops. No other structures were included as part of this survey. The limits of the survey are indicated on Figure 2-2.



PLAYLAND PARK POOL REHABILITATION PROJECT
PLAYLAND PARK
RYE, NEW YORK

D&B ENGINEERS AND ARCHITECTS, P.C.

SITE LOCATION MAP

FIGURE 2-1

5366 - Site Location Map.indd (08/23/19 - 5:31 PM)

PLAYLAND POOL REHABILITATION PROJECT
PLAYLAND PARK
RYE, NEW YORK

NOT TO SCALE

D&B ENGINEERS AND ARCHITECTS, P.C.

SURVEY LIMITS PLAN

FIGURE 2-2

3.0 METHODOLOGY

The following provides a brief description of the methodology used in performing the limited hazardous materials survey for the buildings described in Section 2.0 of this report.

3.1 Asbestos-Containing Materials

An asbestos survey was performed in order to determine the locations, quantities, friability and condition of any asbestos-containing materials (ACM) present. The survey was performed in accordance with the asbestos bulk sampling protocols for multi-layered building systems and materials as specified in the applicable provisions of the following standards:

- New York State Department of Labor (NYSDOL) Industrial Code Rule 56 (12 NYCRR Part 56)
- United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763, Subpart E)
- USEPA Asbestos School Hazard Abatement Reauthorization Act (ASHARA) (40 CFR Part 763, Subpart E)

The purpose of the assessment was to identify whether any suspect ACM is present within the buildings and to sample and determine whether the material is ACM prior to any demolition or renovation activities. NYSDOL's Industrial Code Rule 56 (ICR 56) defines ACM as any material that contains greater than 1% asbestos by weight and requires all ACM to be removed by a licensed asbestos abatement contractor prior to building renovation or demolition. Those materials containing asbestos at concentrations less than or equal to 1% asbestos by weight are classified as non-regulated ACM.

During the assessment, all accessible portions of the buildings were visually assessed to identify any suspect ACM. All suspect ACM observed was grouped into homogenous areas for sampling (i.e., items composed of the same material with the same color and texture).

Samples were collected of each homogenous area for laboratory analysis utilizing the prescribed sample collection methodology outlined by USEPA and NYSDOL as follows: three to nine samples were collected of each surfacing material depending upon the square footage of the material present; three samples were collected of each thermal system insulation (TSI); and two to three samples were collected of each miscellaneous material depending on the square footage of the material present. The samples of each homogenous area were collected from well distributed locations of the material and all layers of the material present were collected. The samples were collected in accordance with the procedures described in the NYSDOL's ICR 56. During sample collection, the suspect ACM was physically handled to determine friability. Only observed suspect ACM was sampled during the assessment. Following collection of each sample, the inspector noted the location from where each sample was collected on a sample location plan and added the sample identification to a Chain of Custody form.

The samples were sent to the laboratory for analysis by Polarized Light Microscopy (PLM) utilizing NYSDOH ELAP Method 198.1 for friable suspect materials, and Non-Friable Organically Bound (NOB) PLM utilizing NYSDOH ELAP Method 198.6 for non-friable suspect materials. Confirmation analysis of NOB materials utilizing Transmission Electron Microscopy (TEM) was performed, where necessary, utilizing NYSDOH ELAP Method 198.4. TEM is required by the New York State Department of Health (NYSDOH) to prove that a NOB material is non-ACM, when the material is initially determined to be non-ACM by PLM and the sample has an acid insoluble inorganic phase of greater than 1.0%.

All samples were submitted to EMSL Analytical Inc. (EMSL) of Carle Place, New York for analysis. EMSL participates in the NYSDOH Environmental Laboratory Approval Program (ELAP). Copies of the laboratory's certifications are provided in Appendix C of this report.

3.2 Lead-Based Paint

A limited lead-based paint (LBP) survey was performed in order to determine the locations, components, extent, substrate materials and condition of any LBP present. The survey was performed utilizing the applicable provisions of the USEPA and United States Department of Housing and Urban Development (HUD) standards.

According to USEPA and HUD, LBP is defined as a coating with a lead concentration greater than or equal to 0.5% or 5,000 parts per million (ppm) (also equivalent to milligrams per kilogram [mg/kg]) in a paint chip sample analyzed by a laboratory.

During the survey, accessible portions of the buildings were visually assessed to identify coated building components. The coated components were grouped by the same color, texture and substrate material. For the purposes of this assessment, the survey was performed utilizing paint chip sampling. One sample was collected of each coated building component for laboratory analysis. During sample collection, layers of the coating present were collected with the substrate material excluded. Following collection of each sample, the inspector noted the location from where each sample was collected on a sample location plan and added the sample identification to a Chain of Custody form.

The samples were sent to the laboratory for lead analysis by atomic absorption spectroscopy utilizing USEPA SW-846 Method 3050B/7000B.

All samples were submitted to EMSL Analytical Inc. (EMSL) of Carle Place, New York for analysis. EMSL participates in the NYSDOH Environmental Laboratory Approval Program (ELAP).

As indicated previously, the lead-based paint survey performed as part of this assessment was intended to determine whether lead-based paint is present within the surveyed area for waste management purposes only (only one sample was collected per coated building component). The lead-based paint survey was not performed to satisfy the requirements of a lead-based paint survey per USEPA or the United States Department of Housing and Urban Development (HUD). In addition, the lead-based paint survey was not performed to identify lead-containing materials for the purpose of complying with the United States Department of Labor Occupational Safety and Health Administration's (OSHA's) "Lead in Construction" Rule (29 CFR 1926.62).

3.3 Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are a group of synthetic chemical compounds known for their non-flammability, chemical stability, low volatility and electrical insulating properties. Due to these properties, PCBs were widely used in electrical, heat transfer and hydraulic equipment; as plasticizers in paints, plastics, caulks and rubber products; as pigments in dyes; as well as many other applications. PCBs were first synthesized in 1881 and, due to their toxicity and environmental persistence, their manufacture was prohibited by USEPA in 1977.

The Toxic Substances Control Act (TSCA) (40 CFR Part 761) regulates the management of PCBs at concentrations greater than or equal to 50 parts per million (ppm). Under TSCA, any equipment or material containing ≥50 ppm PCBs has specific handling, transportation, record keeping and disposal requirements. Electrical equipment has specific requirements depending on the type of equipment and its PCB concentration. Other equipment and materials containing ≥50 ppm PCBs is generally termed "PCB Bulk Product Waste." However, if the electrical equipment or PCB Bulk Product Waste contaminates any other material via a spill, leaching, contact, etc., the impacted material is termed a "PCB Remediation Waste" and is regulated under TSCA if PCBs are detected in the material.

In New York State, the NYSDEC regulates equipment and materials containing PCBs at concentrations of greater than or equal to 50 ppm as hazardous waste. The NYSDEC's regulations governing the identification of PCB hazardous waste are codified at 6 NYCRR Part 371.4(e), and the NYSDEC's regulations governing the management of PCB hazardous waste are codified at 6 NYCRR Parts 372 and 373.

It should be noted that an exemption for "small capacitors" is contained in both TSCA (40 CFR 761.60(b)(2)(ii)) and the New York State hazardous waste management regulations (6 NYCRR Part 371.4(e)(1)), which is applicable to fluorescent light ballasts. All fluorescent light ballasts contain small capacitors. If manufactured prior to 1978, these small capacitors typically contain PCBs at concentrations exceeding 50 ppm. As a result, based on this exemption, the regulations allow non-leaking ballasts to be managed as municipal solid waste. However, USEPA has determined that the ballast's potting material, the insulation that fills the space between the

ballast and the outer metal shell, also contains PCBs at concentrations that can exceed 50 ppm in pre-1978 ballasts. Therefore, USEPA recommends that either the ballast be sampled to determine that its PCB concentration is less than 50 ppm allowing it to be managed as municipal solid waste, or assume the ballast contains ≥50 ppm PCBs and manage the ballast as PCB Bulk Product Waste. Since sampling can be costly, often the most cost-effective option is to simply manage ballasts as PCB Bulk Product Waste.

During the survey, all PCB and suspect PCB items observed were quantified and their locations noted on a floor plan. If it was determined that the item should be sampled for PCBs, the sample was sent to EMSL Analytical Inc. (EMSL) of Cinnaminson, New Jersey for analysis utilizing USEPA SW-846 Method 8082.

3.4 Universal Waste

Due primarily to the presence of mercury and other metals in some commonplace building materials that would render them hazardous waste, the USEPA has created a category of waste referred to as "universal waste" to streamline the hazardous waste management standards and prevent generators of these materials from becoming traditional hazardous waste generators. The goal of this program is to ensure that these materials are properly managed and prevented from entering the environment without imposing the onerous requirements of the hazardous waste management regulations.

As a result, USEPA has specified, and NYSDEC has adopted, the identification of four categories of ubiquitous wastes for management as universal waste. These wastes include certain lamps (i.e., fluorescent, neon, high-intensity discharge, metal halide, sodium vapor and mercury vapor), batteries, mercury-containing equipment and certain pesticides. The regulations specifying the proper identification and management of universal waste are codified in the federal regulations at 40 CFR Part 273 and in the New York State regulations at 6 NYCRR Part 374-3.

During the survey, all universal waste observed was quantified and their locations noted. Samples were not collected of universal waste during the survey for laboratory analysis.

3.5 Refrigerant-Containing Equipment

Many different chemical compounds used as refrigerants in commercial and industrial refrigerant-containing equipment are classified as chlorofluorocarbons (CFCs). CFCs gained notoriety due their persistence in the environment coupled with their ability to efficiently destroy ozone in the upper atmosphere, which has led to the depletion of the ozone layer. As a result of the depletion of the ozone layer, USEPA established the refrigerant recycling rule under Section 608 of the Clean Air Act.

The USEPA's regulations describing the requirements for refrigerant recycling are codified at 40 CFR Part 82. These regulations require that CFCs be recovered and recycled from all equipment in which they are present during any maintenance activities and prior to any disposal activities.

In addition, USEPA has identified some refrigerants as hazardous waste in the event the refrigerants are disposed rather than recycled. The regulations specifying the proper identification and management of certain refrigerants as hazardous waste are codified in the federal regulations at 40 CFR Parts 260 through 268 and in the New York State regulations at 6 NYCRR Parts 370 through 376.

During the survey, all refrigerant-containing equipment observed was quantified and their locations noted. In addition, an attempt was made during the survey to identify the type of refrigerant present in the equipment by reading the equipment nameplate and other information provided on the equipment itself. Samples were not collected of refrigerant during the survey for laboratory analysis.

3.6 Chemical and Petroleum Products

Chemical and petroleum products have the ability to adversely impact human health and/or the environment if not properly managed. As a result, unwanted chemical and petroleum products present in containers and/or tanks should be properly managed prior to any renovation or demolition activities.

Certain chemical and petroleum products can be considered hazardous waste at the time of disposal. The regulations specifying the proper identification and management of hazardous waste are codified in the federal regulations at 40 CFR Parts 260 through 268 and in the New York State regulations at 6 NYCRR Parts 370 through 376.

Many petroleum products are considered used oil by the USEPA and NYSDEC. The regulations specifying the proper identification and management of used oil are codified in the federal regulations at 40 CFR Part 279 and in the New York State regulations at 6 NYCRR Part 374-2.

Even if a chemical or petroleum product is not identified as either hazardous waste or used oil, certain management procedures should be employed to prevent contaminating the environment or triggering a reportable quantity (RQ) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Emergency Planning and Community Right-to-Know Act (EPCRA) or the Chemical Bulk Storage (CBS) regulations. As a result, these materials should be managed as hazardous materials and properly disposed or recycled at an appropriate off-site facility.

During the survey, the chemical and petroleum products observed were quantified and their locations noted. In addition, an attempt was made during the survey to identify the type of product present in the container by reading the label provided on the container/equipment itself. Also, if the container was observed to be leaking, the approximate area of floor impacted by the spill was noted during the survey. Samples were not collected of any chemical or petroleum product during the survey for laboratory analysis.

3.7 Miscellaneous Items, Materials and Equipment

Although not included in any of the categories identified above, some miscellaneous items, materials and equipment commonplace in construction require special handling at the time of disposal, rather than management as construction and demolition debris (C&D). These materials should be removed prior to any planned demolition activities and properly managed. Since the waste management requirements for these items will depend on the specific item,

recommendations for the proper management of these items, if identified on-site, are included in the recommendations section of this report (see Section 6.0).

During the survey, all miscellaneous items, materials and equipment observed were quantified and their locations noted. In addition, an attempt was made during the survey to identify the type of item, material or equipment observed by reading the equipment nameplate and other information provided on the equipment itself. The nameplate was also consulted to determine whether the item, material or equipment contains any chemical or any other material that may be harmful to human health or the environment. Samples were not collected of any item, material or equipment during the survey for laboratory analysis.

4.0 FINDINGS

The sections that follow present the findings of the limited hazardous materials assessment based on the field inspection and laboratory analytical results. The limits of this survey are discussed in Section 2.0 of this report.

4.1 Asbestos-Containing Materials

A total of 71 bulk samples were collected of 31 homogeneous areas from the pool complex. The bulk samples were analyzed via PLM or NOB PLM for asbestos content and, if the results of the NOB PLM analysis were inconclusive, were further analyzed by TEM. A table summarizing the asbestos bulk sample results is provided as Table B-1 in Appendix B. The laboratory data packages and Chain of Custody records for the samples are provided in Appendix C. Asbestos bulk sample location plans are provided as Figures D-1 through D-3 in Appendix D.

Based on the analyses, six homogeneous areas were identified as ACM (i.e., the sample's analytical results indicated asbestos at a concentration above 1% by weight). In addition, the roofing materials on the south building was assumed to be ACM to avoid compromising the weather-tight integrity of the roof. ACM location plans are provided as Figures E-1 and E-2 in Appendix E. The following table summarizes the materials identified as ACM:

SUMMARY OF REGULATED ASBESTOS-CONTAINING MATERIALS			
Homogenous Area	**Location**	**Asbestos content (%)**	**Approximate Quantity***
Exterior Wall Stucco	South Vendor Space	2.10% Chrysotile	10,000 SF
	Eastern Façade - Lower Portion	3.00% Chrysotile	
	Eastern Façade - South Tower	3.40% Chrysotile	
	North Vendor Space	2.80% Chrysotile	

SUMMARY OF REGULATED ASBESTOS-CONTAINING MATERIALS			
Homogenous Area	**Location**	**Asbestos content (%)**	**Approximate Quantity***
Exterior Concrete on Brick	North Vendor Space, Center of North Facing Wall	2.70% Chrysotile	5 SF
Waterproofing Tar Beneath Brick Coping Stone	Exterior Wall Facing Beach	14.00% Chrysotile	112 SF
Roofing Materials	Adjacent South Building	Assumed	13,000 SF

* Quantities are estimated and should be verified by the contractor prior to bidding or abatement.
SF = square feet, LF = linear feet.

4.2 Lead-Based Paint

Paint chip samples were collected from 45 coated components from the pool complex. A table summarizing the results of the paint chip samples collected is provided as Table B-2A in Appendix B. The laboratory data packages and Chain of Custody records for the samples are provided in Appendix C. Sample location plans showing the paint chip sample locations are provided as Figures D-1 through D-3 in Appendix D.

Based on the laboratory analyses, the following components were identified as coated with lead-based paint (i.e., the sample's analytical results indicated lead at a concentration greater than 0.5% by weight):

SUMMARY OF LEAD-BASED PAINT				
Building Component	**Location**	**Color**	**Substrate**	**Lead Content**
Lamp Posts	Exterior - Perimeter of Pool Area	Green	Metal	5.7%
Skylights	Exterior - North and South Sides of the Pool Area	Green	Metal	3.8%

SUMMARY OF LEAD-BASED PAINT				
Building Component	**Location**	**Color**	**Substrate**	**Lead Content**
Walls	North Vendor Space - North Wall of Concession Area	Beige	Concrete	1.2%
Decorative Eaves	Exterior North and South Vendor Spaces	Green	Wood	6.7%
Window	North Vendor Space - North Window	Black	Wood	1.3%
Door/Window Frames	North Vendor Space - South Side	Dark Green	Metal	6.5%
Door/Window Frames	North Vendor Space - South Side	Light Green	Metal	1.3%
Door/Window Frames	Exterior - North Vendor Space, South Side	Beige	Wood	7.2%
Door Frames	Exterior - North Door of South Vendor Space	Beige	Wood	10%
Wall	South Vendor Space, West Wall	Green on White	Concrete	10%
Walls	Women's Locker Room	White	Concrete	5.4%
Doors	Women's Restroom Stalls	Dark Pink	Wood	1.1%
Tanks	South Side of Pool Filtration Room	Blue/Green	Metal	7.5%
Containment Wall	Surrounding Tank in the Pool Filtration Room	Yellow	Concrete	3.0%
Walls	Pool Filtration Room	White over Blue	Concrete	2.9%
Ceiling	Tunnel to Beach	White	Concrete	6.9%
Walls	Hot Water Heater Room	Red	Concrete	4.0%
Walls	Hot Water Heater Room	Yellow	Concrete	2.1%

SUMMARY OF LEAD-BASED PAINT				
Building Component	**Location**	**Color**	**Substrate**	**Lead Content**
Windows	Decorative Window at Base of Stairs to Beach	Green	Metal	8.8%

Due to the large quantity of exterior wall stucco present on the eastern building façade along with the fact that the paint chip samples collected from this stucco (i.e., samples KC-LBP-41 and KC-LBP-42) indicated that the material could potentially be characterized as a lead hazardous waste due to "20 times rule" exceedance, it was determined that samples should be collected of this stucco for RCRA metals analysis by the Toxicity Characteristic Leaching Procedure (TCLP). Since the stucco is painted with two different colors, it was determined that one stucco sample should be collected of each color (two samples total). The sampling was performed on May 7, 2020 and consisted of the collection of two stucco samples along with its associated paint. A table summarizing the results of the stucco samples compared to the TCLP Regulatory Limits is provided as Table B-2B in Appendix B. The laboratory data package and Chain of Custody records for the samples are provided in Appendix C. A sample location plan showing the stucco sample locations is provided as Figure D-3 in Appendix D.

Based on the laboratory analyses, none of the RCRA metals exceeded their respective TCLP Regulatory Limit. As a result, it is not anticipated that the stucco would be considered a hazardous waste.

4.3 Polychlorinated Biphenyls

Exterior caulks and window glazing were observed in the pool complex. In order to determine whether these materials contain PCBs at concentrations in excess of the regulatory level of 50 ppm, samples were collected for PCB analysis to ensure that the materials are properly managed once removed. A table summarizing the PCB sample results is provided as Table B-3 in Appendix B. The laboratory data package and Chain of Custody records for the samples are

provided in Appendix C. Sample location plans showing the PCB sample locations are provided as Figures D-1 through D-3 in Appendix D.

As indicated in Table B-3, PCBs were detected in one of the samples at a concentration above the USEPA Toxic Substances Control Act (TSCA) and New York State Department of Environmental Conservation (NYSDEC) PCB regulatory level of 50 ppm. The following table identifies the material containing greater than 50 ppm PCBs:

SUMMARY OF PCB MATERIALS CONTAINING GREATER THAN 50 PPM		
Material Description	**Location**	**Total PCB Concentration (ppm)**
Exterior Foundation Wall Caulk	North Vendor Space, South Facing Wall	69

Based on the on-site survey, the following suspect PCB-containing items were identified within the within the pool complex:

SUMMARY OF SUSPECT PCB-CONTAINING EQUIPMENT		
Waste Type	**Location**	**Quantity**
Ballasts	Chlorine Room, South Vendor Space	4
	Women's Restroom - Slop Sink Room	1
	Women's Locker Room - Hot Water Heater Room	2
	Hall to Pool Filtration Room	2
	Pool Filtration Room	4
	Southern Building - Shop No. 1 (northernmost)	3
	Southern Building - Shop No. 2	3
	Southern Building - Shop No. 3	3

SUMMARY OF SUSPECT PCB-CONTAINING EQUIPMENT		
Waste Type	**Location**	**Quantity**
Ballasts (cont.)	Southern Building - Shop No. 4	1
	Southern Building - Shop No. 5	1
	Southern Building - Shop No. 6 (southernmost)	1
	Southern Event Space	20

4.4 Universal Waste

Based on the on-site survey, the following universal waste was identified within the pool complex:

SUMMARY OF UNIVERSAL WASTE		
Waste Type	**Location**	**Quantity**
Fluorescent Lamps	Lamp Posts, Surrounding Pool	7
	Chlorine Room, South Vendor Space	16
	Women's Restroom - Slop Sink Room	2
	Women's Locker Room - Hot Water Heater Room	4
	Hall to Pool Filtration Room	4
	Pool Filtration Room	8
	Southern Building – Shop No. 1 (northernmost)	6
	Southern Building – Shop No. 2	6
	Southern Building – Shop No. 3	6
	Southern Building – Shop No. 4	2

SUMMARY OF UNIVERSAL WASTE		
Waste Type	**Location**	**Quantity**
Fluorescent Lamps (cont.)	Southern Building – Shop No. 5	2
	Southern Building – Shop No. 6 (southernmost)	2
	Southern Event Space	40

4.5 Refrigerant-Containing Equipment

Based on the on-site survey, the following refrigerant-containing equipment was identified within the pool complex:

SUMMARY OF REFRIGERANT-CONTAINING EQUIPMENT		
Waste Type	**Location**	**Quantity**
Refrigeration Units	North Vendor Space - Concession Area	8
Ice Machine	North Vendor Space - Concession Area	1

4.6 Chemical and Petroleum Products

Based on the on-site survey, the following chemical and/or petroleum products were identified within the within the pool complex:

SUMMARY OF CHEMICAL AND PETROLEUM PRODUCTS		
Description	**Location**	**Quantity**
Paint	South Vendor Space - Vacant/Storage	Twenty 1-Gallon Containers

SUMMARY OF CHEMICAL AND PETROLEUM PRODUCTS		
Description	**Location**	**Quantity**
Cleaner/Sanitizer	Women's Restroom - Slop Sink Room	One 5-Gallon Container
Fire Extinguishers	North Vendor Space - Concession Area	1
	Women's Locker Room	1
	Men's Locker Room	1

4.7 Miscellaneous Items, Materials and Equipment

Based on the on-site survey, no miscellaneous items, materials and equipment were identified within the pool complex.

5.0 CONCLUSIONS

D&B completed a limited hazardous materials assessment for the Playland Park pool complex located in Rye, New York, as described in Section 2.0 of this report. The results of the survey are provided below.

Asbestos-Containing Materials

The results of the samples collected indicate that the following materials are considered to be ACM.

- Exterior wall stucco located on the North and South Vendor Spaces and beachfront elevation, with the exception of the north tower eastern façade.
- Concrete patching located on brick on the exterior north facing wall of the North Vendor Space.
- Waterproofing Tar located beneath the brick coping stone on the exterior wall facing the beach.

In addition, the following materials were assumed to be ACM:

- Roofing materials on the Southern Building.

Lead-Based Paint

The results of the analysis of the paint chip samples collected indicate that the following coatings are considered to be lead-based paint:

- Green paint on the lamp posts located around the pool.
- Green paint on the skylights located on the north and south sides of the pool deck.
- Beige paint located on the walls of the Concession Area within the North Vendor Space.
- Green paint located on the decorative eaves of the North and South Vendor Spaces.

- Black paint located on the north window of the Concession Area within the North Vendor Space.
- Dark green and light green paint located on the south side doors and windows of the North Vendor Space.
- Beige paint located on the exterior of the south side doors and windows of the North Vendor Space.
- Beige paint located on the exterior of the north side doors of the South Vendor Space.
- Green over white paint located on the west wall of the South Vendor Space.
- White paint located on the concrete walls of the Women's and Men's Locker Rooms.
- Dark pink paint located on the wooden stall doors of the Women's Restroom.
- Blue over green paint located on the tanks in the Pool Filtration Room.
- Yellow paint located on the tank containment wall in the Pool Filtration Room.
- White over blue paint located on the walls of the Pool Filtration Room.
- White paint located on the ceiling of the tunnel from the Bathhouse to the beach.
- Red and yellow paints located on the walls of the hot water heater room of the Men's Locker Room.
- Green paint located on the decorative windows at the base of the stairs along the boardwalk.

In addition, based on the TCLP RCRA metals analytical results for the stucco samples, it is not anticipated that the stucco would be considered a hazardous waste.

Polychlorinated Biphenyls

The results of the samples collected indicate that the following material contains greater than 50 ppm PCBs and requires special management under the TSCA and NYSDEC hazardous waste management regulations:

- Exterior foundation wall caulk located on the North Vendor Space.

Based on the findings of the on-site survey, the following suspect PCB-containing items were observed:

- Ballasts located in the Chlorine Room of the South Vendor Space, the slop sink room in the Women's Restroom, the hot water heater room in the Women's Locker Room, the Pool Filtration Room, the hallway leading to the Pool Filtration Room, and the Event Space and Shops in the Southern Building.

Universal Waste

Based on the findings of the on-site survey, the following universal waste was observed:

- Fluorescent lamps located on the lamp posts surrounding the pool, in the Chlorine Room of the South Vendor Space, the slop sink room in the Women's Restroom, the hot water heater room in the Women's Locker Room, the Pool Filtration Room, the hallway leading to the Pool Filtration Room and the Event Space and Shops in the Southern Building.

Refrigerant-Containing Equipment

Based on the findings of the on-site survey, the following refrigerant-containing equipment was observed:

- Refrigeration units and an ice machine located in the Concession Area of the North Vendor Space.

Chemical and Petroleum Products

Based on the findings of the on-site survey, the following chemical and petroleum products were observed:

- Twenty 1-gallon containers of paint located in the vacant storage area of the South Vendor Space.
- One 5-gallon container of cleaner/sanitizer located in the slop sink room of the Women's Restroom.

- Fire extinguishers located in the Concessions Area of the North Vendor Space, and within the Women's and Men's Locker Room.

Miscellaneous Items, Materials and Equipment

Based on the findings of the on-site survey, no miscellaneous items, materials and equipment were observed.

6.0 RECOMMENDATIONS

The following recommendations are presented based on the conclusions of the limited hazardous materials assessment as presented in Section 5.0 of this report.

6.1 Asbestos-Containing Materials

Prior to performing any future demolition or renovation activities within the survey limits, all ACM affected by the planned activities should be removed and managed in accordance with the USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 61), New York State Department of Labor (NYSDOL) Industrial Code Rule 56 (ICR 56) and any applicable local regulations. A licensed and accredited asbestos abatement contractor must be utilized to perform the removal of all ACM identified within the buildings or on the exterior surfaces. Suspect ACM not sampled during this survey should be considered ACM until sampled and proven by laboratory analysis to be non-ACM. The USEPA and NYSDOL must be notified of this project prior to performing any asbestos removal activities.

During performance of the asbestos removal activities, the owner must retain an independent third-party contractor to conduct project monitoring and work area air sampling and analysis to ensure that the asbestos removal work is performed in accordance with Industrial Code Rule 56 and all other applicable regulations. The owner must obtain copies of the analytical results for all air samples collected for each specific project in order to document the airborne asbestos concentrations before, during and after the asbestos abatement activities. In addition, copies of all clearance asbestos air sampling analytical results must be submitted to the NYSDOL Division of Safety & Health, Asbestos Control Bureau, as required by Industrial Code Rule 56.

6.2 Lead-Based Paint

In the event that materials identified as containing lead are demolished as part of the rehabilitation project, the demolition debris must be tested for lead, at a minimum, utilizing the Toxicity Characteristic Leaching Procedure (TCLP). If the TCLP analysis indicates lead at a concentration of 5 mg/L or greater, then the debris must be managed as a hazardous waste in

accordance with the USEPA Resource Conservation and Recovery Act (RCRA) regulations (40 CFR Parts 260 through 268) and the New York State Department of Environmental Conservation's (NYSDEC's) hazardous waste management regulations (6 NYCRR Parts 370 through 376). However, if the lead containing component is composed of metal, then the scrap metal exemption may be used, and the component can be recycled in lieu of management as hazardous waste (records of the transportation and proper management of these items must be maintained in accordance with 6 NYCRR 371.1(c)(7)).

Whenever work is performed that disturbs any product/material that contains lead, workers must be protected in accordance with the United States Department of Labor Occupational Safety and Health Administration's (OSHA's) "Lead in Construction" Rule (29 CFR 1926.62). As indicated previously, the lead-based paint survey performed during this assessment was performed to only identify the presence of lead-based paint within the limits of work for waste management purposes; this survey was not performed to identify lead-containing materials for the purpose of complying with 29 CFR 1926.62.

In the event that the buildings are converted to HUD housing or a "child-occupied facility", additional requirements become applicable and must be addressed.

6.3 Polychlorinated Biphenyls

The PCB material (exterior foundation wall caulk) identified during this survey requires special management under TSCA and the NYSDEC hazardous waste management regulations in the event that it is affected by any future renovation or demolition activities since its PCB concentration exceeds 50 ppm.

The suspect PCB items identified during this survey and described below should be properly managed as follows in the event that they are affected by any future renovation or demolition activities and will not be reused:

- Ballasts: Since the date the ballasts were manufactured could not be determined, the ballasts should be managed as PCB Bulk Product Waste since sampling the ballasts

would be costly. PCB Bulk Product Waste should be managed at one of the following facilities:

- An incinerator approved by USEPA in accordance with 40 CFR 761.70.
- A chemical waste landfill approved by USEPA in accordance with 40 CFR 761.75.
- A hazardous waste landfill approved by USEPA in accordance with 40 CFR 264 and the NYSDEC in accordance with 6 NYCRR 373.
- An alternate disposal approval in accordance with 40 CFR 761.60(e).

6.4 Universal Waste

All of the universal waste identified during this survey should be properly managed in accordance with the USEPA's universal waste management program codified at 40 CFR 273, as well as any additional requirements set forth by the NYSDEC at 6 NYCRR 274-3, in the event that they are affected by any future renovation or demolition activities and will not be reused.

6.5 Refrigerant-Containing Equipment

All of the refrigerant contained in the refrigerant-containing equipment identified during this survey should be properly managed in accordance with the USEPA's refrigerant recycling rule codified at 40 CFR 82 in the event that the equipment is affected by any future renovation or demolition activities and will not be reused. Once the refrigerant is recovered from the equipment and properly managed, the equipment can be recycled as scrap metal.

6.6 Chemical and Petroleum Products

All of the chemical and petroleum products identified during this survey should be properly managed in the event that they are affected by any future renovation or demolition activities and will not be reused. The first step in disposal is to perform a waste determination on each product in accordance with 40 CFR 261 and 6 NYCRR 371. If a Safety Data Sheet (SDS) cannot be located for the product, a sample of the material should be collected and analyzed for flash point, pH, reactive sulfide, reactive cyanide and RCRA constituents by the Toxicity Characteristic Leaching Procedure (TCLP), as well as any additional parameters specified by the selected

disposal facility. If determined to be hazardous waste, the waste should be managed at a facility authorized to manage hazardous waste in accordance with 40 CFR 264 and 6 NYCRR 373. If determined to be nonhazardous waste, the waste should be managed as nonhazardous waste at a facility approved to manage such waste.

APPENDIX A

ASBESTOS LICENSES

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

D & B Engineers and Architects, P.C. (dba)Dvirka and Bartilucci Consulting Engineers)

330 Crossways Park Drive

Woodbury, NY 11797

FILE NUMBER: 07-0207
LICENSE NUMBER: 28587
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 07/05/2018
EXPIRATION DATE: 07/31/2019

Duly Authorized Representative – Richard M Walka:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

D & B Engineers and Architects, P.C. (dba)Dvirka and Bartilucci Consulting Engineers)

330 Crossways Park Drive

Woodbury, NY 11797

FILE NUMBER: 07-0207
LICENSE NUMBER: 28587
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 08/08/2019
EXPIRATION DATE: 08/31/2020

Duly Authorized Representative – Richard M Walka:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Eileen M. Franko, Director
For the Commissioner of Labor

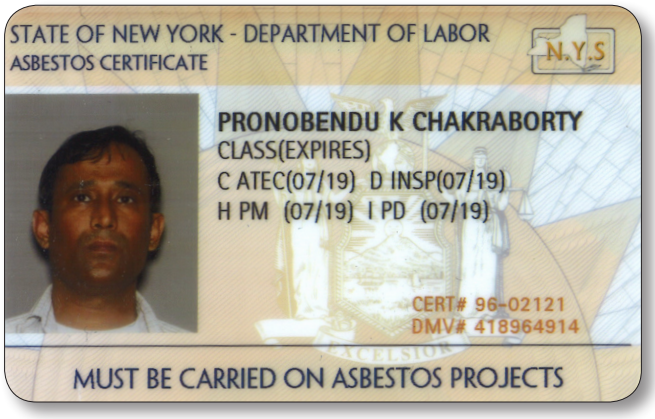
SH 432 (8/12)

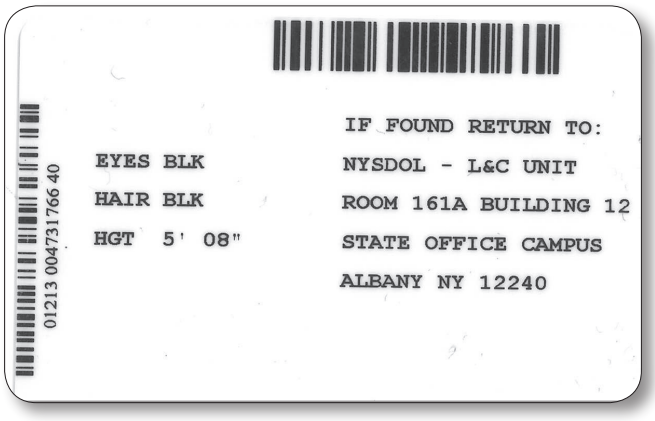
D&B Engineers and Architects, P.C.

P. KUMAR CHAKRABORTY

New York State Department of Labor (NYSDOL)
Certificate # 96-02121
Expiration Date: 07/19

New York State Department of Labor (NYSDOL) - Licenses
Project Designer
Inspector
Project Monitor
Air Sampling Technician



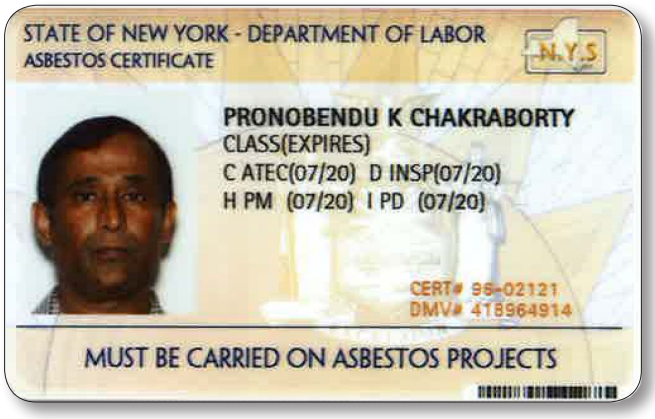


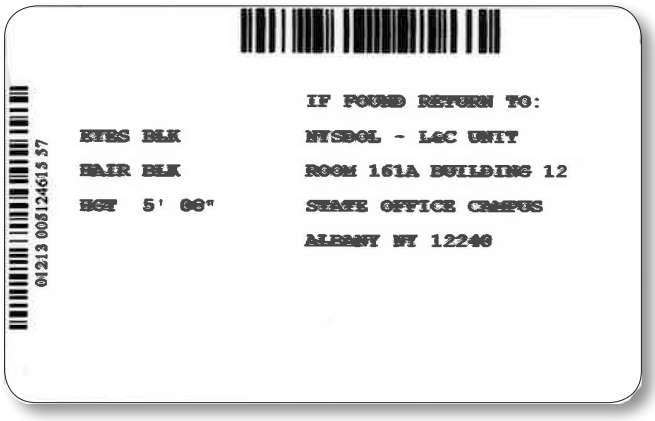
D&B Engineers and Architects, P.C.

P. KUMAR CHAKRABORTY

New York State Department of Labor (NYSDOL)
Certificate # 96-02121
Expiration Date: 07/20

New York State Department of Labor (NYSDOL) - Licenses
Project Designer
Inspector
Project Monitor
Air Sampling Technician



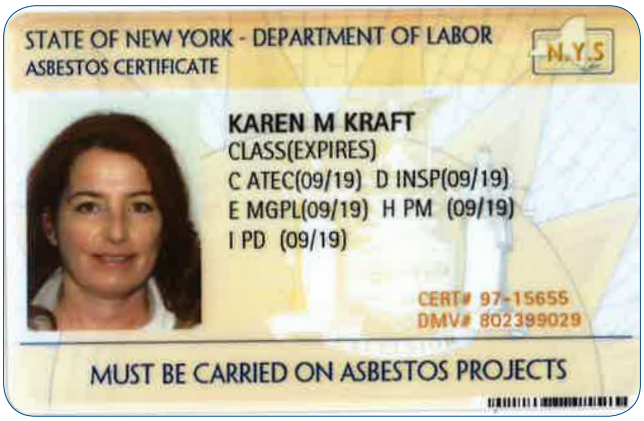


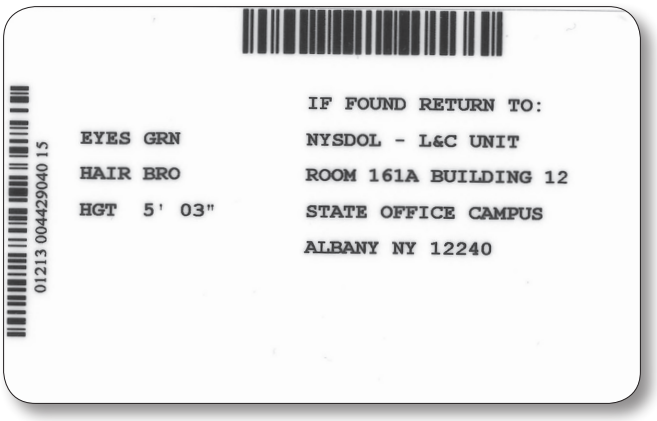
D&B Engineers and Architects, P.C.

KAREN M. KRAFT

New York State Department of Labor (NYSDOL)
Certificate # 97-15655
Expiration Date: 9/19

New York State Department of Labor (NYSDOL) - Licenses
Project Designer
Inspector
Management Planner
Air Sampling Technician
Project Monitor



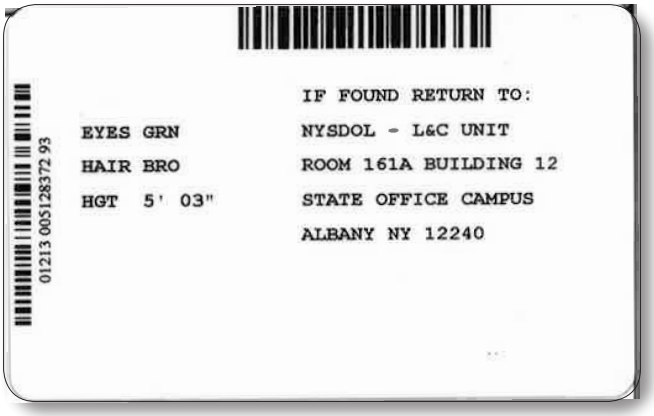


D&B Engineers and Architects, P.C.

KAREN M. KRAFT

New York State Department of Labor (NYSDOL) Certificate # 97-15655
Expiration Date: 9/20

New York State Department of Labor (NYSDOL) - Licenses
Project Designer
Inspector
Management Planner
Air Sampling Technician
Project Monitor



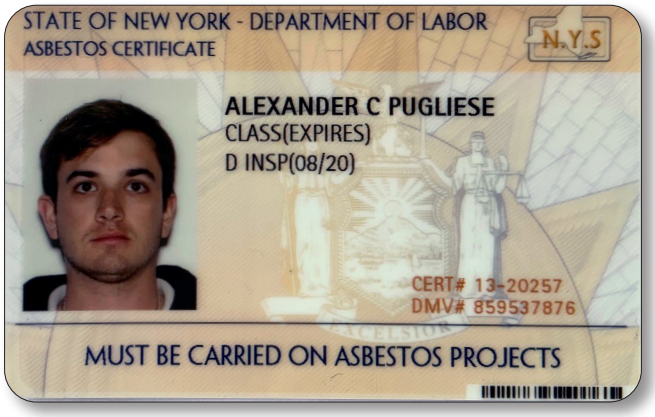
D&B Engineers and Architects, P.C.

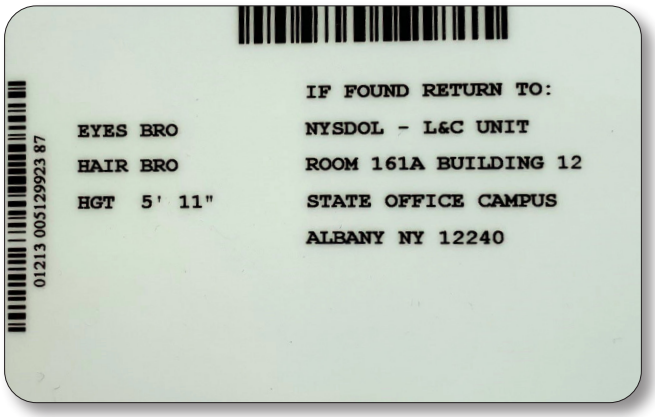
ALEXANDER C. PUGLIESE

New York State Department of Labor (NYSDOL)
Certificate # 13-20257
Expiration Date: 08/20

New York State Department of Labor (NYSDOL) - Licenses

Inspector





APPENDIX B

SAMPLE SUMMARY TABLES

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-CPDT-01-01	Pool Deck Caulking Top Layer	--	South Perimeter of Pool	Exterior	Non-Friable	Significantly Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-CPDT-01-02	Pool Deck Caulking Top Layer	--	North Perimeter of Pool	Exterior	Non-Friable	Significantly Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-CPDB-02-01	Pool Deck Caulking Bottom Layer	--	South Perimeter of Pool	Exterior	Non-Friable	Significantly Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-CPDB-02-02	Pool Deck Caulking Bottom Layer	--	North Perimeter of Pool	Exterior	Non-Friable	Significantly Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-BCSM-03-01	Brick Coping Stone Mortar	--	South Side of Pool	Exterior	Friable	Significantly Damaged	Jul-01-2019	ND	NA
KC-ACM-BCSM-03-02	Brick Coping Stone Mortar	--	North Side of Pool	Exterior	Friable	Significantly Damaged	Jul-01-2019	ND	NA
KC-ACM-ESWP-04-01	Exterior Stucco on Pool Perimeter Wall	--	South Side of Pool	Exterior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-ESWP-04-02	Exterior Stucco on Pool Perimeter Wall	--	North Side of Pool	Exterior	Friable	Damaged	Jul-01-2019	ND	NA

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-EWST-05-01	**Exterior Wall Stucco on Vendor Spaces**	**--**	**Northwest Corner of South Vendor Space**	**Exterior**	**Friable**	**Damaged**	**Jul-01-2019**	**ND**	**NA**
KC-ACM-EWST-05-02	**Exterior Wall Stucco on Vendor Spaces**	**--**	**Northeast Corner of South Vendor Space**	**Exterior**	**Friable**	**Damaged**	**Jul-01-2019**	**2.10% Chrysotile**	**NA**
KC-ACM-EWST-05-03	**Exterior Wall Stucco on Vendor Spaces**	**--**	**South Center of North Vendor Space**	**Exterior**	**Friable**	**Damaged**	**Jul-01-2019**	**NA/PS**	**NA**
KC-ACM-WCEW-06-01	Exterior Window Caulk on Vendor Spaces	--	East Side of North Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	<1% Anthophyllite
KC-ACM-WCEW-06-02	Exterior Window Caulk on Vendor Spaces	--	East Side of Lifeguard Room	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-CW-07-01	Interior Concrete Wall in Vendor Spaces	1	North Wall of North Vendor Space	Interior	Non-Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CW-07-02	Interior Concrete Wall in Vendor Spaces	1	West Wall of Chlorine Room	Interior	Non-Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-TPP-08-01	Tar Patch on Pool Deck	--	Southeast Corner of Pool Deck	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-TPP-08-02	Tar Patch on Pool Deck	--	Northeast Corner of Pool Deck	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-DGG-09-01	Door Glazing on North Vendor Space	--	East Door Facing South	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	<1% Anthophyllite
KC-ACM-DGG-09-02	Door Glazing on North Vendor Space	--	West Door Facing South	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	<1% Anthophyllite
KC-ACM-ECFW-10-01	Exterior Foundation Wall Caulk	--	South Facing Wall of North Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ECFW-10-02	Exterior Foundation Wall Caulk	--	Southwest Corner of South Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ERFC-11-01	Exterior Black Roof Flashing Caulk	--	Northwest Corner of North Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ERFC-11-02	Exterior Black Roof Flashing Caulk	--	North Center of North Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ERBC-12-01	Exterior Beige Roof Flashing Caulk	--	Southwest Corner of South Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ERBC-12-02	Exterior Beige Roof Flashing Caulk	--	South Center of South Vendor Space	Exterior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-ECB-13-01	**Exterior Concrete on Brick (North Vendor Space)**	**--**	**North Vendor Space, Center of North Facing Wall**	**Exterior**	**Friable**	**Damaged**	**Jul-01-2019**	**2.70% Chrysolite**	**NA**
KC-ACM-ECB-13-02	**Exterior Concrete on Brick (North Vendor Space)**	**--**	**North Vendor Space, North Facing Wall Near Door**	**Exterior**	**Friable**	**Damaged**	**Jul-01-2019**	**NA/PS**	**NA**

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-TCTM-14-01	Terra Cotta Tile Mortar	1	West Side of Concession Area	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-TCTM-14-02	Terra Cotta Tile Mortar	1	West Side of Chlorine Room	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CBM-15-01	Coping Brick Mortar	Lower	South Stair to Beach	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CBM-15-02	Coping Brick Mortar	Lower	North Stair to Beach	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-PCTM-16-01	Pink Ceramic Tile Mortar Woman's Restrooms	Lower	West Side of Restroom	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-PCTM-16-02	Pink Ceramic Tile Mortar Woman's Restrooms	Lower	East Side of Restroom	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CBM-17-01	Concrete Black Mortar Women's Locker Room	Lower	Northeast Corner of Hot Water Heater Room	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CBM-17-02	Concrete Black Mortar Women's Locker Room	Lower	Pipe Chase in Janitor Room	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-CTA-18-01	Ceramic Tile Adhesive in Showers	Lower	South Wall Women's Showers	Interior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-CTA-18-02	Ceramic Tile Adhesive in Showers	Lower	North Wall Men's Showers	Interior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-IWGT-19-01	Window Glazing Tunnel Entrance Rooms	Lower	Window from Women's Room	Interior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-IWGT-19-02	Window Glazing Tunnel Entrance Rooms	Lower	Window from Men's Room	Interior	Non-Friable	Damaged	Jul-01-2019	Inconclusive	ND
KC-ACM-GTM-20-01	Green Ceramic Tile Mortar Men's Restroom	Lower	South Wall of Men's Room	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-GTM-20-02	Green Ceramic Tile Mortar Men's Restroom	Lower	West Wall of Men's Room	Interior	Friable	Damaged	Jul-01-2019	ND	NA
KC-ACM-WPPD-21-01	Waterproofing Tar under Concrete Pool Deck	--	Northeast of Pool	Exterior	Non-Friable	Good	Mar-02-2020	Inconclusive	ND
KC-ACM-WPPD-21-02	Waterproofing Tar under Concrete Pool Deck	--	Southeast of Pool	Exterior	Non-Friable	Good	Mar-02-2020	Inconclusive	ND
KC-ACM-PTL-22-01	Tar Pool Lines	--	Pool - Center East Side	Exterior	Non-Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-PTL-22-01	Tar Pool Lines	--	Pool - Center West Side	Exterior	Non-Friable	Damaged	Mar-02-2020	Inconclusive	ND

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-PTP-23-01	Textured Pool Paint - Top Layer	--	Pool - South Side	Exterior	Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-PTP-23-02	Textured Pool Paint - Top Layer	--	Pool - West Side	Exterior	Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-PTP-23-03	Textured Pool Paint - Top Layer	--	Pool - North Side	Exterior	Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-PTP-23-04	Textured Pool Paint - Top Layer	--	Pool - East Side	Exterior	Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-PTP-23-05	Textured Pool Paint - Top Layer	--	Pool - Center Bottom	Exterior	Friable	Damaged	Mar-02-2020	Inconclusive	ND
KC-ACM-WPTB-24-01	**Waterproofing Tar under Brick Coping Stone**	**--**	**Wall Facing Beach - South Side**	**Exterior**	**Non-Friable**	**Good**	**Mar-02-2020**	**14.00% Chrysotile**	**NA**
KC-ACM-WPTB-24-02	**Waterproofing Tar under Brick Coping Stone**	**--**	**Wall Facing Beach - North Side**	**Exterior**	**Non-Friable**	**Good**	**Mar-02-2020**	**NA/PS**	**NA**
KC-ACM-WPTC-25-01	Waterproofing Tar under Concrete along Boardwalk	Lower	Boardwalk - Center of Concrete Walk	Exterior	Non-Friable	Good	Mar-02-2020	Inconclusive	ND
KC-ACM-WPTC-25-02	Waterproofing Tar under Concrete along Boardwalk	Lower	Boardwalk - South Side of Concrete Walk	Exterior	Non-Friable	Good	Mar-02-2020	Inconclusive	ND

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
KC-ACM-DWJC-26-01	Drywall Joint Compound - South Event Space	Lower	South Event Space - South Side of West Wall	Interior	Friable	Good	Mar-02-2020	ND	NA
KC-ACM-DWJC-26-02	Drywall Joint Compound - South Event Space	Lower	South Event Space - Center of West Wall	Interior	Friable	Good	Mar-02-2020	ND	NA
KC-ACM-DWJC-26-03	Drywall Joint Compound - South Event Space	Lower	South Event Space - North Side of West Wall	Interior	Friable	Good	Mar-02-2020	ND	NA
KC-ACM-DW-27-01	Drywall - South Event Space	Lower	South Event Space - South Side of West Wall	Interior	Friable	Good	Mar-02-2020	ND	NA
KC-ACM-DW-27-01	Drywall - South Event Space	Lower	South Event Space - North Side of West Wall	Interior	Friable	Good	Mar-02-2020	ND	NA
AP-ACM-EWST-28-01	**Exterior Wall Stucco on Eastern Façade - East Side**	**--**	**East Side of South Stairs**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**3.00% Chrysotile**	**NA**
AP-ACM-EWST-28-02	**Exterior Wall Stucco on Eastern Façade - East Side**	**--**	**East Wall North Stairs**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**NA/PS**	**NA**
AP-ACM-EWST-28-03	**Exterior Wall Stucco on Eastern Façade - East Side**	**--**	**East Wall below North Balcony**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**NA/PS**	**NA**

TABLE B-1
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
ASBESTOS BULK SAMPLE RESULTS

Sample ID	Material Description	Sample Location			Sample Information			Sample Result	
		Floor	Area	Interior/ Exterior	Friable/ Non-Friable	Condition	Date Sample Collected	PLM or PLM-NOB	TEM-NOB
AP-ACM-EWST-29-01	Exterior Wall Stucco on Eastern Façade - North Tower	--	North Side of North Balcony	Exterior	Friable	Damaged	May-07-2020	ND	NA
AP-ACM-EWST-29-02	Exterior Wall Stucco on Eastern Façade - North Tower	--	South Side of Balcony Door	Exterior	Friable	Damaged	May-07-2020	ND	NA
AP-ACM-EWST-29-03	Exterior Wall Stucco on Eastern Façade - North Tower	--	South Side of North Tower	Exterior	Friable	Damaged	May-07-2020	ND	NA
AP-ACM-EWST-30-01	**Exterior Wall Stucco on Eastern Façade - South Tower**	**--**	**South Side of Balcony above Railing**	**Exterior**	**Friable**	**Damaged**	**May-07-2020**	**ND**	**NA**
AP-ACM-EWST-30-02	**Exterior Wall Stucco on Eastern Façade - South Tower**	**--**	**North Side of South Tower**	**Exterior**	**Friable**	**Damaged**	**May-07-2020**	**3.40% Chrysotile**	**NA**
AP-ACM-EWST-30-03	**Exterior Wall Stucco on Eastern Façade - South Tower**	**--**	**North Side above Balcony Railing**	**Exterior**	**Friable**	**Damaged**	**May-07-2020**	**NA/PS**	**NA**
AP-ACM-EWST-31-01	**Exterior Wall Stucco on North Vendor Space**	**--**	**South Side**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**ND**	**NA**
AP-ACM-EWST-31-02	**Exterior Wall Stucco on North Vendor Space**	**--**	**West Side above Stairs**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**2.80% Chrysotile**	**NA**
AP-ACM-EWST-31-03	**Exterior Wall Stucco on North Vendor Space**	**--**	**North Side above Roof**	**Exterior**	**Friable**	**Good**	**May-07-2020**	**NA/PS**	**NA**

Notes:
ND: Asbestos not detected
PLM: Polarized light microscopy
NA/PS: Not analyzed. Analysis stopped after first positive result.
NA: Not analyzed.
TEM: Transmission electron microscopy
Asbestos Containing Materials are bold and highlighted in orange.

TABLE B-2A
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
PAINT CHIP LEAD SAMPLE RESULTS

Sample ID	Location	Floor	Color	Interior/ Exterior	Condition	Substrate Material	Date Sample Collected	Lead Concentration (% by weight)
KC-LBP-01	**Lamp Post South Side of Pool Wall**	**--**	**Green**	**Exterior**	**Damage**	**Metal**	**Jul-1-2019**	**5.7**
KC-LBP-02	Coping Stone Wall South Side of Pool	--	White	Exterior	Damage	Concrete	Jul-1-2019	0.17
KC-LBP-03	**South Side Skylight**	**--**	**Green**	**Exterior**	**Damage**	**Metal**	**Jul-1-2019**	**3.8**
KC-LBP-04	East Side Concession Area Window	1	Green	Interior	Damage	Metal	Jul-1-2019	0.23
KC-LBP-05	**Concession Area North Wall**	**1**	**Beige**	**Interior**	**Good**	**Concrete**	**Jul-1-2019**	**1.2**
KC-LBP-06	**Eaves on North Side of South Vendor Space**	**--**	**Green**	**Exterior**	**Damage**	**Wood**	**Jul-1-2019**	**6.7**
KC-LBP-07	**Window Frame North Side of North Vendor Space**	**--**	**Black**	**Exterior**	**Damage**	**Wood**	**Jul-1-2019**	**1.3**
KC-LBP-08	**Door/Window Frame South Side of North Vendor Space**	**--**	**Dark Green**	**Exterior**	**Damage**	**Metal**	**Jul-1-2019**	**6.5**
KC-LBP-09	**Door/Window Frame South Side of North Vendor Space**	**--**	**Light Green**	**Exterior**	**Damage**	**Metal**	**Jul-1-2019**	**1.3**
KC-LBP-10	**Exterior Door/Window South Side of North Vendor Space**	**--**	**Beige**	**Exterior**	**Damage**	**Wood**	**Jul-1-2019**	**7.2**

TABLE B-2A
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
PAINT CHIP LEAD SAMPLE RESULTS

Sample ID	Location	Floor	Color	Interior/ Exterior	Condition	Substrate Material	Date Sample Collected	Lead Concentration (% by weight)
KC-LBP-11	**North Door on South Vendor Space**	**--**	**Beige**	**Exterior**	**Damage**	**Wood**	**Jul-1-2019**	**10**
KC-LBP-12	Base of Breezeway, South Vendor Space	--	Red	Exterior	Good	Concrete	Jul-1-2019	0.033
KC-LBP-13	**West Wall, South Vendor Space**	**1**	**Green on White**	**Interior**	**Damage**	**Concrete**	**Jul-1-2019**	**10**
KC-LBP-14	Safety Line Around Pool	--	Yellow	Exterior	Good	Concrete	Jul-1-2019	0.26
KC-LBP-15	Locker Room Stair Rails	--	Blue	Exterior	Damage	Metal	Jul-1-2019	0.020
KC-LBP-16	Wall of Women's Locker Room Entrance	Lower	Black	Interior	Good	Concrete	Jul-1-2019	0.015
KC-LBP-17	Deck of Women's Locker Room Entrance	Lower	Black	Interior	Good	Concrete	Jul-1-2019	0.017
KC-LBP-18	Women's Locker Room Floor	Lower	Gray	Interior	Good	Concrete	Jul-1-2019	0.013
KC-LBP-19	Door Frame Women's Restroom	Lower	Beige	Interior	Damage	Wood	Jul-1-2019	0.083
KC-LBP-20	**Concrete Wall in Women's Locker Room**	**Lower**	**White**	**Interior**	**Good**	**Concrete**	**Jul-1-2019**	**5.4**

TABLE B-2A
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
PAINT CHIP LEAD SAMPLE RESULTS

Sample ID	Location	Floor	Color	Interior/ Exterior	Condition	Substrate Material	Date Sample Collected	Lead Concentration (% by weight)
KC-LBP-21	**Women's Restroom Stall Doors**	**Lower**	**Dark Pink**	**Interior**	**Good**	**Wood**	**Jul-1-2019**	**1.1**
KC-LBP-22	Women's Locker Room Entrance to Ceiling Tunnel	Lower	White	Interior	Damage	Concrete	Jul-1-2019	0.022
KC-LBP-23	**Tank in South Side of Pool Filtration Room**	**Lower**	**Blue/ Green**	**Interior**	**Damage**	**Concrete**	**Jul-1-2019**	**7.5**
KC-LBP-24	**Containment Wall Around Tank**	**Lower**	**Yellow**	**Interior**	**Damage**	**Concrete**	**Jul-1-2019**	**3.0**
KC-LBP-25	Metal Pipes Between Tanks	Lower	Light Blue	Interior	Damage	Metal	Jul-1-2019	0.26
KC-LBP-26	Pipe Valves	Lower	Red	Interior	Damage	Metal	Jul-1-2019	0.42
KC-LBP-27	**Concrete Wall in Pool Filtration Room**	**Lower**	**White over Blue**	**Interior**	**Damage**	**Concrete**	**Jul-1-2019**	**2.9**
KC-LBP-28	Pool Filtration Room Ceiling	Lower	White	Interior	Damage	Concrete	Jul-1-2019	0.016
KC-LBP-29	Metal Pipe South Side	Lower	Light Green	Interior	Damage	Metal	Jul-1-2019	0.32
KC-LBP-30	Three Tanks in Pool Filtration Room	Lower	Blue over Silver	Interior	Damage	Metal	Jul-1-2019	0.091

TABLE B-2A
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
PAINT CHIP LEAD SAMPLE RESULTS

Sample ID	Location	Floor	Color	Interior/ Exterior	Condition	Substrate Material	Date Sample Collected	Lead Concentration (% by weight)
KC-LBP-31	Tank Base	Lower	Red	Interior	Damage	Concrete	Jul-1-2019	0.23
KC-LBP-32	Roll-Up Hallway Gate	Lower	Light Blue	Interior	Damage	Metal	Jul-1-2019	0.026
KC-LBP-33	Valve Wheels	Lower	Black	Interior	Damage	Metal	Jul-1-2019	0.32
KC-LBP-34	**Tunnel Ceiling**	**Lower**	**White**	**Interior**	**Damage**	**Concrete**	**Jul-1-2019**	**6.9**
KC-LBP-35	Tunnel Wall	Lower	White	Interior	Damage	Concrete	Jul-1-2019	0.19
KC-LBP-36	**Hot Water Heater Room Wall**	**Lower**	**Red**	**Interior**	**Good**	**Concrete**	**Jul-1-2019**	**4.0**
KC-LBP-37	**Hot Water Heater Room Wall**	**Lower**	**Yellow**	**Interior**	**Good**	**Concrete**	**Jul-1-2019**	**2.1**
KC-LBP-38	Men's Room Stall Doors	Lower	Blue	Interior	Good	Metal	Jul-1-2019	<0.0080
KC-LBP-39	Hand Rail on Stairs to Beach	Lower	Silver	Exterior	Damage	Metal	Jul-1-2019	0.046
KC-LBP-40	**Decorative Metal Window**	**Lower**	**Green**	**Exterior**	**Damage**	**Metal**	**Jul-1-2019**	**8.8**

TABLE B-2A
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
PAINT CHIP LEAD SAMPLE RESULTS

Sample ID	Location	Floor	Color	Interior/ Exterior	Condition	Substrate Material	Date Sample Collected	Lead Concentration (% by weight)
KC-LBP-41	Wall Facing Boardwalk	Lower	White	Exterior	Good	Concrete	Jul-1-2019	0.014
KC-LBP-42	Stair Wall to Boardwalk	Lower	Beige	Exterior	Good	Concrete	Jul-1-2019	0.015
KC-LBP-43	Gate to Lockers from Boardwalk	Lower	Green	Exterior	Damage	Metal	Jul-1-2019	0.11
KC-LBP-44	Concrete Pool	--	Textured White	Exterior	Damage	Concrete	Mar-02-2020	<0.0080
KC-LBP-45	Concrete Pool	--	White	Exterior	Damage	Concrete	Mar-02-2020	<0.0080

Notes:
Lead-based paint is defined as a coating with a lead concentration greater than or equal to 0.5% by weight or 5,000 parts per million (ppm).
Lead-based paint highlighted in green.

TABLE B-2B
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
TCLP RCRA METALS SAMPLE RESULTS

Sample ID Sampling Date Description Units	AP-TCLP-1 5/7/2020 White Paint and Stucco on Wall Facing Boardwalk mg/L	AP-TCLP-2 5/7/2020 Beige Paint and Stucco on Stair Wall to Boardwalk mg/L	RCRA Maximum Concentration of Contaminants for Toxicity Characteristic mg/L
Arsenic	U	U	5
Barium	U	0.57	100
Cadmium	U	U	1
Chromium	U	U	5
Lead	U	U	5
Mercury	U	U	0.2
Selenium	U	U	1
Silver	U	U	5

Qualifiers:
U: Analyzed for but not detected

TABLE B-3
WESTCHESTER COUNTY
PLAYLAND PARK
POOL REHABILITATION PROJECT
RYE, NEW YORK
POLYCHLORINATED BIPHENYL SAMPLE RESULTS

Sample ID	Materials Description	Location	Floor	Interior/ Exterior	Condition	Date Sample Collected	Total PCB Concentration (ppm)
KC-PCB-01	Exterior Pool Deck Caulk - Top Layer	South Perimeter of Pool	--	Exterior	Significant Damage	July-1-2019	ND
KC-PCB-02	Exterior Pool Deck Caulk - Bottom Layer	South Perimeter of Pool	--	Exterior	Significant Damage	July-1-2019	3.0
KC-PCB-03	Exterior Window Caulk	East Side of Concession	--	Exterior	Damaged	July-1-2019	ND
KC-PCB-04	Exterior Door Glazing	North Vendor Space, East Door Facing South	--	Exterior	Damaged	July-1-2019	ND
KC-PCB-05	**Exterior Foundation Wall Caulk**	**North Vendor Space, South Facing Wall**	**--**	**Exterior**	**Damaged**	**July-1-2019**	**69**
KC-PCB-06	Exterior Black Roof Flashing Caulk	North Vendor Space, Northwest Corner	--	Exterior	Damaged	July-1-2019	ND
KC-PCB-07	Exterior Beige Roof Flashing Caulk	South Vendor Space, Southwest Corner	--	Exterior	Damaged	July-1-2019	ND
KC-PCB-08	Interior Window Glazing	Window between Women's Locker Room and Tunnel Entrance	Lower	Interior	Damaged	July-1-2019	ND

Notes:
ND: Not detected
The Toxic Substances Control Act (TSCA) (40 CFR Part 761) and NYSDEC regulate the management of PCBs at concentrations greater than or equal to 50 parts per million (ppm) (also equivalent to milligrams per kilogram [mg/kg]).
Materials containing PCBs at concentrations exceeding 50 ppm are highlighted in blue.

APPENDIX C

LABORATORY RESULTS, CHAIN OF CUSTODY RECORDS AND LABORATORY CERTIFICATIONS

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Attention: Kumar Chakroborty
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received Date: 07/03/2019 6:00 PM
Analysis Date: 07/15/2019 - 08/22/2019
Collected Date: 07/01/2019

Project: Westchester County, Playland Pool Rehabiltation / #5366

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos: Fibrous	Non-Asbestos: Non-Fibrous	Asbestos
Sample ID KC-ACM-CPDT-01-01 *061914839-0001*		**Description**	South Perimeter of Pool - 1st Floor - Pool Deck Caulking - Top Layer		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray/ Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray/ Black		100.00% Other	**None Detected**
Sample ID KC-ACM-CPDT-01-02 *061914839-0002*		**Description**	North Perimeter of Pool - 1st Floor - Pool Deck Caulking - Top Layer		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray/ Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray/ Black		100.00% Other	**None Detected**
Sample ID KC-ACM-CPDB-02-01 *061914839-0003*		**Description**	South Perimeter of Pool - 1st Floor - Pool Deck Caulking - Bottom Layer		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige		100.00% Other	**None Detected**
Sample ID KC-ACM-CPDB-02-02 *061914839-0004*		**Description**	North Perimeter of Pool - 1st Floor - Pool Deck Caulking - Bottom Layer		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige		100.00% Other	**None Detected**
Sample ID KC-ACM-BCSM-03-01 *061914839-0005*		**Description**	South Side of Pool - 1st Floor - Brick Coping Stone Mortar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan		38.00% Ca Carbonate 6.00% Non-fibrous (other) 56.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
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http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-BCSM-03-02 *061914839-0006*		**Description**	North Side of Pool - 1st Floor - Brick Coping Stone Mortar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan		35.00% Ca Carbonate 7.00% Non-fibrous (other) 58.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-ESWP-04-01 *061914839-0007*		**Description**	South Side of Pool - 1st Floor - Exterior Stucco on Pool Perimeter Wall		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan/ White		30.00% Ca Carbonate 15.00% Gypsum 5.00% Non-fibrous (other) 50.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-ESWP-04-02 *061914839-0008*		**Description**	North Side of Pool - 1st Floor - Exterior Stucco on Pool Perimeter Wall		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan/ White		25.00% Ca Carbonate 15.00% Gypsum 2.00% Non-fibrous (other) 58.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-EWST-05-01 *061914839-0009*		**Description**	NW Corner of S. Tenant Space - 1st Floor - Exterior Wall Stucco on Tenant Spaces		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan/ White		28.00% Ca Carbonate 23.00% Gypsum 4.00% Non-fibrous (other) 45.00% Quartz	**None Detected**
Sample is not homogeneous with 05-02, and 05-03					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-EWST-05-02 *061914839-0010*		**Description**	NE Corner of S. Tenant Space - 1st Floor - Exterior Wall Stucco on Tenant Spaces		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	07/15/2019	Tan/ White	None	40.00% Ca Carbonate 7.90% Non-fibrous (other) 50.00% Quartz	**2.10% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-EWST-05-03 *061914839-0011*		**Description** S. Center of N. Tenant Space - 1st Floor - Exterior Wall Stucco on Tenant Spaces **Homogeneity**			
PLM NYS 198.1 Friable	07/15/2019				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-WCEW-06-01 *061914839-0012*		**Description** East Side of Cafeteria - 1st Floor - Exterior Window Caulk on Tenant Spaces **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray	<1.00% Fibrous (other)	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray	None	100.00% Other	**<1% Anthophyllite**
Sample ID KC-ACM-WCEW-06-02 *061914839-0013*		**Description** East Side of Lifeguard Room - 1st Floor - Exterior Window Caulk on Tenant Spaces **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray	<1.00% Fibrous (other)	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-CW1-07-01 *061914839-0014*		**Description** N. Wall of Cafeteria - 1st Floor - Interior Concrete Wall in Tenant Spaces **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	07/15/2019	Tan/ White	5.00% Wollastonite	35.00% Ca Carbonate 5.00% Non-fibrous (other) 55.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-CW1-07-02 *061914839-0015*		**Description** N. Wall of Chlorine Room - 1st Floor - Interior Concrete Wall in Tenant Spaces **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	07/15/2019	Various		37.00% Ca Carbonate 5.00% Non-fibrous (other) 58.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-TPP-08-01 *061914839-0016*		**Description** SE Corner of Pool Deck - 1st Floor - Tar Patch on Pool Deck **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Black		100.00% Other	**None Detected**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-TPP-08-02 *061914839-0017*		**Description**	NE Corner of Pool Deck - 1st Floor - Tar Patch on Pool Deck		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Black		100.00% Other	**None Detected**
Sample ID KC-ACM-DGG-09-01 *061914839-0018*		**Description**	E. Door facing South - 1st Floor - Door Glazing on North Tenant Space		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige	<1.00% Fibrous (other)	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige	None	100.00% Other	**<1% Anthophyllite**
Sample ID KC-ACM-DGG-09-02 *061914839-0019*		**Description**	W. Door facing South - 1st Floor - Door Glazing on North Tenant Space		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige	<1.00% Fibrous (other)	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige	None	100.00% Other	**<1% Anthophyllite**
Sample ID KC-ACM-ECFW-10-01 *061914839-0020*		**Description**	S. Facing Wall of N. Tenant Space - 1st Floor - Exterior Foundation Wall Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-ECFW-10-02 *061914839-0021*		**Description**	SW Corner of S. Tenant Space - 1st Floor - Exterior Foundation Wall Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-ERFC-11-01 *061914839-0022*		**Description**	NW Corner of N. Tenant Space - 1st Floor - Exterior Black Roof Flashing Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**

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http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-ERFC-11-02 *061914839-0023*		**Description**	N Center of N. Tenant Space - 1st Floor - Exterior Black Roof Flashing Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-ERBC-12-01 *061914839-0024*		**Description**	SW Corner of S. Tenant Space - 1st Floor - Exterior Beige Roof Flashing Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-ERBC-12-02 *061914839-0025*		**Description**	S. Center of S. Tenant Space - 1st Floor - Exterior Beige Roof Flashing Caulk		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-ECB-13-01 *061914839-0026*		**Description**	N. Wall facing N. Center - 1st Floor - Exterior Concrete on Brick (N. Tenant Space)		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/16/2019	Gray	None	30.00% Ca Carbonate 12.30% Non-fibrous (other) 55.00% Quartz	**2.70% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-ECB-13-02 *061914839-0027*		**Description**	N. facing Ext. Wall next to Door - 1st Floor - Exterior Concrete on Brick (N. Tenant Space)		
		Homogeneity			
PLM NYS 198.1 Friable	07/16/2019				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-TCTM-14-01 *061914839-0028*		**Description**	W. Side of Cafeteria - 1st Floor - Terra Cotta Tile Mortar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/16/2019	Tan	4.00% Cellulose	20.00% Ca Carbonate 21.00% Non-fibrous (other) 55.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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EMSL Order: 061914839
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-TCTM-14-02 *061914839-0029*		**Description** W. Side of Chlorine Room - 1st Floor - Terra Cotta Tile Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	Tan	6.00% Cellulose	25.00% Ca Carbonate 14.00% Non-fibrous (other) 55.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-CBM-15-01 *061914839-0030*		**Description** S. Stair to Beach - 1st Floor - Coping Brick Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	Gray/ Tan		20.00% Ca Carbonate 20.00% Non-fibrous (other) 60.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-CBM-15-02 *061914839-0031*		**Description** N. Stair to Beach - 1st Floor - Coping Brick Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	Gray/ Tan		20.00% Ca Carbonate 20.00% Non-fibrous (other) 60.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-PCTM-16-01 *061914839-0032*		**Description** W. Side of Restroom - Lower - Pink Ceramic Tile Mortar - Women's Restrooms **Homogeneity** Heterogeneous/Homogeneous			
PLM NYS 198.1 Friable	07/16/2019		None	40.00% Ca Carbonate 23.00% Non-fibrous (other) 25.00% Quartz 12.00% Vermiculite	
Vermiculite > 10% - Analysis via NYS ELAP 198.6 required.					
PLM NYS 198.6 VCM	08/22/2019	Gray/ White		100.00% Other	**None Detected**
This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing > 10% vermiculite.					
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-PCTM-16-02 *061914839-0033*		**Description** E. Side of Restroom - Lower - Pink Ceramic Tile Mortar - Women's Restrooms **Homogeneity** Heterogeneous/Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	White	None	45.00% Ca Carbonate 20.00% Non-fibrous (other) 20.00% Quartz 15.00% Vermiculite	
Vermiculite > 10% - Analysis via NYS ELAP 198.6 required.					
PLM NYS 198.6 VCM	08/22/2019	Gray/ White		100.00% Other	**None Detected**
This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing > 10% vermiculite.					
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

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EMSL Order:	061914839
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos
Sample ID KC-ACM-CBM-17-01 *061914839-0034*		**Description** NE Corner of HWH Room - Lower - Concrete Block Mortar - Women's Locker Rooms **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	Gray		20.00% Ca Carbonate 20.00% Non-fibrous (other) 60.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-CBM-17-02 *061914839-0035*		**Description** Pipe Chase in Janitor Room - Lower - Concrete Block Mortar - Women's Locker Rooms **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/16/2019	Gray		20.00% Ca Carbonate 15.00% Non-fibrous (other) 65.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-CTA-18-01 *061914839-0036*		**Description** S. Wall of Women's Showers - Lower - Ceramic Tile Adhesive in Showers **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige		100.00% Other	**None Detected**
Sample ID KC-ACM-CTA-18-02 *061914839-0037*		**Description** N. Wall of Men's Showers - Lower - Ceramic Tile Adhesive in Showers **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Beige		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Beige		100.00% Other	**None Detected**
Sample ID KC-ACM-1WGT-19-01 *061914839-0038*		**Description** Window from Women's Room - Lower - Window Glazing - Tunnel Entrance Rooms **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**
Sample ID KC-ACM-1WGT-19-02 *061914839-0039*		**Description** Window from Men's Room - Lower - Window Glazing - Tunnel Entrance Rooms **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/16/2019	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	07/16/2019	Gray		100.00% Other	**None Detected**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

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EMSL Order:	061914839
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC-ACM-GTM-20-01 *061914839-0040*		**Description**	S. Wall of Men's Room - Lower - Green Ceramic Tile Mortar - Men's Restroom		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/16/2019	Tan		25.00% Ca Carbonate 20.00% Non-fibrous (other) 55.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC-ACM-GTM-20-02 *061914839-0041*		**Description**	W. Wall of Men's Room - Lower - Green Ceramic Tile Mortar- Men's Restroom		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	07/16/2019	Tan		25.00% Ca Carbonate 20.00% Non-fibrous (other) 55.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Report amended: 08/22/2019 17:17:31 Replaces initial report from: 07/17/2019 15:53:29 Reason Code: Client-Test Added

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EMSL Order:	061914839
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	7/3/2019	Sample Receipt Time:	6:00 PM
Analysis Completed Date:	7/16/2019	Analysis Completed Time:	3:05 PM

Analyst(s):

Jennifer Lovell PLM NYS 198.1 Friable (11)

Justin Valles PLM NYS 198.1 Friable (8)

Jennifer Lovell PLM NYS 198.6 NOB (20)

Steve Jusczuk PLM NYS 198.6 VCM (2)

Rosemary Ortega TEM NYS 198.4 NOB (20)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

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061914839

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name:	Project Name and Address:	Inspector/Investigator:	Page:
Westchester County	Playland Pool Rehabilitation	Kumar Chakraborty	1 of 5

Date:	Requested Turnaround Time:	Project Manager	Project Number:
7/01/19	☐ 2 Hour ☐ 6 Hour ☐ 24 Hour 2 week ☐ 48 Hour ☐ 72 Hour ☒ Other ~~5-day~~ HR___	Andrew Grundy	5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM-CPDT-01-01	Pool Deck Caulking Top Layer	1st	South perimeter of pool	SD	
KC-ACM-CPDT-01-02		1st	North perimeter of pool	SD	
~~KC-ACM-~~					
KC-ACM-CPDB-02-01	Pool Deck Caulking Bottom Layer	1st	South perimeter of pool	SD	
KC-ACM-CPDB-02-02		1st	North perimeter of pool	SD	
~~KC-ACM-~~					
KC-ACM-BCSM-03-01	Brick Coping Stone Mortar	1st	South side of pool	SD	
KC-ACM-BCSM-03-02	"	1st	North side of pool	SD	
~~KC-ACM-~~					
KC-ACM-ESWP-04-01	Exterior Stucco on Pool Perimeter Wall	1st	South side of pool	D	
KC-ACM-ESWP-04-02		1st	North side of pool	D	
~~KC-ACM-~~					
KC-ACM-					

Condition:
G- Good, D –Damage,
SD – Significant Damage

Friability:
F – Friable
NF – Not Friable

Special Instruction to Laboratory:
☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

2019 JUL -3 P 1:00

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft	07/03/19		via UPS			Field	
(Sign): Karen Kraft						Walk In	
II. (Print):			Charlie	7/3/19	6pm	Fed-Ex	0
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

7/15/19 10:43PM PLM Jennifer Jack Hughes

TEM 7/16/19

0619 14839

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name:	Project Name and Address:	Inspector/Investigator:	Page:
Westchester County	Playland Pool Rehabilitation	Kumar Chakraborty	2 of 5

Date:	Requested Turnaround Time:	Project Manager	Project Number:
7/01/19	☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☒ Other ~~6day~~ 2week HR___	Andrew Grundy	5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM-EWST-05-01	Exterior wall Stucco on	1st	NW corner of S Tenant Space	D	
KC-ACM-EWST-05-02	Tenant Spaces	1st	NE corner of S Tenant Space	D	
KC-ACM-EWST-05-03	"	1st	S center of N Tenant Space	D	
~~KC-ACM-~~					
KC-ACM-WCEW-06-01	Exterior Window Caulk on	1st	East side of Cafeteria	D	
KC-ACM-WCEW-06-02	Tenant Spaces	1st	East side of Lifeguard Room	D	
~~KC-ACM-~~					
KC-ACM-CWI-07-01	Interior Concrete Wall	1st	N wall of Cafeteria	D	
KC-ACM-CWI-07-02	in Tenant Spaces	1st	N wall of Chlorine Rm	D	
~~KC-ACM-~~					
KC-ACM-TPP-08-01	Tar Patch on Pool	1st	SE corner of pool deck	D	
KC-ACM-TPP-08-02	Deck	1st	NE corner of pool deck	D	
~~KC-ACM-~~					

Condition: G- Good, D –Damage, SD – Significant Damage

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory:
☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft	07/03/19		pick UPS			Field	
(Sign): Karen Kraft						Walk In	
II. (Print):			[signature]	7/3/19	6PM	Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

RECEIVED 2019 JUL -3 P 6:00

PLM [signature] 7/15/19 10:43PM PLM [signature] 7/16/19 TEM [signature] 7/16/19

Page 2 Of 5

OrderID: 061914839

061914839

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name:	Project Name and Address:	Inspector/Investigator:	Page:
Westchester County	Playland Pool Rehabilitation	Kumar Chakraborty	3 of 5

Date:	Requested Turnaround Time:	Project Manager	Project Number:
7/01/19	☐ 2 Hour ☐ 6 Hour ☐ 24 Hour 2 week ☐ 48 Hour ☐ 72 Hour ☒ Other ~~5 day~~ HR___	Andrew Grundy	5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM-DGG-09-01	Door Glazing on North Tenant Space	1st	E Door facing South	D	
KC-ACM-DGG-09-01	"	"	W Door facing South	D	
~~KC-ACM-~~					
KC-ACM-ECFW-10-01	Exterior Foundation Wall Caulk	1st	S facing wall of N Tenant Space	D	
KC-ACM-ECFW-10-02	"	"	SW corner of S Tenant Space	D	
~~KC-ACM-~~					
KC-ACM-ERFC-11-01	Exterior Black Roof Flashing Caulk	1st	NW corner of N Tenant Space	D	
KC-ACM-ERFC-11-02	"	"	N center of N Tenant Space	D	
~~KC-ACM-~~					
KC-ACM-ERBC-12-01	Exterior Beige Roofing Flashing Caulk	1st	SW corner of S Tenant Space	D	
KC-ACM-ERBC-12-02	"	"	S center of S Tenant Space	D	
~~KC-ACM-~~					
~~KC-ACM-~~					

Condition:
G- Good, D –Damage,
SD – Significant Damage

Friability:
F – Friable
NF – Not Friable

Special Instruction to Laboratory:
☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print):						Field	
. (Sign):						Walk In	
II. (Print):						Fed-Ex	
(Sign):				7/15/19	6PM	Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

Justin 7/15/19 10:43PM PLM Jennifer Louh 7/16/19 TEM 7/16/19

061914839

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Kumar Chakraborty	Page: 4 of 5
Date: 7/02/19	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☒ Other ~~5-day~~ 2 week HR___	Project Manager: Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM-ECB-13-01	Exterior Concrete on	1st	N wall facing N center	D	
KC-ACM-ECB-13-02	Brick (N Tenant Space)	1st	N facing ext wall next to door	D	
~~KC-ACM-~~					
KC-ACM-TCTM-14-01	Terra Cotta Tile Mortar	1st	W side of Cafeteria	D	
KC-ACM-TCTM-14-02	"	1st	W side of Chlorine Rm	D	
~~KC-ACM-~~					
KC-ACM-CBM-15-01	Coping Brick Mortar	1st	S stair to Beach	D	
KC-ACM-CBM-15-02	"	1st	N stair to Beach	D	
~~KC-ACM-~~					
KC-ACM-PCTM-16-01	Pink Ceramic Tile Mortar	Lower	W Side of Restroom	D	
KC-ACM-PCTM-16-02	Women's Restrooms	Lower	E Side of Restroom	D	
KC-ACM-					
KC-ACM-					

Condition: G- Good, D –Damage, SD – Significant Damage

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory: ☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print):						Field	
(Sign):						Walk In	
II. (Print):			[signature]	7/3/19	6PM	Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

RECEIVED ... 2019 JUL 3 P 6:00

[signature] 7/15/19 FUSING 10:43PM   PLM Jennifer [signature] 7/16/19   TEM [signature] 7/16/19

OrderID: 061914839

061914839

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Kumar Chakraborty	Page: 5 of 5
Date: 07/02/19	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☒ Other ~~5-day~~ 2 week HR___	Project Manager: Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM- CBM-17-01	Concrete Block Mortar	Lower	NE corner of HWH Room	D	
KC-ACM- CBM-17-02	Women's Locker Rooms	Lower	Pipe Chase in Janitor Room	D	
~~KC-ACM-~~					
KC-ACM- CTA-18-01	Ceramic Tile Adhesive in	Lower	S wall Women's Showers	D	
KC-ACM- CTA-18-02	Showers	Lower	N wall Men's Showers	D	
~~KC-ACM-~~					
KC-ACM- WGT-19-01	Window Glazing-Tunnel	Lower	Window from Women's Rm	D	
KC-ACM- WGT-19-02	Entrance Rooms	Lower	Window from Men's Room	D	
~~KC-ACM-~~					
KC-ACM- GTM-20-01	Green Ceramic Tile	Lower	S wall of Men's Room	D	
KC-ACM- GTM-20-02	Mortar Men's Restroom	Lower	W wall of Men's Room	D	
KC-ACM-					
KC-ACM-					

Condition: G- Good, D –Damage, SD – Significant Damage

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory:
☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft						Field	
(Sign): Karen Kraft	07/03/19		Sent via	UPS		Walk In	
II. (Print):			[signature]	7/3/19	6:07	Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:

Lab Comments:

Analyzed By: | Date & Time:
Print Name:
Sign:

RECEIVED ANALYTICAL LAB. INC. 2019 JUL -5 AM 6:00

[signature] 7/1/19 10:43 AM

TEM [signature] - 7/6/19

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062004898
Customer ID: DVBI69
Customer PO:
Project ID:

Attention: Karen Kraft
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received Date: 03/06/2020 10:03 AM
Analysis Date: 03/08/2020 - 03/18/2020
Collected Date: 03/02/2020

Project: Rye Playland - Pool Rehabilitation Project

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC- ACM- WPPD-21-01 *062004898-0001*		**Description**	NE of Pool - Waterproofing under Concrete Pool Deck		
		Homogeneity	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Black		100.00% Other	**None Detected**
Sample ID KC- ACM- WPPD-21-02 *062004898-0002*		**Description**	SE of Pool - Waterproofing under Concrete Pool Deck		
		Homogeneity	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Black		100.00% Other	**None Detected**
Sample ID KC- ACM- PTL-22-01 *062004898-0003*		**Description**	Pool - Center - E. Side - Pool Tar Lines		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Gray/ Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Gray/ Black		100.00% Other	**None Detected**
Sample ID KC- ACM- PTL-22-02 *062004898-0004*		**Description**	Pool - Center - N. Side - Pool Tar Lines		
		Homogeneity	Heterogeneous/Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Gray/ Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Gray/ Black		100.00% Other	**None Detected**
Sample ID KC- ACM- PTP-23-01 *062004898-0005*		**Description**	Pool - S. Side - Textured Paint - Top Layer		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	White/ Blue		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	White/ Blue		100.00% Other	**None Detected**

Initial report from: 03/18/2020 20:07:19

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062004898
Customer ID: DVBI69
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC- ACM- PTP-23-02 *062004898-0006*		**Description**	Pool - W. Side - Textured Paint - Top Layer		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	White/ Blue		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	White/ Blue		100.00% Other	**None Detected**
Sample ID KC- ACM- PTP-23-03 *062004898-0007*		**Description**	Pool - N. Side - Textured Paint - Top Layer		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	White/ Blue		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	White/ Blue		100.00% Other	**None Detected**
Sample ID KC- ACM- PTP-23-04 *062004898-0008*		**Description**	Pool - E. Side - Textured Paint - Top Layer		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	White/ Blue		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	White/ Blue		100.00% Other	**None Detected**
Sample ID KC- ACM- PTP-23-05 *062004898-0009*		**Description**	Pool - Center - Bottom - Textured Paint - Top Layer		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	White/ Blue		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	White/ Blue		100.00% Other	**None Detected**
Sample ID KC- ACM- WPTB-24-01 *062004898-0010*		**Description**	Wall Facing Beach - S. Side - Waterproofing Tar under Brick Coping Stone		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Black	None	86.00% Other	**14.00% Chrysotile**
TEM NYS 198.4 NOB	03/18/2020				**Not Analyzed**
Sample ID KC- ACM- WPTB-24-02 *062004898-0011*		**Description**	Wall Facing Beach - N. Side - Waterproofing Tar under Brick Coping Stone		
		Homogeneity			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020				**Positive Stop (Not Analyzed)**
TEM NYS 198.4 NOB	03/18/2020				**Not Analyzed**

Initial report from: 03/18/2020 20:07:19

EMSL Analytical, Inc.

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Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062004898
Customer ID:	DVBI69
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC- ACM- WPTC-25-01 *062004898-0012*		**Description** Center Concrete - Waterproofing Tar under Concrete along Boardwalk **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Black		100.00% Other	**None Detected**
Sample ID KC- ACM- WPTC-25-02 *062004898-0013*		**Description** S. Side of Concrete - Waterproofing Tar under Concrete along Boardwalk **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	03/08/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	03/18/2020	Black		100.00% Other	**None Detected**
Sample ID KC--ACM- DWJC-26-01 *062004898-0014*		**Description** South Event Space - S Side - Drywall Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	03/08/2020	White		82.00% Ca Carbonate 3.00% Mica 15.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC--ACM- DWJC-26-02 *062004898-0015*		**Description** South Event Space - Center - Drywall Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	03/08/2020	White		78.00% Ca Carbonate 5.00% Mica 17.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC--ACM- DWJC-26-03 *062004898-0016*		**Description** South Event Space - N. Side - Drywall Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	03/16/2020	White	2.00% Cellulose	88.00% Ca Carbonate 3.00% Mica 7.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID KC--ACM- DW-27-01 *062004898-0017*		**Description** South Event Space - S. Side - Drywall **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	03/08/2020	White	2.00% Cellulose <1.00% Glass	5.00% Ca Carbonate 88.00% Gypsum 5.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 03/18/2020 20:07:19

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062004898
Customer ID:	DVBI69
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID KC--ACM- DW-27-02 *062004898-0018*		**Description** South Event Space - N. Side - Drywall **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	03/16/2020	Brown/ Gray	4.00% Cellulose 3.00% Glass	37.00% Ca Carbonate 56.00% Gypsum	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 03/18/2020 20:07:19

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062004898
Customer ID:	DVBI69
Customer PO:	
Project ID:	

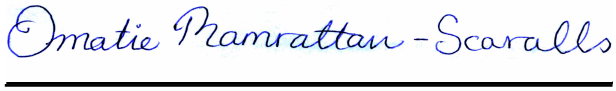
Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	3/6/2020	Sample Receipt Time:	10:03 AM
Analysis Completed Date:	3/8/2020	Analysis Completed Time:	9:16 PM

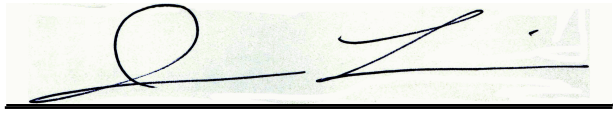
Analyst(s):



Omatie Ramrattan-Scarallo PLM NYS 198.1 Friable (2)

Steve Jusczuk PLM NYS 198.1 Friable (3)

Steve Jusczuk PLM NYS 198.6 NOB (12)



Jackson Li TEM NYS 198.4 NOB (11)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

Initial report from: 03/18/2020 20:07:19

OrderID: 062004898

0620004898

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Address: Rye Playland Pool Rehabilitation Project	Inspector/Investigator: K. Chakraborty	Page: 1 of 2
Date: 3/2/20	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour 72 Hour ☒ Other 2 week HR___	Project Manager: Andrew Grundy	Project Number: 5366-01P-06

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM- WPPD - 21 - 01	Waterproofing under	—	NE of pool	NF/G	
KC-ACM- WPPD - 21 - 02	concrete pool deck.	—	SE of pool	NF/G	
~~KC-ACM-~~					
KC-ACM- PTL - 22 - 01	Pool tar lines	—	Pool - Center E side	NF/D	
KC-ACM- PTL - 22 - 02	"	—	Pool - Center N side	NF/D	
~~KC-ACM-~~					
KC-ACM- PTP - 23 - 01	Textured Paint Top layer	—	Pool - S side	F/D	
KC-ACM- PTP - 23 - 02	"	—	Pool - W side	F/D	
KC-ACM- PTP - 23 - 03	"	—	Pool - N side	F/D	
KC-ACM- PTP - 23 - 04	"	—	Pool - E side	F/D	
KC-ACM- PTP - 23 - 05	"	—	Pool - Center bottom	F/D	
~~KC-ACM-~~					

Condition:	Friability:	Special Instruction to Laboratory:
G- Good, D –Damage, SD – Significant Damage	F – Friable, NF – Not Friable	☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary ☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft	3/3/20		Benny	3/4/20	10:03 am	Field	
(Sign): Karen Kraft						Walk In	
II. (Print):						Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

RECEIVED EMSL ANALYTICAL, INC. CARLE PLACE, NY 20 MAR -4 AM 10:03

D&B ENGINEERS AND ARCHITECTS, P.C.

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Address: Rye Playland Pool Rehabilitation Project	Inspector/Investigator: K. Chakraborty	Page: 2 of 2
Date: 3/2/20	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour 72 Hour ☒ Other 2 week HR___	Project Manager: Andrew Grundy	Project Number: 5366-01P-06

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ Time
KC-ACM- WPTB-24-01	waterproofing tar under brick coping stone	—	wall facing beach - S side	NF/G	
KC-ACM- WPTB-24-02		—	wall facing beach - N side	NF/G	
~~KC-ACM-~~					
KC-ACM- WPTC 25-01	waterproofing tar under concrete along boardwalk	—	center concrete	NF/G	
KC-ACM- WPTC 25-02		—	S side of concrete	NF/G	
~~KC-ACM-~~					
KC-ACM- DWJC-26-01	Drywall Joint Compound	1	South Event Space S side	F/G	
KC-ACM- DWJC-26-02	"	1	South Event Space Center	F/G	
KC-ACM- DWJC-26-03	"	1	South Event Space N side	F/G	
~~KC-ACM-~~					
KC-ACM- DW-27-01	Drywall	1	South Event Space S. side	F/G	
KC-ACM- DW-27-02	"	1	South Event Space N side	F/G	

Condition: G- Good, D –Damage, SD – Significant Damage	Friability: F – Friable NF – Not Friable	Special Instruction to Laboratory: ☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis If Necessary ☒ Email Results to: kkraft@db-eng.com/kchakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft	3/3/20		Bemy C.	3/4/2020	10:03 am	Field	
. (Sign): Karen Kraft						Walk In	
II. (Print):						Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

RECEIVED BY EMSL ANALYTICAL, INC. CARLE PLACE, NY AM 10: 03

OrderID: 062004898

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062007298
Customer ID: DVBI69
Customer PO: 5366
Project ID:

Attention: Alex Pugliese
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received Date: 05/08/2020 10:37 AM
Analysis Date: 05/14/2020
Collected Date: 05/07/2020

Project: Westchester County, Playland Pool Rehabilitation. Project #5366

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos: Fibrous	Non-Asbestos: Non-Fibrous	Asbestos
Sample ID AP-ACM-EWST-28-01 *062007298-0001*		**Description**	Exterior - East Side of South Stairs - Exterior Wall Stucco on Eastern Façade - East Side		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	05/14/2020	Tan/ White	None	60.00% Ca Carbonate 25.00% Non-fibrous (other) 12.00% Quartz	**3.00% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-28-02 *062007298-0002*		**Description**	Exterior - East Wall North Stairs - Exterior Wall Stucco on Eastern Façade - East Side		
		Homogeneity			
PLM NYS 198.1 Friable	05/14/2020				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-28-03 *062007298-0003*		**Description**	Exterior - East Wall below North Balcony - Exterior Wall Stucco on Eastern Façade - East Side		
		Homogeneity			
PLM NYS 198.1 Friable	05/14/2020				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-29-01 *062007298-0004*		**Description**	Exterior - North Side of North Balcony - Exterior Wall Stucco on Eastern Façade - North Tower		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	05/14/2020	Tan/ White		74.00% Ca Carbonate 8.00% Mica 14.00% Non-fibrous (other) 4.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 05/15/2020 11:02:08

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528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062007298
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID AP-ACM-EWST-29-02 *062007298-0005*		**Description** Exterior - South Side of Balcony Door - Exterior Wall Stucco on Eastern Façade - North Tower **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	05/14/2020	Tan/ White		75.00% Ca Carbonate 7.00% Mica 15.00% Non-fibrous (other) 3.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-29-03 *062007298-0006*		**Description** Exterior - South Side of North Tower - Exterior Wall Stucco on Eastern Façade - North Tower **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	05/14/2020	Tan/ White		70.00% Ca Carbonate 8.00% Mica 22.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-30-01 *062007298-0007*		**Description** Exterior - South Side of Balcony above Railing - Exterior Wall Stucco on Eastern Façade - South Tower **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	05/14/2020	Tan		68.00% Ca Carbonate 8.00% Mica 19.00% Non-fibrous (other) 5.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-30-02 *062007298-0008*		**Description** Exterior - North Side of South Tower - Exterior Wall Stucco on Eastern Façade - South Tower **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	05/14/2020	Gray/ Tan/ White	None	65.00% Ca Carbonate 8.00% Mica 23.60% Non-fibrous (other)	**3.40% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-30-03 *062007298-0009*		**Description** Exterior - North Side of above Balcony Railing of South Tower - Exterior Wall Stucco on Eastern Façade - South Tower **Homogeneity**			
PLM NYS 198.1 Friable	05/14/2020				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 05/15/2020 11:02:08

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514

Tel/Fax: (516) 997-7251 / (516) 997-7528

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EMSL Order:	062007298
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID AP-ACM-EWST-31-01 *062007298-0010*		**Description**	Exterior - South Side of NVS - Exterior Wall Stucco on North Vendor Space		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	05/14/2020	Gray/ Tan/ White		65.00% Ca Carbonate 6.00% Mica 22.00% Non-fibrous (other) 7.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-31-02 *062007298-0011*		**Description**	Exterior - West Side above Stairs - NVS - Exterior Wall Stucco on North Vendor Space		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	05/14/2020	Tan	None	65.00% Ca Carbonate 8.00% Mica 18.20% Non-fibrous (other) 6.00% Quartz	**2.80% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID AP-ACM-EWST-31-03 *062007298-0012*		**Description**	Exterior - North Side above Roof - NVS - Exterior Wall Stucco on North Vendor Space		
		Homogeneity			
PLM NYS 198.1 Friable	05/14/2020				**Positive Stop (Not Analyzed)**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 05/15/2020 11:02:08

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528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062007298
Customer ID:	DVBI69
Customer PO:	5366
Project ID:	

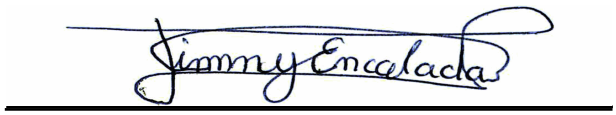
Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	5/8/2020	Sample Receipt Time:	10:37 AM
Analysis Completed Date:	5/14/2020	Analysis Completed Time:	1:55 PM

Analyst(s):



Jimmy Encalada PLM NYS 198.1 Friable (8)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

Initial report from: 05/15/2020 11:02:08

D&B Engineers & Architects 062007298

[redacted]

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Alex Pugliese	Page: ____1__ of ______
Date: 5/7/2020	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour 72 Hour ☒ Other _1 week___ HR___	Project Manager Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No:	Material Description	Floor ID	Room/Area Description	Condition/Friability	Photo ID/Time
AP-ACM-EWST-28-01	Exterior Wall Stucco on Eastern Façade - East Side	Ext	East Side of South Stairs	G / F	
AP-ACM-EWST-28-02		ext	East wall North Stair	G / F	
AP-ACM-EWST-28-03		ext	East wall Below North Balcony	G / F	
AP-ACM-EWST-29-01	Exterior Wall Stucco on Eastern Façade - North Tower	ext	North Side of North Balcony	D / F	
AP-ACM-EWST-29-02		ext	South Side of Balcony Door	D / F	
AP-ACM-EWST-29-03		ext	South Side of North Tower	D / F	

Condition: G- Good, D -Damage, SD – Significant Damage

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory: ☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary ☒ Email Results to: mhofgren@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Alex Pugliese						Field	
(Sign): [signature]	5/7/20	12:01				Walk In	
II. (Print): E Grund	5-8-20					Fed-Ex	
(Sign):	10:37am					Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:

Lab Comments:

Analyzed By: Date & Time:

Print Name:

Sign:

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OrderID: 062007298

062007298

[redacted]

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Alex Pugliese	Page: 1 of
Date: 5/7/2020	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour 72 Hour ☒ Other 1 week HR	Project Manager: Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition/ Friability	Photo ID/ Time
AP-ACM-EWST-30-01	Exterior Wall Stucco on Eastern Façade - South Tower	ext	South Side of Balcony above Railing	D / F	
AP-ACM-EWST-30-02		ext	North Side of South tower	D / F	
AP-ACM-EWST-30-03		ext	North Side above Balcony Railing of South tower	D / F	

[redacted]

ASBESTOS BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Alex Pugliese	Page: 1 of

Condition: G- Good, D -Damage, SD – Significant Damage	Friability: F – Friable NF – Not Friable	Special Instruction to Laboratory: ☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary ☒ Email Results to: mhofgren@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Alex Pugliese						Field	
(Sign):						Walk In	
II. (Print):	5-8-20					Fed-Ex	
(Sign):	10:37am					Others	
III. (Print):						Fed-Ex	
(Sign):						Others	
D&B Comments:			Lab Comments:			Analyzed By:	Date & Time:
						Print Name:	
						Sign:	

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062007298

Date: 5/7/2020	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour 72 Hour ☒ Other _1 week___ HR___	Project Manager: Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition/ Friability	Photo ID/ Time
AP-ACM-EWST-31-01	Exterior Wall Stucco on North Vendor Space	ext	South Side of NVS	G / F	
AP-ACM-EWST-31-02		ext	West Side above stairs NVS	G / F	
AP-ACM-EWST-31-03		ext	North Side above Roof NVS	G / F	

Condition: G- Good, D -Damage, SD – Significant Damage

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory:
☐ Analyze All Samples ☒ Stop at First Positive in Each Homogeneous Group ☒ Perform TEM-NOB Analysis if Necessary
☒ Email Results to: mhofgren@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Alex Pugliese						Field	
(Sign):	5/7/20	12:01				Walk In	
II. (Print)	5-8-20					Fed-Ex	
(Sign):	10: 32am					Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

D&B Comments:	Lab Comments:	Analyzed By:	Date & Time:
		Print Name:	
		Sign:	

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Page 3 Of 3

OrderID: 062007298

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EMSL Order:	061914129
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Karen Kraft**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone:	(516) 364-9890
Fax:	(516) 364-9045
Received:	07/03/19 6:01 PM
Collected:	7/1/2019

Project: **5366, NY**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
KC-LBP-01	*061914129-0001*	7/1/2019	7/14/2019	5.7 % wt
	Site: Lamp Post-S Side of Pool Desc: Green Paint/Metal			
KC-LBP-02	*061914129-0002*	7/1/2019	7/14/2019	0.17 % wt
	Site: White Pant Coping Stone Wall S Side of Pool Desc: White/Concrete			
KC-LBP-03	*061914129-0003*	7/1/2019	7/14/2019	3.8 % wt
	Site: S Side Skylight Desc: Gree/Metal			
KC-LBP-04	*061914129-0004*	7/1/2019	7/14/2019	0.23 % wt
	Site: E Side Cafeteria Window Desc: Green/Metal			
KC-LBP-05	*061914129-0005*	7/1/2019	7/14/2019	1.2 % wt
	Site: N Wall Cafeteria Desc: Beige/Concrete			
KC-LBP-06	*061914129-0006*	7/1/2019	7/14/2019	6.7 % wt
	Site: Eaves-N Side of S Tenant Space Desc: Green/Wood			
KC-LBP-07	*061914129-0007*	7/1/2019	7/14/2019	1.3 % wt
	Site: Window Frame N Side N Tenant Space Desc: Black/Wood			
KC-LBP-08	*061914129-0008*	7/1/2019	7/14/2019	6.5 % wt
	Site: Door/Window Frame S Side N Tenant Space Desc: Dk Green/Metal			
KC-LBP-09	*061914129-0009*	7/1/2019	7/14/2019	1.3 % wt
	Site: Door/Window Frame S Side N Tenant Space Desc: Lt Green/Metal			
KC-LBP-10	*061914129-0010*	7/1/2019	7/14/2019	7.2 % wt
	Site: Door/Window S Ext N Tenant Space Desc: Beig/Wood			
KC-LBP-11	*061914129-0011*	7/1/2019	7/14/2019	10 % wt
	Site: N. Door on S Tenant Space Desc: Beige/Wood			

Alger Liang, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010% wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the warning limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by the AIHA LAP, LLC in the Environmental Lead accred. program for Lead in Dust, CT PH-0249, NYS ELAP 11469, CA 2339.

Initial report from 07/15/2019 17:39:40

EMSL Analytical, Inc.
528 Mineola Avenue, Carle Place, NY 11514
Phone/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com carleplacelab@emsl.com

EMSL Order:	061914129
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Karen Kraft**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone:	(516) 364-9890
Fax:	(516) 364-9045
Received:	07/03/19 6:01 PM
Collected:	7/1/2019

Project: **5366, NY**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
KC-LBP-12	*061914129-0012*	7/1/2019	7/14/2019	0.033 % wt
	Site: Base of Breezeway, S Tenant Desc: Red/Concrete			
KC-LBP-13	*061914129-0013*	7/1/2019	7/14/2019	10 % wt
	Site: W Wall, S Tenant Space Desc: Green on White/Concrete			
KC-LBP-14	*061914129-0014*	7/1/2019	7/14/2019	0.26 % wt
	Site: SAFETY Line Around Pool Desc: Yellow/Concrete			
KC-LBP-15	*061914129-0015*	7/1/2019	7/14/2019	0.020 % wt
	Site: Locker Room Stair Rails Desc: Blue/Metal			
KC-LBP-16	*061914129-0016*	7/1/2019	7/14/2019	0.015 % wt
	Site: Concrete Wall Women's Locker Room Ent Desc: Black/Concrete			
KC-LBP-17	*061914129-0017*	7/1/2019	7/14/2019	0.017 % wt
	Site: Concrete Deck Women's Locker Room Ent Desc: Black/Concrete			
KC-LBP-18	*061914129-0018*	7/1/2019	7/14/2019	0.013 % wt
	Site: Women's Locker Room Floor Desc: Gray/Concrete			
KC-LBP-19	*061914129-0019*	7/1/2019	7/14/2019	0.083 % wt
	Site: Door Frame Women's Restroom Desc: Beige/Wood			
KC-LBP-20	*061914129-0020*	7/1/2019	7/14/2019	5.4 % wt
	Site: Concrete Wall in Women's Locker Room Desc: White/Concrete			
KC-LBP-21	*061914129-0021*	7/1/2019	7/14/2019	1.1 % wt
	Site: Women's Restroom Stall Doors Desc: Dk Pink/Wood			
KC-LBP-22	*061914129-0022*	7/1/2019	7/14/2019	0.022 % wt
	Site: Women's Locker Room Entrance to Ceiling Tunnel Desc: White/Concrete			

Alger Liang, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010% wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the warning limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by the AIHA LAP, LLC in the Environmental Lead accred. program for Lead in Dust, CT PH-0249, NYS ELAP 11469, CA 2339.

Initial report from 07/15/2019 17:39:40

EMSL Analytical, Inc.
528 Mineola Avenue, Carle Place, NY 11514
Phone/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com carleplacelab@emsl.com

EMSL Order:	061914129
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Karen Kraft**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone:	(516) 364-9890
Fax:	(516) 364-9045
Received:	07/03/19 6:01 PM
Collected:	7/1/2019

Project: **5366, NY**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
KC-LBP-23	*061914129-0023*	7/1/2019	7/14/2019	7.5 % wt
	Site: Tank S Side of Tank Room Desc: Blue/Green/Concrete			
KC-LBP-24	*061914129-0024*	7/1/2019	7/14/2019	3.0 % wt
	Site: Containment Wall Around Tank Desc: Yellow/Concrete			
KC-LBP-25	*061914129-0025*	7/1/2019	7/14/2019	0.26 % wt
	Site: Metal Pipes b/w Tanks Desc: Lt Blue/Metal			
KC-LBP-26	*061914129-0026*	7/1/2019	7/14/2019	0.42 % wt
	Site: Pipe Valves Desc: Red/Metal			
KC-LBP-27	*061914129-0027*	7/1/2019	7/14/2019	2.9 % wt
	Site: Concrete Wall in Tank Room Desc: White over Blue/Concrete			
KC-LBP-28	*061914129-0028*	7/1/2019	7/14/2019	0.016 % wt
	Site: Tank Room Ceiling Desc: White/Concrete			
KC-LBP-29	*061914129-0029*	7/1/2019	7/14/2019	0.32 % wt
	Site: Metal Pipe S Side Desc: Lt Green/Metal			
KC-LBP-30	*061914129-0030*	7/1/2019	7/14/2019	0.091 % wt
	Site: Tanks (3) in Tank Room Desc: Blue Over Silver/Metal			
KC-LBP-31	*061914129-0031*	7/1/2019	7/14/2019	0.23 % wt
	Site: Tank Base Desc: Red/Cncrete			
KC-LBP-32	*061914129-0032*	7/1/2019	7/14/2019	0.026 % wt
	Site: Roll-up Hallway Gate Desc: Lt Blue/Metal			
KC-LBP-33	*061914129-0033*	7/1/2019	7/14/2019	0.32 % wt
	Site: Valve Wheels Desc: Black/Metal			

Alger Liang, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010% wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the warning limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by the AIHA LAP, LLC in the Environmental Lead accred. program for Lead in Dust, CT PH-0249, NYS ELAP 11469, CA 2339.

Initial report from 07/15/2019 17:39:40

EMSL Analytical, Inc.
528 Mineola Avenue, Carle Place, NY 11514
Phone/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com carleplacelab@emsl.com

EMSL Order:	061914129
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Karen Kraft**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone:	(516) 364-9890
Fax:	(516) 364-9045
Received:	07/03/19 6:01 PM
Collected:	7/1/2019

Project: **5366, NY**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
KC-LBP-34	*061914129-0034*	7/1/2019	7/14/2019	6.9 % wt
	Site: Tunnel Ceiling Desc: White/Concrete			
KC-LBP-35	*061914129-0035*	7/1/2019	7/14/2019	0.19 % wt
	Site: Tunnel Wall Desc: White/Concrete			
KC-LBP-36	*061914129-0036*	7/1/2019	7/14/2019	4.0 % wt
	Site: Hot Water Heater Room Desc: Red/Concrete			
KC-LBP-37	*061914129-0037*	7/1/2019	7/15/2019	2.1 % wt
	Site: Hot Water Heater Room Desc: Yellow/Concrete			
KC-LBP-38	*061914129-0038*	7/1/2019	7/15/2019	<0.0080 % wt
	Site: Men's Room Stall Doors Desc: Blue/Metal			
KC-LBP-39	*061914129-0039*	7/1/2019	7/15/2019	0.046 % wt
	Site: Hand Rail on Stairs to Beach Desc: Silver/Metal			
KC-LBP-40	*061914129-0040*	7/1/2019	7/15/2019	8.8 % wt
	Site: Decorative Metal Window Desc: Green/Metal			
KC-LBP-41	*061914129-0041*	7/1/2019	7/15/2019	0.014 % wt
	Site: Wall Facing Boardwalk Desc: White/Concrete			
KC-LBP-42	*061914129-0042*	7/1/2019	7/15/2019	0.015 % wt
	Site: Stair Wall to Boardwalk Desc: Beige/Concrete			
KC-LBP-43	*061914129-0043*	7/1/2019	7/15/2019	0.11 % wt
	Site: Gate to Lockers from Boardwalk Desc: Green/Metal			

Alger Liang, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010% wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies the analyte was not detected at or above the warning limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by the AIHA LAP, LLC in the Environmental Lead accred. program for Lead in Dust, CT PH-0249, NYS ELAP 11469, CA 2339.

Initial report from 07/15/2019 17:39:40

OrderID: 061914129

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody

EMSL Order ID *(Lab Use Only):* 061914129

PHONE: ( )
FAX: ( )

Company: D&B Engineers & Architects	**EMSL-Bill to:** ☒ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 330 Crossways Park Drive	*Third Party Billing requires written authorization from third party*
City: Woodbury **State/Province:** NY	**Zip/Postal Code:** 11797 **Country:** USA
Report To (Name): Karen Kraft	**Telephone #:** 516 364-9890 ext 3107
Email Address: kkraft@db-eng.com	**Fax #:** **Purchase Order:** 5366
Project Name/Number: 5366	**Please Provide Results:** ☐ Fax ☒ Email
U.S. State Samples Taken: NY	**CT Samples:** ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☒ 2 Week

*Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide

Matrix	Method	Instrument	Reporting Limit	Check
Chips ☒ % by wt. ☐ mg/cm² ☐ ppm (mg/kg)	SW846-7000B	Flame Atomic Absorption	0.01%	☒
Air	NIOSH 7082	Flame Atomic Absorption	4 µg/filter	☐
	NIOSH 7105	Graphite Furnace AA	0.03 µg/filter	☐
	NIOSH 7300M/NIOSH 7303	ICP-OES	0.5 µg/filter	☐
Wipe* ASTM ☐ non ASTM ☐ *if no box checked, non-ASTM Wipe assumed	SW846-7000B	Flame Atomic Absorption	10 µg/wipe	☐
	SW846-6010B or C	ICP-OES	1.0 µg/wipe	☐
TCLP	SW846-1311/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1311/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW846-1312/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1312/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW846-7000B	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
Wastewater Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	SM3111B/SW846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
	40 CFR Part 50	Graphite Furnace AA	3.6 µg/filter	☐
Other:				☐

Name of Sampler: **Signature of Sampler:**

Sample #	Location	Volume/Area	Date/Time Sampled
KC-LBP-01	Lamp Post - S Side of Pool	Green Paint / Metal	07/01/19
KC-LBP-02	White paint coping stone wall S Side of Pool	White / Concrete	07/01/19

Client Sample #s - **Total # of Samples:**

Relinquished (Client):		**Date:**		**Time:**	
Received (Lab):	Sharon W.	**Date:**	7/3/19	**Time:**	6:01 pm

Comments:

Pb- QT 7/5/19

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

LEAD (Pb) CHAIN OF CUSTODY

EMSL ORDER ID *(Lab Use Only)*: 061914129

PHONE: ( )
FAX: ( )

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Location	Volume/Area	Date/Time Sampled
KC-LBP-03	S Side Skylight	Green / Metal	07/01/19
KC-LBP-04	E side cafeteria window	Green / Metal	
KC-LBP-05	N wall cafeteria	Beige / Concrete	
KC-LBP-06	Eaves - N side of S Tenant Space	Green / Wood	
KC-LBP-07	Window frame N side N Tenant Space	Black / Wood	
KC-LBP-08	Door/Window frame S side N Tenant Sp	Dk Green / Metal	
KC-LBP-09	Door/ Window frame S side N Tenant Space	Lt Green / Metal	
KC-LBP-10	Door/Window Sext. N Tenant Space	Beige / Wood	
KC-LBP-11	N Door on S Tenant Space	Beige / Wood	
KC-LBP-12	Base of Breezeway, S Tenant	Red / Concrete	
KC-LBP-13	W wall, S Tenant Space	Green on White / Concrete	
KC-LBP-14	Safety Line Around Pool	Yellow / Concrete	
KC-LBP-15	Locker Room Stair Rails	Blue / Metal	
KC-LBP-16	Concrete Wall Women's ~~LR~~ Locker Room Entrance	Black / Concrete	
KC-LBP-17	Concrete Deck Women's Locker Room Ent.	Black / Concrete	
KC-LBP-18	Women's Locker Room Floor	Gray / Concrete	
KC-LBP-19	Door Frame Women's Rest Room	Beige / Wood	
KC-LBP-20	Concrete Wall in Women's Locker Room	White / Concrete	

Comments/Special Instructions:

RECEIVED
EMSL ANALYTICAL, INC.
CHARLOTTE, NC
2019 JUL -3 P 6:00

1/3/19

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

LEAD (Pb) CHAIN OF CUSTODY

EMSL ORDER ID *(Lab Use Only)*: 061914129

PHONE: ( )
FAX: ( )

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Location	Volume/Area	Date/Time Sampled
KC-LBP-21	Women's Rest Room Stall Doors	Dk Pink / Wood	
KC-LBP-22	Women's Locker room Entrance to Tunnel Painted Ceiling	White / Concrete	
KC-LBP-23	Tank S side of tank room	Blue / Green / Concrete	
KC-LBP-24	Containment Wall around tank	Yellow / Concrete	
KC-LBP-25	Metal Pipes b/w tanks	Lt Blue / Metal	
KC-LBP-26	Pipe Valves	Red / Metal	
KC-LBP-27	Concrete wall in tank room	White over Blue / Concrete	
KC-LBP-28	Tank room ceiling	White / Concrete	
KC-LBP-29	Metal Pipes, S. Side	Lt Green / Metal	
KC-LBP-30	tanks (3) in tank room	Blue over Silver / Metal	
KC-LBP-31	Tank Base	Red / Concrete	
KC-LBP-32	Roll-up hallway gate	Lt Blue / Metal	
KC-LBP-33	Valve Wheels	Black / Metal	
KC-LBP-34	Tunnel Ceiling	White / Concrete	
KC-LBP-35	Tunnel Wall	White / Concrete	
KC-LBP-36	Hot water heater room	Red / Concrete	
KC-LBP-37	Hot water heater Room	Yellow / Concrete	
KC-LBP-38	Men's Room Stall Doors	Blue / Metal	

Comments/Special Instructions:

RECEIVED
EMSL ANALYTICAL INC.
CAMILLE PLACE
2019 JUL -3 P 3:00

7/15/19

Page 3 of 4 pages

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

LEAD (Pb) CHAIN OF CUSTODY

EMSL ORDER ID *(Lab Use Only):* 061914129

PHONE: ( )
FAX: ( )

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Location	Volume/Area	Date/Time Sampled
KC-LBP-39	Hand rail on stairs to Beach	Silver / Metal	
KC-LBP-40	Decorative Metal Window	Green / Metal	
KC-LBP-41	Wall facing Boardwalk	White / Concrete	
KC-LBP-42	Stair wall to Boardwalk	Beige / Concrete	
KC-LBP-43	Gate to Lockers from Boardwalk	Green / Metal	

Comments/Special Instructions:

2019 JUL -5 P 6:01

Page 4 of 4 pages

1/18/19

EMSL Analytical, Inc.
528 Mineola Avenue, Carle Place, NY 11514
Phone/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com carleplacelab@emsl.com

EMSL Order:	062004869
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Karen Kraft**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone:	(516) 364-9890
Fax:	(516) 364-9045
Received:	03/04/20 10:03 AM
Collected:	3/2/2020

Project: **5366- OIP-06**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
KC-LBP-44	*062004869-0001*	3/2/2020	3/7/2020	<0.0080 % wt
	Site: Textured White Paint			
KC-LBP-45	*062004869-0002*	3/2/2020	3/7/2020	<0.0080 % wt
	Site: White Paint			

Alger Liang, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. When the information supplied by the customer can affect the validity of the results, it will be noted on the report. "<" (less than) result signifies the analyte was not detected at or above the warning limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by AIHA LAP, LLC in the env. accreditation program for Lead in Paint, CT PH-0249, NYS ELAP 11469, CA 2339

Initial report from 03/07/2020 16:02:26

OrderID: 062004869

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody

EMSL Order ID *(Lab Use Only):* 062004869

PHONE: ( )
FAX: ( )

Company: D&B Engineers & Architects	EMSL-Bill to: ☒ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 330 Crossways Park Drive	*Third Party Billing requires written authorization from third party*
City: Woodbury State/Province: NY	Zip/Postal Code: Country:
Report To (Name): Karen Kraft	Telephone #:
Email Address: kkraft@dh-eng.com	Fax #: Purchase Order:
Project Name/Number: 5366-01P-06	Please Provide Results: ☐ Fax ☒ Email
U.S. State Samples Taken: NY	CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☒ 2 Week

*Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide

Matrix	Method	Instrument	Reporting Limit	Check
Chips ☒ % by wt. ☐ mg/cm² ☐ ppm (mg/kg)	SW846-7000B	Flame Atomic Absorption	0.01%	☒
Air	NIOSH 7082	Flame Atomic Absorption	4 µg/filter	☐
	NIOSH 7105	Graphite Furnace AA	0.03 µg/filter	☐
	NIOSH 7300M/NIOSH 7303	ICP-OES	0.5 µg/filter	☐
Wipe* ASTM ☐ non ASTM ☐ *if no box checked, non-ASTM Wipe assumed	SW846-7000B	Flame Atomic Absorption	10 µg/wipe	☐
	SW846-6010B or C	ICP-OES	1.0 µg/wipe	☐
TCLP	SW846-1311/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1311/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
SPLP	SW846-1312/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1312/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW846-7000B	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
Wastewater Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	SM3111B/SW846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
	40 CFR Part 50	Graphite Furnace AA	3.6 µg/filter	☐
Other:				☐

Name of Sampler: **Signature of Sampler:**

Sample #	Location	Volume/Area	Date/Time Sampled
KC-LBP-44	Textured white paint	Top layer, concrete	3/2/20
KC-LBP-45	White paint	Bottom Layer, concrete	3/2/20

Client Sample #s - **Total # of Samples:** 2

Relinquished (Client):	Karen Kraft	**Date:**	3/3/20	**Time:**	
Received (Lab):		**Date:**		**Time:**	

RECEIVED EMSL ANALYTICAL, INC. CINNAMINSON, NJ MAR 10 '20 AM 10:03

Comments:

Rye Playland Pool Rehabilitation Project

Controlled Document — COC-25 Lead Pb – R6 – 7/19/2017

Page 1 of 1 pages

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **Mike Hofgren**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797
Phone: (516) 364-9890
Fax: (516) 364-9045

5/19/2020

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 5/8/2020. The results are tabulated on the attached data pages for the following client designated project:

Playland

The reference number for these samples is EMSL Order #012004586. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

Lead was detected in the method blank.

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order:	012004586
CustomerID:	DVBI69
CustomerPO:	
ProjectID:	

Attn: **Mike Hofgren**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received: 05/08/20 9:50 AM

Project: **Playland**

Analytical Results

Client Sample Description AP-TCLP-1
South Tower Corner White
Collected: 5/7/2020 11:00:00 AM
Lab ID: *012004586-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
TCLP 7470A	Mercury	ND D	0.0020	mg/L	5/14/2020	SW	05/14/20 15:46	SW
TCLP 1311/6010D	Arsenic	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Barium	ND D	0.50	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Cadmium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Chromium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Lead	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Selenium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV
TCLP 1311/6010D	Silver	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:53	PV

Client Sample Description AP-TCLP-2
South Stairs Balse
Collected: 5/7/2020 11:15:00 AM
Lab ID: *012004586-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
METALS								
TCLP 7470A	Mercury	ND D	0.0020	mg/L	5/14/2020	SW	05/14/20 15:48	SW
TCLP 1311/6010D	Arsenic	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Barium	0.57 D	0.50	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Cadmium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Chromium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Lead	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Selenium	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV
TCLP 1311/6010D	Silver	ND D	0.10	mg/L	5/13/2020	AM	05/15/20 15:58	PV

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution Sample required a dilution which was used to calculate final results

OrderID: 012004586

EMSL Analytical, Inc.
200 Route 130 North

Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
FAX: (856) 786-5974

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody

EMSL Order ID *(Lab Use Only)*: 012004586

Company : D&B Engineers and Architects, P.C.	**EMSL-Bill to:** ☑ Same ☐ Different If Bill to is Different note instructions in Comments** *Third Party Billing requires written authorization from third party*
Street: 330 Crossway Park Drive	
City: Woodbury **State/Province:** NY	**Zip/Postal Code:** 11797 **Country:** US
Report To (Name): Mike Hofgren	**Telephone #:** 516-364-9890
Email Address: mhofgren@db-eng.com	**Fax #:** 516-364-9045 **Purchase Order:**
Project Name/Number: Playland	**Please Provide Results:** ☐ Fax ☑ Email
U.S. State Samples Taken: NY	**CT Samples:** ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

**Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide*

Matrix	Method	Instrument	Reporting Limit	Check
Chips ☐ % by wt. ☐ mg/cm² ☐ ppm (mg/kg)	SW846-7000B	Flame Atomic Absorption	0.01%	☐
Air	NIOSH 7082	Flame Atomic Absorption	4 µg/filter	☐
	NIOSH 7105	Graphite Furnace AA	0.03 µg/filter	☐
	NIOSH 7300M/NIOSH 7303	ICP-OES	0.5 µg/filter	☐
Wipe* ASTM ☐ non ASTM ☐ *if no box checked, non-ASTM Wipe assumed	SW846-7000B	Flame Atomic Absorption	10 µg/wipe	☐
	SW846-6010B or C	ICP-OES	1.0 µg/wipe	☐
TCLP RCRA Metals by TCLP	SW846-1311/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1311/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☑
SPLP	SW846-1312/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1312/SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
TTLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
STLC	22 CCR App. II, 7000B/7420	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	22 CCR App. II, SW846-6010B or C	ICP-OES	0.1 mg/L (ppm)	☐
Soil	SW846-7000B	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	SW846-6010B or C	ICP-OES	2 mg/kg (ppm)	☐
Wastewater Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	SM3111B/SW846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.7	ICP-OES	0.020 mg/L (ppm)	☐
Drinking Water Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.5	ICP-OES	0.003 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-OES	12 µg/filter	☐
	40 CFR Part 50	Graphite Furnace AA	3.6 µg/filter	☐
Other:				☐

Name of Sampler: **Signature of Sampler:**

Sample #	Location	Volume/Area	Date/Time Sampled
(1) AP-TCLP-1	South Tower corner White	330g	11:00 / 5/7/20
(2) AP-TCLP-2	South Stairs Beige	230g	11:15 / 5/7/20

Client Sample #s - **Total # of Samples:** 2

Relinquished (Client):	[signature]	**Date:**	5/7/20	**Time:**	12:01
Received (Lab):	[signature]	**Date:**	5/8	**Time:**	9:50

Comments:

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **Kumar Chakroborty**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797
Phone: (516) 364-9890
Fax: (516) 364-9045

7/19/2019

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 7/5/2019. The results are tabulated on the attached data pages for the following client designated project:

Playland Pool Rehabilitation, 5366

The reference number for these samples is EMSL Order #011908273. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

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EMSL Order: 011908273
CustomerID: DVBI69
CustomerPO:
ProjectID:

Attn: **Kumar Chakroborty**
D&B Engineers and Architects, P.C.
330 Crossway Park Drive
Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received: 07/05/19 9:10 AM

Project: **Playland Pool Rehabilitation, 5366**

Analytical Results

Client Sample Description KC-PCB-01
Pool Deck Caulk-Top Layer 1st South Perimeter of Pool SD
Collected: 7/1/2019 ***Lab ID:*** *011908273-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3546/8082A	Aroclor-1016	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-02
Pool Deck Caulk-Bottom Layer 1st South Perimeter of Pool SD
Collected: 7/1/2019 ***Lab ID:*** *011908273-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3546/8082A	Aroclor-1016	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	3.0 D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND D		1.0 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-03
Exterior Window Caulk 1st East Side of Cafeteria D
Collected: 7/1/2019 ***Lab ID:*** *011908273-0003*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3546/8082A	Aroclor-1016	ND D		0.83 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND D		0.83 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND D		0.83 mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

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EMSL Order: 011908273
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Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received: 07/05/19 9:10 AM

Project: **Playland Pool Rehabilitation, 5366**

Analytical Results

Client Sample Description KC-PCB-03
Exterior Window Caulk 1st East Side of Cafeteria D
Collected: 7/1/2019 ***Lab ID:*** *011908273-0003*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1242	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	0.83	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-04
Door Glazing on North Tenant Space 1st East Door Facing South D
Collected: 7/1/2019 ***Lab ID:*** *011908273-0004*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1016	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	0.93	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-05
Exterior Foundation Wall Caulk 1st S Facing Wall of N Tenant Space D
Collected: 7/1/2019 ***Lab ID:*** *011908273-0005*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1016	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	56	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

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Fax: (516) 364-9045
Received: 07/05/19 9:10 AM

Project: **Playland Pool Rehabilitation, 5366**

Analytical Results

Client Sample Description KC-PCB-05
Exterior Foundation Wall Caulk 1st S
Facing Wall of N Tenant Space D

Collected: 7/1/2019 ***Lab ID:*** *011908273-0005*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1260	13	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	4.8	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-06
Exterior Black Roof Flashing Caulk 1st NW
Corner of N Tenant Space D

Collected: 7/1/2019 ***Lab ID:*** *011908273-0006*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1016	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	0.95	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Client Sample Description KC-PCB-07
Exterior Roof Flashing Caulk Beige 1st SW
Corner of S Tenant Space D

Collected: 7/1/2019 ***Lab ID:*** *011908273-0007*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1016	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	1.0	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

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Woodbury, NY 11797

Phone: (516) 364-9890
Fax: (516) 364-9045
Received: 07/05/19 9:10 AM

Project: **Playland Pool Rehabilitation, 5366**

Analytical Results

Client Sample Description KC-PCB-08
Window Glazing-Tunnel Entrance Lower
Window From Women's Room D

Collected: 7/1/2019 ***Lab ID:*** *011908273-0008*

Method	*Parameter*	*Result*		*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA									
3546/8082A	Aroclor-1016	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1221	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1232	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1242	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1248	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1254	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1260	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1262	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH
3546/8082A	Aroclor-1268	ND	D	0.96	mg/Kg	7/10/2019	AF	07/10/19 0:00	EH

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution

011908273

D&B ENGINEERS AND ARCHITECTS, P.C.

PCB BULK SAMPLE DATA AND CHAIN OF CUSTODY FORM

Client Name: Westchester County	Project Name and Address: Playland Pool Rehabilitation	Inspector/Investigator: Kumar Chakraborty	Page: 1 of 1
Date: 07/01/19	Requested Turnaround Time: ☐ 2 Hour ☐ 6 Hour ☐ 24 Hour 2 week ☐ 48 Hour ☐ 72 Hour ☒ Other ~~5 Day~~ 96hour	Project Manager: Andrew Grundy	Project Number: 5366

BULK SAMPLE INFORMATION

Bulk Sample ID No.	Material Description	Floor ID	Room/Area Description	Condition / Friability	Photo ID/ time
KC-PCB-01	Pool Deck Caulk - Top Layer	1st	South Perimeter of Pool	SD 1 ~~SD~~	1
KC-PCB-02	Pool Deck Caulk - Bottom Layer	1st	South Perimeter of Pool	SD 1	1
KC-PCB-03	Exterior Window Caulk	1st	East Side of Cafeteria	D 1	1
KC-PCB-04	Door Glazing on North Tenant Space	1st	East Door facing South	D 1	1
KC-PCB-05	Exterior Foundation Wall Caulk	1st	S facing wall of N Tenant Space	D	1
KC-PCB-06	Exterior Black Roof Flashing Caulk	1st	NW corner of N Tenant Space	D 1	1
KC-PCB-07	Exterior Roof Flashing Caulk Beige	1st	SW corner of S Tenant Space	D 1	1
~~KC-PCB-08~~	~~Pink Ceramic Tile Mortar Women's Rm~~	~~Lower~~	~~W Side of Rest Room~~	~~D~~	
KC-PCB-08	Window Glazing - Tunnel Entrance	Lower	Window from Women's Room	1 D	1
KC-PCB-				1	1
KC-PCB-					1
KC-PCB-					1

Condition: G- Good, MD – Minor Damage, P – Poor

Friability: F – Friable, NF – Not Friable

Special Instruction to Laboratory: ☒ Analyze All Samples

Email Results to: KKraft@db-eng.com/KChakraborty@db-eng.com

CHAIN OF CUSTODY INFORMATION AND LABORATORY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time	Method Of Submittal	
I. (Print): Karen Kraft	07/03/19		via UPS			Field	
(Sign): Karen Kraft				7/5	9:10am	Walk In	
II. (Print):						Fed-Ex	
(Sign):						Others	
III. (Print):						Fed-Ex	
(Sign):						Others	

TRC Comments: received in plastic.

Lab Comments:

Analyzed By: Date & Time:

Print Name:

Sign:

RECEIVED ENSR ANALYTICAL, INC. CARLE PLACE, NY 19 JUL -3 PM 5:55

FX 7882 7808 4069 4°C

Page 1 Of 1

OrderID: 011908273

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2020
Issued April 01, 2019

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. DANIEL CLARKE
EMSL ANALYTICAL, INC.
528 MINEOLA AVE.
CARLE PLACE, NY 11514

NY Lab Id No: 11469

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B

Sample Preparation Methods

	EPA 3051A

Serial No.: 59670

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101048-10

EMSL Analytical, Inc.

Carle Place, NY

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2019-07-01 through 2020-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

EMSL Analytical, Inc.
528 Mineola Ave.
Carle Place, NY 11514
Daniel Clarke
Phone: 516-997-7251
Email: dclarke@emsl.com
http://www.emsl.com

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 101048-10

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

Effective 2019-07-01 through 2020-06-30

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

EMSL Analytical, Inc.

528 Mineola Ave., Carle Place, NY 11514

Laboratory ID: 102344

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: June 01, 2020
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: June 01, 2020
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: June 01, 2020
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Beth Bair

Elizabeth Bair
Chairperson, Analytical Accreditation Board

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 16: 03/21/2018

Date Issued: 05/03/2018

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

EMSL Analytical, Inc.
528 Mineola Ave., Carle Place, NY 11514

Laboratory ID: **102344**
Issue Date: 05/03/2018

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 10/01/2005

IHLAP Scope Category	Field of Testing (FoT) (FoTs cover all relevant IH matrices)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte *(for internal methods only)*
Asbestos/Fiber Microscopy Core	Phase Contrast Microscopy (PCM)		NIOSH 7400	

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

AIHA Laboratory Accreditation Programs, LLC
SCOPE OF ACCREDITATION

EMSL Analytical, Inc.
528 Mineola Ave., Carle Place, NY 11514

Laboratory ID: **102344**
Issue Date: 05/03/2018

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA-LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air and composited wipes analyses are not included as part of the NLLAP.

Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 08/15/1999

Field of Testing (FoT)	Technology sub-type/ Detector	Method	Method Description (*for internal methods only*)
Paint		EPA SW-846 3050B	
		EPA SW-846 3051A	
		EPA SW-846-7000B	
Soil		EPA SW-846 3050B	
		EPA SW-846 3051A	
		EPA SW-846-7000B	
Settled Dust by Wipe		EPA SW-846 3050B	
		EPA SW-846 3051A	
		EPA SW-846-7000B	
Airborne Dust		NIOSH 7082	

A complete listing of currently accredited Environmental Lead laboratories is available on the AIHA-LAP, LLC website at: http://www.aihaaccreditedlabs.org

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2020
Issued April 01, 2019
Revised July 02, 2019

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. PHILLIP M. WORBY
EMSL ANALYTICAL INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

NY Lab Id No: 10872

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Bacteriology	
Coliform, Total / E. coli (Qualitative)	SM 20, 21-23 9223B (-04) (Colilert)
Heterotrophic Plate Count	SM 20, 21-23 9215B (-04)
Disinfection By-products	
Bromide	EPA 300.0 Rev. 2.1
Fuel Additives	
Methyl tert-butyl ether	EPA 524.2
Naphthalene	EPA 524.2
Metals I	
Arsenic, Total	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.9 Rev. 2.2
	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 245.1 Rev. 3.0
Selenium, Total	EPA 200.8 Rev. 5.4
Metals I	
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Metals II	
Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.8 Rev. 5.4
Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Thallium, Total	EPA 200.8 Rev. 5.4
Metals III	
Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4
Uranium (Mass)	EPA 200.8 Rev. 5.4
Microextractables	
1,2,3-Trichloropropane, Low Level	EPA 504.1
1,2-Dibromo-3-chloropropane, Low Level	EPA 504.1
1,2-Dibromoethane, Low Level	EPA 504.1
Miscellaneous	
Asbestos	EPA 100.1

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All approved analytes are listed below:

Miscellaneous	
Asbestos	EPA 100.2
Organic Carbon, Total	SM 21-23 5310C (-00)
Surfactant (MBAS)	SM 21-23 5540C (-00)
Turbidity	SM 21-23 2130 B (-01)
	EPA 180.1 Rev. 2.0
Non-Metals	
Alkalinity	SM 21-23 2320B (-97)
Calcium Hardness	EPA 200.7 Rev. 4.4
Chloride	EPA 300.0 Rev. 2.1
Color	SM 21-23 2120B (-01)
Cyanide	SM 20, 21-23 4500-CN E
	SM 20, 21-23 4500-CN G
Fluoride, Total	EPA 300.0 Rev. 2.1
Nitrate (as N)	EPA 300.0 Rev. 2.1
Nitrite (as N)	EPA 300.0 Rev. 2.1
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
Silica, Dissolved	EPA 200.7 Rev. 4.4
Solids, Total Dissolved	SM 21-23 2540C (-97)
Specific Conductance	SM 21-23 2510B (-97)
Sulfate (as SO4)	EPA 300.0 Rev. 2.1
Radiological Analytes	
Gamma Emitters	EPA 901.1
Gross Alpha	EPA 900.0
Gross Beta	EPA 900.0
Radium-226	EPA 903.0
Radiological Analytes	
Radium-228	EPA 904.0
Tritium	EPA 906.0
Uranium (Activity)	EPA 908.0
Trihalomethanes	
Bromodichloromethane	EPA 524.2
Bromoform	EPA 524.2
Chloroform	EPA 524.2
Dibromochloromethane	EPA 524.2
Total Trihalomethanes	EPA 524.2
Volatile Aromatics	
1,2,3-Trichlorobenzene	EPA 524.2
1,2,4-Trichlorobenzene	EPA 524.2
1,2,4-Trimethylbenzene	EPA 524.2
1,2-Dichlorobenzene	EPA 524.2
1,3,5-Trimethylbenzene	EPA 524.2
1,3-Dichlorobenzene	EPA 524.2
1,4-Dichlorobenzene	EPA 524.2
2-Chlorotoluene	EPA 524.2
4-Chlorotoluene	EPA 524.2
Benzene	EPA 524.2
Bromobenzene	EPA 524.2
Chlorobenzene	EPA 524.2
Ethyl benzene	EPA 524.2
Hexachlorobutadiene	EPA 524.2
Isopropylbenzene	EPA 524.2

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All approved analytes are listed below:

Volatile Aromatics

n-Butylbenzene	EPA 524.2
n-Propylbenzene	EPA 524.2
p-Isopropyltoluene (P-Cymene)	EPA 524.2
sec-Butylbenzene	EPA 524.2
Styrene	EPA 524.2
tert-Butylbenzene	EPA 524.2
Toluene	EPA 524.2
Total Xylenes	EPA 524.2

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 524.2
1,1,1-Trichloroethane	EPA 524.2
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1,1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2
1,2,3-Trichloropropane	EPA 524.2
1,2-Dichloroethane	EPA 524.2
1,2-Dichloropropane	EPA 524.2
1,3-Dichloropropane	EPA 524.2
2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2

Volatile Halocarbons

Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 524.2
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2

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All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260C
Acrylonitrile	EPA 8260C
Amines	
1,2-Diphenylhydrazine	EPA 8270D
1-Naphthylamine	EPA 8270D
2-Naphthylamine	EPA 8270D
2-Nitroaniline	EPA 8270D
3-Nitroaniline	EPA 8270D
4-Chloroaniline	EPA 8270D
4-Nitroaniline	EPA 8270D
5-Nitro-o-toluidine	EPA 8270D
a,a-Dimethylphenethylamine	EPA 8270D
Aniline	EPA 8270D
Carbazole	EPA 8270D
Diphenylamine	EPA 8270D
Pronamide	EPA 8270D
Benzidines	
3,3'-Dichlorobenzidine	EPA 8270D
3,3'-Dimethylbenzidine	EPA 8270D
Benzidine	EPA 8270D
Characteristic Testing	
Corrosivity	EPA 9045D
Free Liquids	EPA 9095B
Ignitability	EPA 1010A
Characteristic Testing	
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B
4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
Chlorobenzilate	EPA 8270D
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Isodrin	EPA 8270D
Kepone	EPA 8270D

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Chlorinated Hydrocarbon Pesticides

Lindane	EPA 8081B
Methoxychlor	EPA 8081B
Pentachloronitrobenzene	EPA 8270D
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
1,2,4-Trichlorobenzene	EPA 8270D
2-Chloronaphthalene	EPA 8270D
Hexachlorobenzene	EPA 8270D
Hexachlorobutadiene	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D
Hexachloroethane	EPA 8260C
	EPA 8270D
Hexachloropropene	EPA 8270D
Pentachlorobenzene	EPA 8270D

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270D
4-Bromophenylphenyl ether	EPA 8270D
4-Chlorophenylphenyl ether	EPA 8270D
Bis(2-chloroethoxy)methane	EPA 8270D
Bis(2-chloroethyl)ether	EPA 8270D

Low Level Polynuclear Aromatic Hydrocarbons

Acenaphthene Low Level	EPA 8270D

Low Level Polynuclear Aromatic Hydrocarbons

Acenaphthene Low Level	EPA 8270D SIM
Acenaphthylene Low Level	EPA 8270D SIM
Anthracene Low Level	EPA 8270D SIM
Benzo(a)anthracene Low Level	EPA 8270D SIM
Benzo(a)pyrene Low Level	EPA 8270D SIM
Benzo(b)fluoranthene Low Level	EPA 8270D SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D SIM
Benzo(k)fluoranthene Low Level	EPA 8270D SIM
Chrysene Low Level	EPA 8270D SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D SIM
Fluoranthene Low Level	EPA 8270D SIM
Fluorene Low Level	EPA 8270D SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D
	EPA 8270D SIM
Naphthalene Low Level	EPA 8270D
	EPA 8270D SIM
Phenanthrene Low Level	EPA 8270D SIM
Pyrene Low Level	EPA 8270D SIM

Metals I

Barium, Total	EPA 6010D
	EPA 6020B
Cadmium, Total	EPA 6010D
	EPA 6020B
Calcium, Total	EPA 6010D
	EPA 6020B

Serial No.: 60401

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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Metals I

Chromium, Total	EPA 6010D
	EPA 6020B
Copper, Total	EPA 6010D
	EPA 6020B
Iron, Total	EPA 6010D
	EPA 6020B
Lead, Total	EPA 6010D
	EPA 6020B
	EPA 7000B
Magnesium, Total	EPA 6010D
	EPA 6020B
Manganese, Total	EPA 6010D
	EPA 6020B
Nickel, Total	EPA 6010D
	EPA 6020B
Potassium, Total	EPA 6010D
	EPA 6020B
Silver, Total	EPA 6010D
	EPA 6020B
Sodium, Total	EPA 6010D
	EPA 6020B
Strontium, Total	EPA 6010D
	EPA 6020B

Metals II

Aluminum, Total	EPA 6010D

Metals II

Aluminum, Total	EPA 6020B
Antimony, Total	EPA 6010D
	EPA 6020B
Arsenic, Total	EPA 6010D
	EPA 6020B
Beryllium, Total	EPA 6010D
	EPA 6020B
Chromium VI	EPA 7196A
Lithium, Total	EPA 6010D
Mercury, Total	EPA 7471B
Selenium, Total	EPA 6010D
	EPA 6020B
Vanadium, Total	EPA 6010D
	EPA 6020B
Zinc, Total	EPA 6010D
	EPA 6020B

Metals III

Cobalt, Total	EPA 6010D
	EPA 6020B
Molybdenum, Total	EPA 6010D
	EPA 6020B
Thallium, Total	EPA 6010D
	EPA 6020B
Tin, Total	EPA 6010D
	EPA 6020B

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Metals III	
Titanium, Total	EPA 6010D
	EPA 6020B
Minerals	
Bromide	EPA 9056A
Chloride	EPA 9056A
Fluoride, Total	EPA 9056A
Sulfate (as SO4)	EPA 9056A
Miscellaneous	
Boron, Total	EPA 6010D
	EPA 6020B
Cyanide, Total	EPA 9014
Phenols	EPA 9065
Sulfide (as S)	EPA 9034
Nitroaromatics and Isophorone	
1,3,5-Trinitrobenzene	EPA 8270D
1,3-Dinitrobenzene	EPA 8270D
1,4-Naphthoquinone	EPA 8270D
2,4-Dinitrotoluene	EPA 8270D
2,6-Dinitrotoluene	EPA 8270D
4-Nitroquinoline-1-oxide	EPA 8270D
Isophorone	EPA 8270D
Nitrobenzene	EPA 8260C
	EPA 8270D
Pyridine	EPA 8270D
Nitrosoamines	
N-Nitrosodiethylamine	EPA 8270D
N-Nitrosodimethylamine	EPA 8270D
N-Nitrosodi-n-butylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 8270D
N-Nitrosodiphenylamine	EPA 8270D
N-nitrosomethylethylamine	EPA 8270D
N-nitrosomorpholine	EPA 8270D
N-Nitrosopyrrolidine	EPA 8270D
Nutrients	
Nitrate (as N)	EPA 9056A
Nitrite (as N)	EPA 9056A
Orthophosphate (as P)	EPA 9056A
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Oil and Grease Total Recoverable (HEM)	EPA 9071B (Solvent:Hexane)
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 8270D
Diethyl phthalate	EPA 8270D
Dimethyl phthalate	EPA 8270D
Di-n-butyl phthalate	EPA 8270D
Di-n-octyl phthalate	EPA 8270D

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Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
PCB 1	EPA 8082A
PCB 101	EPA 8082A
PCB 110	EPA 8082A
PCB 138	EPA 8082A
PCB 141	EPA 8082A
PCB 151	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 187	EPA 8082A
PCB 206	EPA 8082A
PCB 31	EPA 8082A
PCB 44	EPA 8082A
PCB 5	EPA 8082A
PCB 52	EPA 8082A

Polychlorinated Biphenyls	
PCB 66	EPA 8082A
PCB 87	EPA 8082A
Polynuclear Aromatic Hydrocarbons	
2-Acetylaminofluorene	EPA 8270D
Acenaphthene	EPA 8270D
Acenaphthylene	EPA 8270D
Anthracene	EPA 8270D
Benzo(a)anthracene	EPA 8270D
Benzo(a)pyrene	EPA 8270D
Benzo(b)fluoranthene	EPA 8270D
Benzo(g,h,i)perylene	EPA 8270D
Benzo(k)fluoranthene	EPA 8270D
Chrysene	EPA 8270D
Dibenzo(a,h)anthracene	EPA 8270D
Fluoranthene	EPA 8270D
Fluorene	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D
Naphthalene	EPA 8270D
Phenanthrene	EPA 8270D
Pyrene	EPA 8270D
Priority Pollutant Phenols	
2,3,4,6 Tetrachlorophenol	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D
2,4-Dichlorophenol	EPA 8270D

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WADSWORTH CENTER

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MR. PHILLIP M. WORBY
EMSL ANALYTICAL INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

NY Lab Id No: 10872

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All approved analytes are listed below:

Priority Pollutant Phenols

2,4-Dimethylphenol	EPA 8270D
2,4-Dinitrophenol	EPA 8270D
2,6-Dichlorophenol	EPA 8270D
2-Chlorophenol	EPA 8270D
2-Methyl-4,6-dinitrophenol	EPA 8270D
2-Methylphenol	EPA 8270D
2-Nitrophenol	EPA 8270D
3-Methylphenol	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D
4-Methylphenol	EPA 8270D
4-Nitrophenol	EPA 8270D
Pentachlorophenol	EPA 8270D
Phenol	EPA 8270D

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
2-Methylnaphthalene	EPA 8270D
2-Picoline	EPA 8270D
4-Amino biphenyl	EPA 8270D
Acetophenone	EPA 8270D
Aramite	EPA 8270D
Benzaldehyde	EPA 8270D
Benzoic Acid	EPA 8270D

Semi-Volatile Organics

Benzyl alcohol	EPA 8270D
Caprolactam	EPA 8270D
Dibenzofuran	EPA 8270D
Ethyl methanesulfonate	EPA 8270D
Methyl methanesulfonate	EPA 8270D
Phenacetin	EPA 8270D
Safrole	EPA 8270D

Volatile Aromatics

1,2,4-Trichlorobenzene, Volatile	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260C
1,2-Dichlorobenzene	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260C
1,3-Dichlorobenzene	EPA 8260C
1,4-Dichlorobenzene	EPA 8260C
2-Chlorotoluene	EPA 8260C
4-Chlorotoluene	EPA 8260C
Benzene	EPA 8260C
Bromobenzene	EPA 8260C
Chlorobenzene	EPA 8260C
Ethyl benzene	EPA 8260C
Isopropylbenzene	EPA 8260C
m/p-Xylenes	EPA 8260C
Naphthalene, Volatile	EPA 8260C
n-Butylbenzene	EPA 8260C
n-Propylbenzene	EPA 8260C

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Volatile Aromatics	
o-Xylene	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260C
sec-Butylbenzene	EPA 8260C
Styrene	EPA 8260C
tert-Butylbenzene	EPA 8260C
Toluene	EPA 8260C
Total Xylenes	EPA 8260C
Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260C
1,1,1-Trichloroethane	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260C
1,1,2-Trichloroethane	EPA 8260C
1,1-Dichloroethane	EPA 8260C
1,1-Dichloroethene	EPA 8260C
1,1-Dichloropropene	EPA 8260C
1,2,3-Trichloropropane	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260C
1,2-Dibromoethane	EPA 8260C
1,2-Dichloroethane	EPA 8260C
1,2-Dichloropropane	EPA 8260C
1,3-Dichloropropane	EPA 8260C
2,2-Dichloropropane	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260C
Bromochloromethane	EPA 8260C
Volatile Halocarbons	
Bromodichloromethane	EPA 8260C
Bromoform	EPA 8260C
Bromomethane	EPA 8260C
Carbon tetrachloride	EPA 8260C
Chloroethane	EPA 8260C
Chloroform	EPA 8260C
Chloromethane	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260C
Dibromochloromethane	EPA 8260C
Dibromomethane	EPA 8260C
Dichlorodifluoromethane	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260C
Methyl iodide	EPA 8260C
Methylene chloride	EPA 8260C
Tetrachloroethene	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260C
trans-1,4-Dichloro-2-butene	EPA 8260C
Trichloroethene	EPA 8260C
Trichlorofluoromethane	EPA 8260C
Vinyl chloride	EPA 8260C
Volatile Organics	
2-Butanone (Methylethyl ketone)	EPA 8260C
2-Hexanone	EPA 8260C

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Volatile Organics

4-Methyl-2-Pentanone	EPA 8260C
Acetone	EPA 8260C
Acetonitrile	EPA 8260C
Carbon Disulfide	EPA 8260C
Ethylene Glycol	EPA 8015C
Methyl acetate	EPA 8260C
Methyl tert-butyl ether	EPA 8260C
o-Toluidine	EPA 8270D
tert-butyl alcohol	EPA 8260C
Vinyl acetate	EPA 8260C

Sample Preparation Methods

EPA 5035A-L
EPA 5035A-H
EPA 9030B
EPA 3010A
EPA 3005A
EPA 3050B
EPA 3550C
EPA 3540C
EPA 3020A
EPA 3546
EPA 3051A
EPA 3585
EPA 3060A
EPA 3541

Sample Preparation Methods

EPA 9010C

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Acrylates	
Acrolein (Propenal)	EPA 8260C
	EPA 624.1
Acrylonitrile	EPA 8260C
	EPA 624.1
Amines	
1,2-Diphenylhydrazine	EPA 8270D
1-Naphthylamine	EPA 8270D
2-Naphthylamine	EPA 8270D
2-Nitroaniline	EPA 8270D
3-Nitroaniline	EPA 8270D
4-Chloroaniline	EPA 8270D
4-Nitroaniline	EPA 8270D
5-Nitro-o-toluidine	EPA 8270D
a,a-Dimethylphenethylamine	EPA 8270D
Aniline	EPA 625.1
	EPA 8270D
Carbazole	EPA 625.1
	EPA 8270D
Diphenylamine	EPA 8270D
Pyridine	EPA 625.1
	EPA 8270D
Bacteriology	
Heterotrophic Plate Count	SM 18-21 9215B

Benzidines	
3,3'-Dichlorobenzidine	EPA 625.1
	EPA 8270D
3,3'-Dimethylbenzidine	EPA 8270D
Benzidine	EPA 625.1
	EPA 8270D
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081B
	EPA 608.3
4,4'-DDE	EPA 8081B
	EPA 608.3
4,4'-DDT	EPA 8081B
	EPA 608.3
Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B
	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3
delta-BHC	EPA 8081B
	EPA 608.3
Dieldrin	EPA 8081B
	EPA 608.3

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Chlorinated Hydrocarbon Pesticides	
Endosulfan I	EPA 8081B
	EPA 608.3
Endosulfan II	EPA 8081B
	EPA 608.3
Endosulfan sulfate	EPA 8081B
	EPA 608.3
Endrin	EPA 8081B
	EPA 608.3
Endrin aldehyde	EPA 8081B
	EPA 608.3
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Isodrin	EPA 8270D
Kepone	EPA 8270D
Lindane	EPA 8081B
	EPA 608.3
Methoxychlor	EPA 8081B
	EPA 608.3
Mirex	EPA 8081B
PCNB	EPA 8270D
Toxaphene	EPA 8081B
	EPA 608.3

Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
1,2,4-Trichlorobenzene	EPA 625.1
	EPA 8270D
2-Chloronaphthalene	EPA 625.1
	EPA 8270D
Hexachlorobenzene	EPA 625.1
	EPA 8270D
Hexachlorobutadiene	EPA 625.1
	EPA 8270D
Hexachlorocyclopentadiene	EPA 625.1
	EPA 8270D
Hexachloroethane	EPA 8260C
	EPA 625.1
	EPA 8270D
Hexachloropropene	EPA 8270D
Pentachlorobenzene	EPA 8270D
Chlorophenoxy Acid Pesticides	
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Demand	
Biochemical Oxygen Demand	SM 5210B-2011
Carbonaceous BOD	SM 5210B-2011
Chemical Oxygen Demand	EPA 410.4, Rev. 2.0 (1993)
	SM 5220D-2011

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Fuel Oxygenates	
Ethanol	EPA 8015D
Methyl tert-butyl ether	EPA 8260C
tert-butyl alcohol	EPA 8260C
Haloethers	
2,2'-Oxybis(1-chloropropane)	EPA 625.1
	EPA 8270D
4-Bromophenylphenyl ether	EPA 625.1
	EPA 8270D
4-Chlorophenylphenyl ether	EPA 625.1
	EPA 8270D
Bis(2-chloroethoxy)methane	EPA 625.1
	EPA 8270D
Bis(2-chloroethyl)ether	EPA 625.1
	EPA 8270D
Low Level Halocarbons	
1,2-Dibromo-3-chloropropane, Low Level	EPA 8011
1,2-Dibromoethane, Low Level	EPA 8011
Low Level Polynuclear Aromatics	
Acenaphthene Low Level	EPA 8270D SIM
Acenaphthylene Low Level	EPA 8270D SIM
Anthracene Low Level	EPA 8270D SIM
Benzo(a)anthracene Low Level	EPA 8270D SIM
Benzo(a)pyrene Low Level	EPA 8270D SIM
Benzo(b)fluoranthene Low Level	EPA 8270D SIM

Low Level Polynuclear Aromatics	
Benzo(g,h,i)perylene Low Level	EPA 8270D SIM
Benzo(k)fluoranthene Low Level	EPA 8270D SIM
Chrysene Low Level	EPA 8270D SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D SIM
Fluoranthene Low Level	EPA 8270D SIM
Fluorene Low Level	EPA 8270D SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D SIM
Naphthalene Low Level	EPA 8270D SIM
Phenanthrene Low Level	EPA 8270D SIM
Pyrene Low Level	EPA 8270D SIM
Metals I	
Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D

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Metals I	
Chromium, Total	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Copper, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Iron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 7000B
	EPA 200.9 Rev. 2.2 (1994)
	EPA 200.8, Rev. 5.4 (1994)
Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Metals I	
Nickel, Total	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Strontium, Total	EPA 6010D
	EPA 6020B
Metals II	
Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

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Metals II

Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium VI	EPA 7196A
	SM 3500-Cr B-2011
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 7470A
	SM 3112B-2011
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

Metals III

Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Gold, Total	SM 3111B-2011
Molybdenum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Palladium, Total	SM 3111B-2011
Platinum, Total	SM 3111B-2011
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Tin, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Titanium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Uranium (Mass)	EPA 200.8, Rev. 5.4 (1994)

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Mineral	
Acidity	SM 2310B-2011
Alkalinity	SM 2320B-2011
Chloride	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Hardness, Total	EPA 200.7, Rev. 4.4 (1994)
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Miscellaneous	
Boron, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 6020B
Bromide	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Color	SM 2120B-2011
Cyanide, Total	EPA 9014
	SM 4500-CN E-2011
non-Polar Extractable Material (TPH)	EPA 1664A
Oil and Grease Total Recoverable (HEM)	EPA 1664A
Organic Carbon, Total	SM 5310C-2011
Phenols	EPA 420.1 (Rev. 1978)
	EPA 9065
Silica, Dissolved	EPA 200.7, Rev. 4.4 (1994)
Specific Conductance	EPA 120.1 (Rev. 1982)

Miscellaneous	
Specific Conductance	SM 2510B-2011
	EPA 9050A
Sulfide (as S)	EPA 9034
	SM 4500-S2- D-2011
Surfactant (MBAS)	SM 5540C-2011
Turbidity	SM 2130 B-2011
Nitroaromatics and Isophorone	
1,3,5-Trinitrobenzene	EPA 8270D
1,3-Dinitrobenzene	EPA 8270D
1,4-Naphthoquinone	EPA 8270D
2,4-Dinitrotoluene	EPA 625.1
	EPA 8270D
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270D
Isophorone	EPA 625.1
	EPA 8270D
Nitrobenzene	EPA 8260C
	EPA 625.1
	EPA 8270D
Nitrosoamines	
N-Nitrosodiethylamine	EPA 8270D
N-Nitrosodimethylamine	EPA 625.1
	EPA 8270D
N-Nitrosodi-n-butylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 625.1

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Nitrosoamines	
N-Nitrosodi-n-propylamine	EPA 8270D
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270D
N-nitrosomethylethylamine	EPA 8270D
N-nitrosomorpholine	EPA 8270D
N-Nitrosopyrrolidine	EPA 8270D
Nutrient	
Ammonia (as N)	SM 4500-NH3 C-2011
Kjeldahl Nitrogen, Total	SM 4500-NH3 C-2011
Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)
	EPA 9056A
Phosphorus, Total	SM 4500-P E-2011
Organophosphate Pesticides	
Atrazine	EPA 8270D
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 625.1
	EPA 8270D

Phthalate Esters	
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270D
Diethyl phthalate	EPA 625.1
	EPA 8270D
Dimethyl phthalate	EPA 625.1
	EPA 8270D
Di-n-butyl phthalate	EPA 625.1
	EPA 8270D
Di-n-octyl phthalate	EPA 625.1
	EPA 8270D
Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3

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WADSWORTH CENTER

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EMSL ANALYTICAL INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

NY Lab Id No: 10872

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Polychlorinated Biphenyls

Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
PCB 1	EPA 8082A
PCB 101	EPA 8082A
PCB 110	EPA 8082A
PCB 138	EPA 8082A
PCB 141	EPA 8082A
PCB 151	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 187	EPA 8082A
PCB 206	EPA 8082A
PCB 31	EPA 8082A
PCB 44	EPA 8082A
PCB 5	EPA 8082A
PCB 52	EPA 8082A
PCB 66	EPA 8082A
PCB 87	EPA 8082A

Polynuclear Aromatics

7,12-Dimethylbenzyl (a) anthracene	EPA 8270D
Acenaphthene	EPA 625.1
	EPA 8270D

Polynuclear Aromatics

Acenaphthylene	EPA 625.1
	EPA 8270D
Anthracene	EPA 625.1
	EPA 8270D
Benzo(a)anthracene	EPA 625.1
	EPA 8270D
Benzo(a)pyrene	EPA 625.1
	EPA 8270D
Benzo(b)fluoranthene	EPA 625.1
	EPA 8270D
Benzo(g,h,i)perylene	EPA 625.1
	EPA 8270D
Benzo(k)fluoranthene	EPA 625.1
	EPA 8270D
Chrysene	EPA 625.1
	EPA 8270D
Dibenzo(a,h)anthracene	EPA 625.1
	EPA 8270D
Fluoranthene	EPA 625.1
	EPA 8270D
Fluorene	EPA 625.1
	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 625.1
	EPA 8270D
Naphthalene	EPA 625.1
	EPA 8270D

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Polynuclear Aromatics	
Phenanthrene	EPA 625.1
	EPA 8270D
Pyrene	EPA 625.1
	EPA 8270D
Priority Pollutant Phenols	
2,3,4,6 Tetrachlorophenol	EPA 8270D
2,4,5-Trichlorophenol	EPA 625.1
	EPA 8270D
2,4,6-Trichlorophenol	EPA 625.1
	EPA 8270D
2,4-Dichlorophenol	EPA 625.1
	EPA 8270D
2,4-Dimethylphenol	EPA 625.1
	EPA 8270D
2,4-Dinitrophenol	EPA 625.1
	EPA 8270D
2,6-Dichlorophenol	EPA 8270D
2-Chlorophenol	EPA 625.1
	EPA 8270D
2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270D
2-Methylphenol	EPA 625.1
	EPA 8270D
2-Nitrophenol	EPA 625.1
	EPA 8270D
Priority Pollutant Phenols	
3-Methylphenol	EPA 8270D
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270D
4-Methylphenol	EPA 625.1
	EPA 8270D
4-Nitrophenol	EPA 625.1
	EPA 8270D
Pentachlorophenol	EPA 625.1
	EPA 8270D
Phenol	EPA 625.1
	EPA 8270D
Residue	
Settleable Solids	SM 2540 F-2011
Solids, Total	SM 2540 B-2011
Solids, Total Dissolved	SM 2540 C-2011
Solids, Total Suspended	SM 2540 D-2011
Solids, Volatile	EPA 160.4 (Issued 1971)
Semi-Volatile Organics	
1,1'-Biphenyl	EPA 8270D
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
2-Methylnaphthalene	EPA 8270D
2-Picoline	EPA 8270D
4-Amino biphenyl	EPA 8270D

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Semi-Volatile Organics	
Acetophenone	EPA 8270D
Aramite	EPA 8270D
Benzaldehyde	EPA 8270D
Benzoic Acid	EPA 8270D
Benzyl alcohol	EPA 8270D
Caprolactam	EPA 8270D
Dibenzofuran	EPA 8270D
Ethyl methanesulfonate	EPA 8270D
Methyl methanesulfonate	EPA 8270D
n-Decane	EPA 625.1
n-Octadecane	EPA 625.1
Phenacetin	EPA 8270D
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260C
1,2-Dichlorobenzene	EPA 8260C
	EPA 624.1
1,3,5-Trimethylbenzene	EPA 8260C
1,3-Dichlorobenzene	EPA 8260C
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260C
	EPA 624.1
2-Chlorotoluene	EPA 8260C
4-Chlorotoluene	EPA 8260C
Benzene	EPA 8260C

Volatile Aromatics	
Benzene	EPA 624.1
Bromobenzene	EPA 8260C
Chlorobenzene	EPA 8260C
	EPA 624.1
Ethyl benzene	EPA 8260C
	EPA 624.1
Isopropylbenzene	EPA 8260C
m/p-Xylenes	EPA 8260C
	EPA 624.1
Naphthalene, Volatile	EPA 8260C
n-Butylbenzene	EPA 8260C
n-Propylbenzene	EPA 8260C
o-Xylene	EPA 8260C
	EPA 624.1
p-Isopropyltoluene (P-Cymene)	EPA 8260C
sec-Butylbenzene	EPA 8260C
Styrene	EPA 8260C
	EPA 624.1
tert-Butylbenzene	EPA 8260C
Toluene	EPA 8260C
	EPA 624.1
Total Xylenes	EPA 8260C
	EPA 624.1
Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260C

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Volatile Halocarbons	
1,1,1-Trichloroethane	EPA 8260C
	EPA 624.1
1,1,2,2-Tetrachloroethane	EPA 8260C
	EPA 624.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260C
1,1,2-Trichloroethane	EPA 8260C
	EPA 624.1
1,1-Dichloroethane	EPA 8260C
	EPA 624.1
1,1-Dichloroethene	EPA 8260C
	EPA 624.1
1,1-Dichloropropene	EPA 8260C
1,2,3-Trichloropropane	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260C
1,2-Dibromoethane	EPA 8260C
1,2-Dichloroethane	EPA 8260C
	EPA 624.1
1,2-Dichloropropane	EPA 8260C
	EPA 624.1
1,3-Dichloropropane	EPA 8260C
2,2-Dichloropropane	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260C
	EPA 624.1
Bromochloromethane	EPA 8260C
Bromodichloromethane	EPA 8260C
	EPA 624.1

Volatile Halocarbons	
Bromoform	EPA 8260C
	EPA 624.1
Bromomethane	EPA 8260C
	EPA 624.1
Carbon tetrachloride	EPA 8260C
	EPA 624.1
Chloroethane	EPA 8260C
	EPA 624.1
Chloroform	EPA 8260C
	EPA 624.1
Chloromethane	EPA 8260C
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260C
	EPA 624.1
cis-1,3-Dichloropropene	EPA 8260C
	EPA 624.1
Dibromochloromethane	EPA 8260C
	EPA 624.1
Dibromomethane	EPA 8260C
Dichlorodifluoromethane	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260C
Methyl iodide	EPA 8260C
Methylene chloride	EPA 8260C
	EPA 624.1
Tetrachloroethene	EPA 8260C
	EPA 624.1

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All approved analytes are listed below:

Volatile Halocarbons	
trans-1,2-Dichloroethene	EPA 8260C
	EPA 624.1
trans-1,3-Dichloropropene	EPA 8260C
	EPA 624.1
trans-1,4-Dichloro-2-butene	EPA 8260C
Trichloroethene	EPA 8260C
	EPA 624.1
Trichlorofluoromethane	EPA 8260C
	EPA 624.1
Vinyl chloride	EPA 8260C
	EPA 624.1

Volatiles Organics	
2-Butanone (Methylethyl ketone)	EPA 8260C
2-Hexanone	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260C
Acetone	EPA 8260C
Acetonitrile	EPA 8260C
Carbon Disulfide	EPA 8260C
Ethylene Glycol	EPA 8015D
Methyl acetate	EPA 8260C
o-Toluidine	EPA 8270D
Vinyl acetate	EPA 8260C

Sample Preparation Methods	
	SM 4500-P B(5)-2011
	EPA 5030C

Sample Preparation Methods	
	SM 4500-CN B-2011 and C-201
	EPA 3015A
	EPA 9030B
	EPA 3010A
	EPA 3005A
	EPA 3510C
	EPA 3520C
	EPA 3020A
	SM 4500-NH3 B-2011
	SM 4500-N Org B-2011 or C-20
	EPA 9010C

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 6010C
	EPA 7000B

Sample Preparation Methods

	EPA 3050B

Serial No.: 59461

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NY Lab Id No: 10872

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All approved analytes are listed below:

Acrylates	
Acetonitrile	EPA TO-15
Acrylonitrile	EPA TO-17
	EPA TO-15
Ethyl acrylate	EPA TO-15
Methyl methacrylate	EPA TO-15
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA TO-17
Hexachlorobutadiene	EPA TO-17
	EPA TO-15
Hexachloroethane	EPA TO-15
Miscellaneous	
Formaldehyde	EPA TO-15
Radon	Charcoal - Liquid Scintillation
Polychlorinated Biphenyls	
PCBs and Aroclors	EPA TO-10A
	EPA TO-4A
Polynuclear Aromatics	
Naphthalene	EPA TO-15
Priority Pollutant Phenols	
Phenol	EPA TO-15
Purgeable Aromatics	
1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-17
	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,3-Dichlorobenzene	EPA TO-17
	EPA TO-15
1,4-Dichlorobenzene	EPA TO-17
	EPA TO-15
2-Chlorotoluene	EPA TO-15
Benzene	EPA TO-17
	EPA TO-15
Chlorobenzene	EPA TO-17
	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-17
	EPA TO-15
m/p-Xylenes	EPA TO-15
o-Xylene	EPA TO-17
	EPA TO-15
Styrene	EPA TO-17
	EPA TO-15
Toluene	EPA TO-17
	EPA TO-15
Total Xylenes	EPA TO-17
	EPA TO-15
Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA TO-17

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Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA TO-15
1,1,2,2-Tetrachloroethane	EPA TO-17
	EPA TO-15
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA TO-15
1,1,2-Trichloroethane	EPA TO-17
	EPA TO-15
1,1-Dichloroethane	EPA TO-17
	EPA TO-15
1,1-Dichloroethene	EPA TO-17
	EPA TO-15
1,2-Dibromo-3-chloropropane	EPA TO-15
1,2-Dibromoethane	EPA TO-15
1,2-Dichloroethane	EPA TO-17
	EPA TO-15
1,2-Dichloropropane	EPA TO-17
	EPA TO-15
3-Chloropropene (Allyl chloride)	EPA TO-15
Bromodichloromethane	EPA TO-15
Bromoform	EPA TO-17
	EPA TO-15
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-17
	EPA TO-15
Chloroethane	EPA TO-15
Chloroform	EPA TO-17
	EPA TO-15

Purgeable Halocarbons	
Chloromethane	EPA TO-15
cis-1,2-Dichloroethene	EPA TO-17
	EPA TO-15
cis-1,3-Dichloropropene	EPA TO-17
	EPA TO-15
Dibromochloromethane	EPA TO-15
Dichlorodifluoromethane	EPA TO-15
Methylene chloride	EPA TO-17
	EPA TO-15
Tetrachloroethene	EPA TO-17
	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-17
	EPA TO-15
Trichloroethene	EPA TO-17
	EPA TO-15
Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-17
	EPA TO-15
Vinyl chloride	EPA TO-17
	EPA TO-15
Volatile Chlorinated Organics	
Benzyl chloride	EPA TO-15
Epichlorohydrin	EPA TO-15

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Volatile Organics

1,2-Dichlorotetrafluoroethane	EPA TO-15
1,3-Butadiene	EPA TO-17
	EPA TO-15
1,4-Dioxane	EPA TO-15
2,2,4-Trimethylpentane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetaldehyde	EPA TO-15
Acetone	EPA TO-15
Acrolein (Propenal)	EPA TO-15
Carbon Disulfide	EPA TO-17
	EPA TO-15
Cyclohexane	EPA TO-15
Hexane	EPA TO-15
Isopropanol	EPA TO-15
Methanol	EPA TO-15
Methyl iodide	EPA TO-15
Methyl tert-butyl ether	EPA TO-17
	EPA TO-15
n-Heptane	EPA TO-15
Nitrobenzene	EPA TO-15
Propionaldehyde	EPA TO-15
tert-butyl alcohol	EPA TO-15
Vinyl acetate	EPA TO-15

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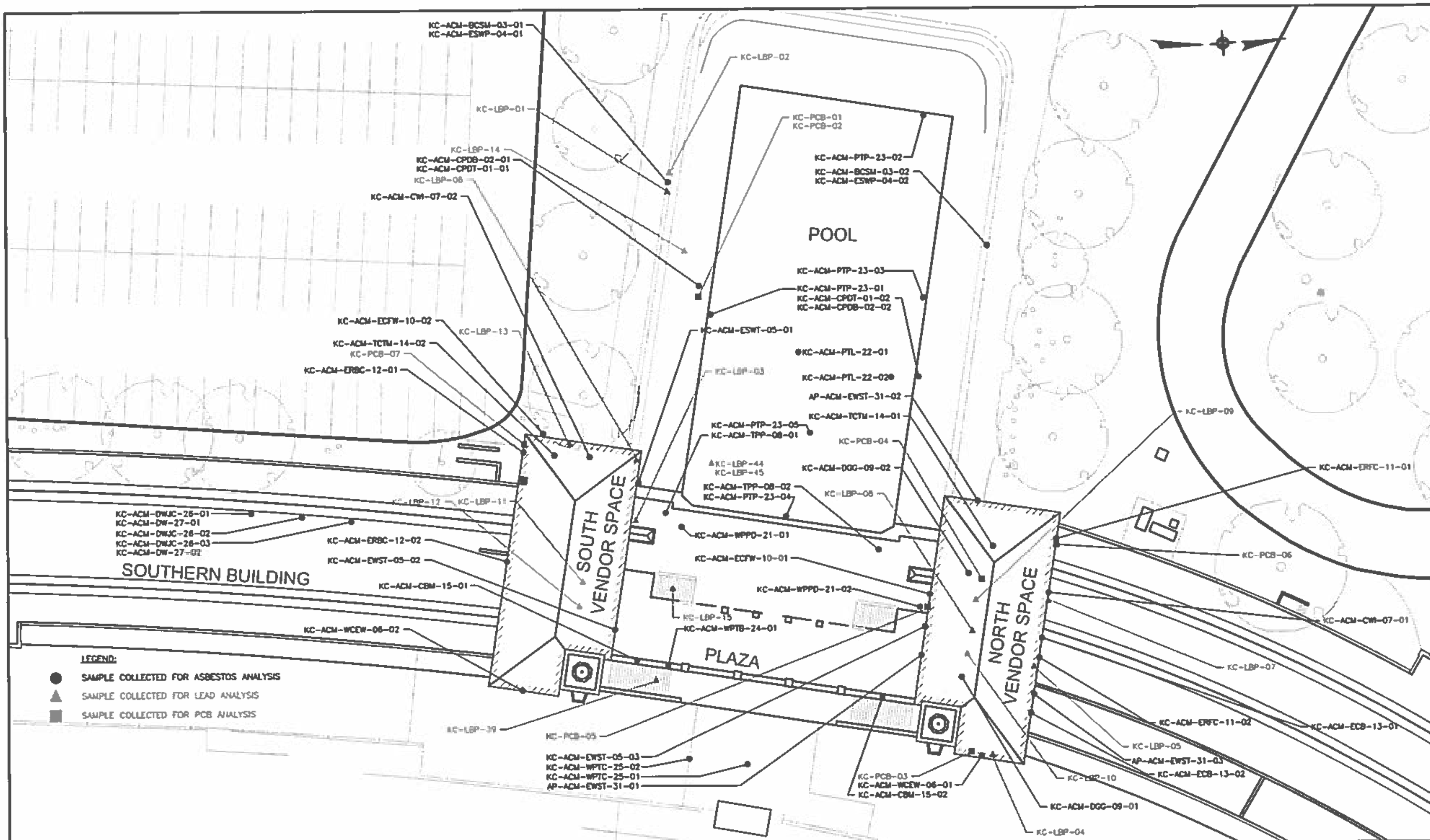
All approved subcategories and/or analytes are listed below:

Chlorinated Hydrocarbon Pesticides	
Chlordane Total	NIOSH 5510
Metals I	
Lead, Total	NIOSH 7082
	40 CFR PART 50 2013 APP G
Metals II	
Mercury, Total	NIOSH 6009
Miscellaneous	
Asbestos	40 CFR 763 APX A No. III
	YAMATE,AGARWAL GIBB
	NIOSH 7402
Fibers	NIOSH 7400 A RULES
Suspended Particulates	40 CFR PART 50 APP B
	40 CFR PART 50 APP J (PM10)
Polychlorinated Biphenyls	
PCBs and Aroclors	NIOSH 5503
Purgeable Aromatics	
Benzene	NIOSH 1501
Toluene	NIOSH 1501
Total Xylenes	NIOSH 1501
Sample Preparation Methods	
	40 CFR PART 50 APP G

Serial No.: 59463

APPENDIX D

SAMPLE LOCATION PLANS



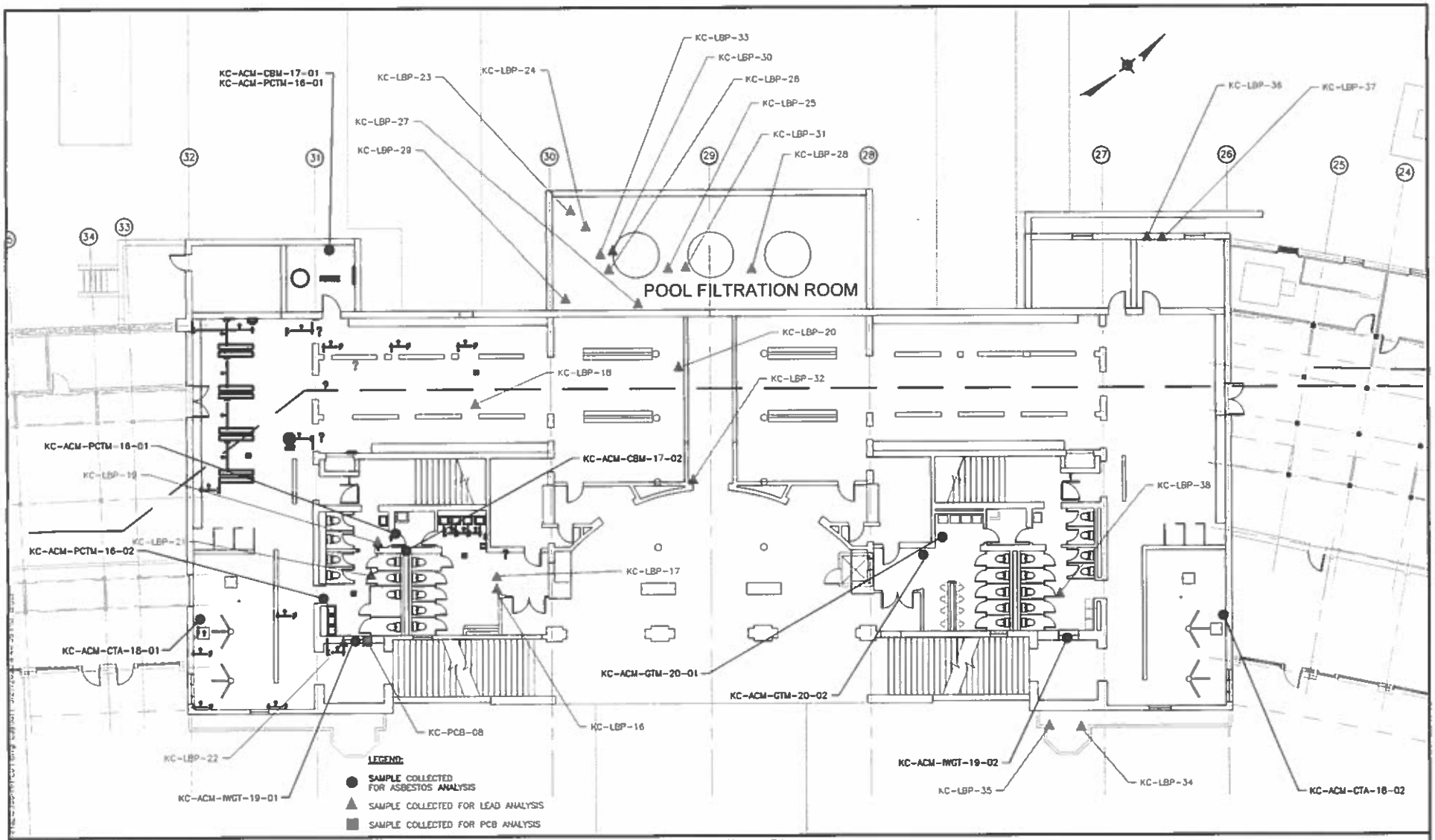
D&B ENGINEERS AND ARCHITECTS, P.C.

WESTCHESTER COUNTY
PLAYLAND PARK - POOL REHABILITATION PROJECT

POOL LEVEL SAMPLE LOCATION PLAN

SCALE: 1/32"=1'0"

FIGURE D-1



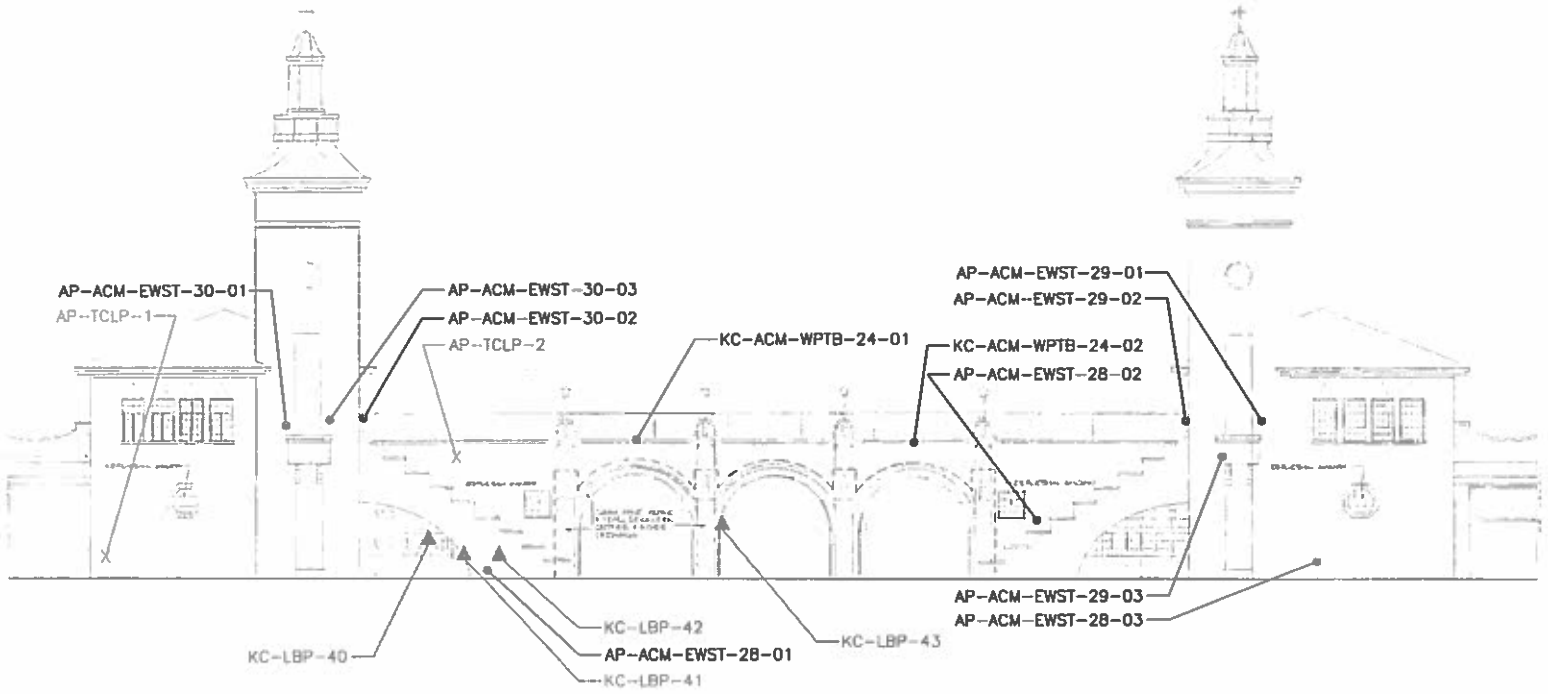
D&B ENGINEERS AND ARCHITECTS, P.C.

WESTCHESTER COUNTY
PLAYLAND PARK - POOL REHABILITATION PROJECT

SCALE: 1/16"=1'0"

BATHHOUSE LEVEL SAMPLE LOCATION PLAN

FIGURE D-2



LEGEND:

- ● SAMPLE COLLECTED FOR ASBESTOS ANALYSIS
- ▲ SAMPLE COLLECTED FOR LEAD ANALYSIS
- ■ SAMPLE COLLECTED FOR PCB ANALYSIS
- X SAMPLE COLLECTED FOR TCLP RCRA METALS ANALYSIS

D&B ENGINEERS AND ARCHITECTS, P.C.

WESTCHESTER COUNTY
PLAYLAND PARK - POOL REHABILITATION PROJECT

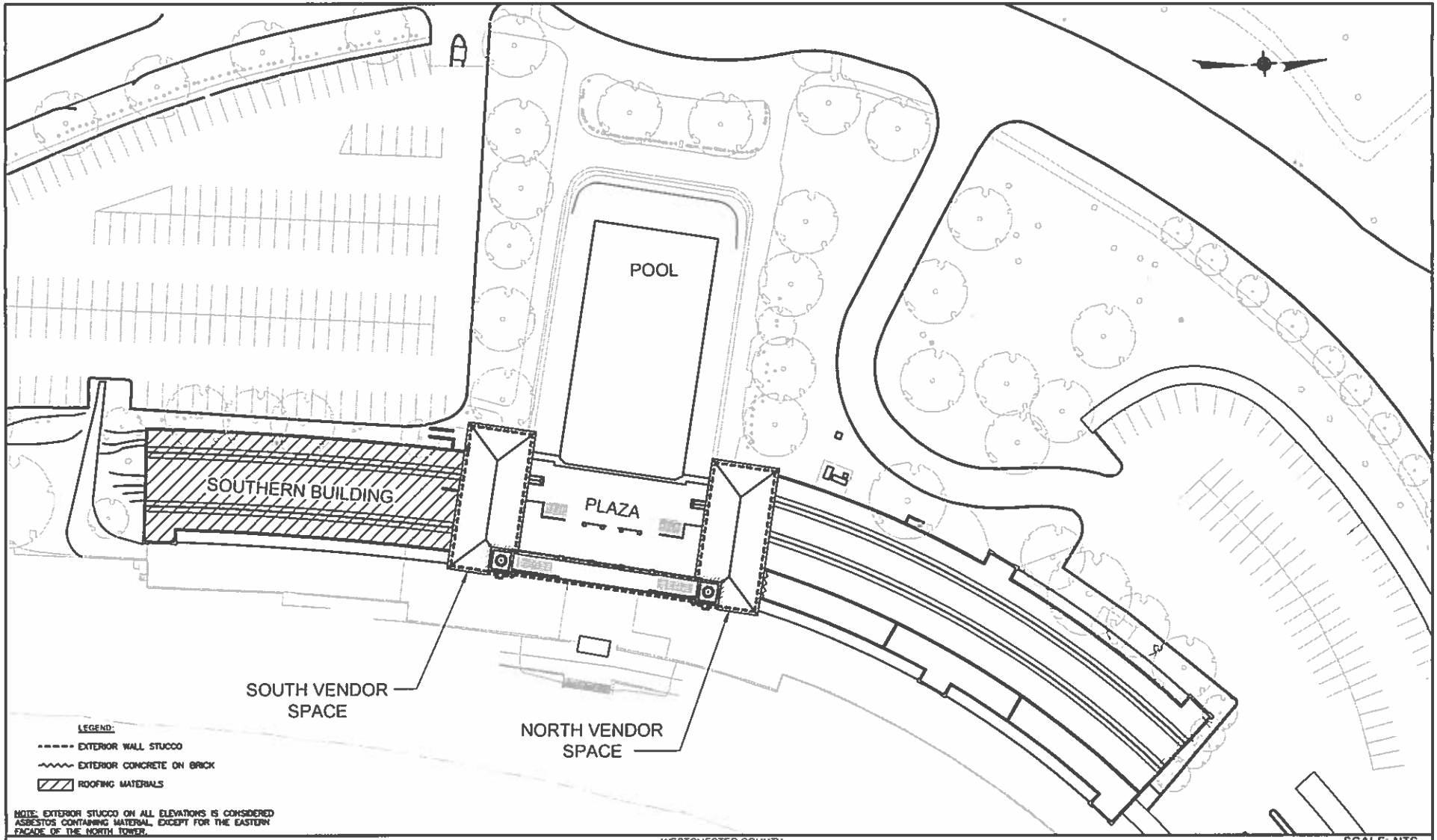
ELEVATION SAMPLE LOCATION PLAN

SCALE: NTS

FIGURE D-3

APPENDIX E

ASBESTOS LOCATION PLANS



D&B ENGINEERS AND ARCHITECTS, P.C.

WESTCHESTER COUNTY
PLAYLAND PARK - POOL REHABILITATION PROJECT

ASBESTOS LOCATION PLAN

SCALE: NTS

FIGURE E-1

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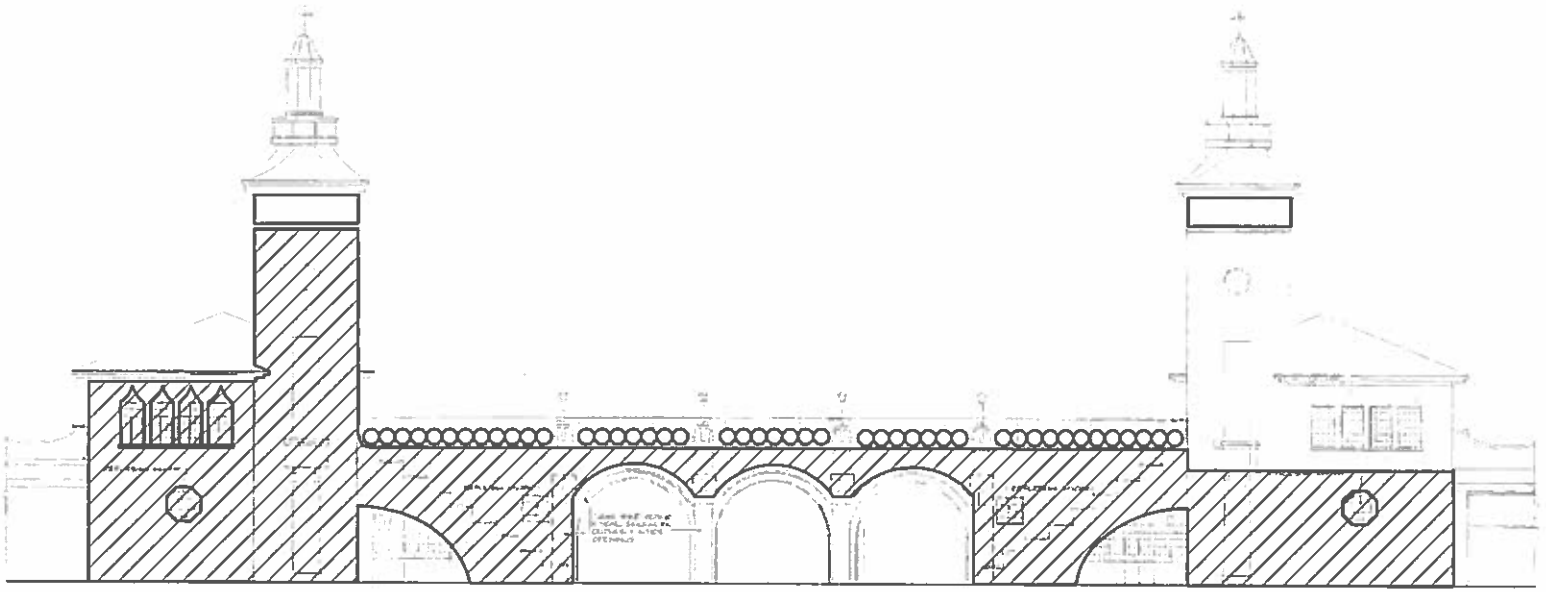

ELEVATION

LEGEND:

EXTERIOR WALL STUCCO

WATERPROOFING TAR UNDER BRICK COPING STONE

NOTE: EXTERIOR STUCCO ON ALL ELEVATIONS IS CONSIDERED ASBESTOS CONTAINING MATERIAL, EXCEPT FOR THE EASTERN FACADE OF THE NORTH TOWER

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WESTCHESTER COUNTY
PLAYLAND PARK - POOL REHABILITATION PROJECT

ELEVATION ASBESTOS LOCATION PLAN

SCALE:

FIGURE E-2

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APPENDIX IV – STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

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STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

NOVEMBER 10, 2020

PROJECT:

Rehabilitation of Pool and Bathhouse

Playland Park

1 Playland Pkwy

Rye, New York, 10580

AGREEMENT No. 19-907

Prepared for:

WESTCHESTER COUNTY

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.

4 W RED OAK LANE SUITE 315

WHITE PLAINS, NEW YORK, 10604

Table of Contents

LIST OF APPENDICES

1.0 INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared in accordance with the requirement and the specifications presented in the New York State Department of Environmental Conservation (NYSDEC) SPEDES General Permit GP-0-20-001 for Stormwater Discharges for Construction Activities.

The SWPPP describes the practices and procedures necessary to minimize pollutants in stormwater discharge. The SWPPP was designed in conformance with the criteria established in the New York State Stormwater Management Design Manual and the New York State Standards and Specifications for Erosion and Sediment Control.

Site Owner/Operator

The owner/operator for the construction activities is responsible to oversee the installation and maintenance of all stormwater pollution prevention measures proposed in this report.

Westchester County Dept. of Public Works and Transportation
148 Martine Ave #500
White Plains, New York, 10601
(914) 995-2547

2.0 SWPPP DEVELOPMENT AND REVIEW

SWPPP Development

The SWPPP was developed in accordance with accepted engineering practices to provide the following information:

- Potential sources of stormwater pollution from the construction site
- Protective measures to minimize the transport of sediment and pollutants during construction
- Outline the owner and contractor responsibility to maintain the post stormwater managements in compliance with the Permit GP-0-20-001.

3.0 EXISTING SITE CONDITIONS

The project is located in the City of Rye, Westchester County, New York, along the Long Island Sound, east of Playland Parkway and west of Rye Beach. The current block/lot that the project is located in is District 146, Section 20, Block 1 and Tax Lot 6. The site location is depicted on the USGS Topographic New York Quadrangle (Figure 1).

The current project site is improved with a 150 ft long x 75 ft wide concrete pool adjacent to a bathhouse building. The bathhouse building includes men's and women's locker rooms at the level of the beach boardwalk as well as two buildings (vendor spaces) at the pool level. The bathhouse is adjoined by two buildings to the north and south. The northern vendor space includes a concession area, kitchen and seating. The southern vendor space encompasses the concession area, currently used for storage, the lifeguard office, and chlorine storage. A concrete plaza between the north and south vendor space is used for pool deck as well as seating area. Stairs from the pool plaza deck provide access to the men's and women's locker room. A small elevator in the plaza deck provides access to the bathhouse entrance area.
Both men's and women's locker rooms, have a shower area, restroom space, lockers and changing rooms. Other areas of the bathhouse include a pool filtration room as well as electrical and mechanical rooms.

Direct access to the beach from the locker rooms was available through a tunnel below the boardwalk. The tunnel has not been used in several years and is flooded with water, sand and debris. The tunnel entrance at the beach is secured with metal gates, which allow for both sand and water to enter the tunnel during storms.

The topography of the project area is generally flat, the areas adjacent on the north and south side of pool are several feet lower in elevation. Finished grades of the new pool will be

similar to existing. The siteincludes approximately 77% impervious area and 23% pervious area. The soil type for this site as defined by USGS, is Uf, Urban Land, Uc, Udorthents - West Substratum, and CrC, Charlton – Chatfield Complex.

Existing flood information has been obtained from FEMA. According to FEMA Map (Appendix 3), the western side of the site (pool area) is in Zone X, an area of minimal flood hazard, and the eastern site (boardwalk and beach area)is located in the Zone AE and VE, with Base Flood Elevations of 13 Feet and 15, respectively.

4.0 PROJECT DISCRIPTION

The project will consist of replacing the existing pool and pool related systems including, chlorination equipment, filters, pumps, etc. and replacement of the concrete deck surrounding the pool. Also included, are interior and exterior building improvements, including replacement of second-floor windows, removing locker room skylights and elevator, as well as repairs to the interior stairs from pool deck to bathhouse. The locker rooms will be fully renovated with code compliant up-grading, with new furnishing and finishes, mechanical, plumbing, electrical, lighting and separate family changing rooms. Renovations will be made to the exterior stucco of both the pool deck and bath house levels and the tunnel leading from the bathhouse to the beach. Exterior elements, including gate, doors and windows, will be upgraded by either repairing or in compliance with applicable government restoration standards. A new access ramp will be introduced to allow access from existing parking areas down to the beach level for maintenance vehicles.

A new concrete vehicular ramp will be constructed from the southwest corner of the boardwalk to the beach for use by beach maintenance vehicles. Minor improvements are being

made to the pedestrian access ramps from the beach to the tunnel as cleaning and improving the tunnel for re-use.

5.0 STORMWATER MANAGEMENT

The proposed development will disturb approximately .65 acres, on the basis of movement and construction of pool and deck, as well as the construction of the beach access ramp. Since the ground disturbance area is less than 1-acre, the project is not required to meet the water quantity and water quality requirements of New York State Stormwater Management Design Manual nor is the project required to file a Notice of Intent (NOI) with the NYSDEC. The development will, however, will result in ground disturbance activities. Contractor must provide erosion control Best Management Practices (BMPs) during construction to minimize sediment from entering the Long Island Sound.

The existing storm drainage system will remain in place and be modified, as needed, in order to collect runoff from pool deck area. The roof and plaza deck drainage systems currently connect to the existing storm drainage system and will remain that way.

6.0 SOIL EROSION AND SEDIMENT CONTROL

During construction, both temporary and permanent soil erosions measures shall be enforced, to minimize impact to the surrounding areas.

Soil erosion will be controlled by:

- Keeping stockpiles less than 15 feet high and keeping the sides of the slopes of the stockpiles at or less than 2:1; and

- Construction a 50 ft long x 20’ wide crushed stone stabilized construction entrance as the points of ingress and egress for construction vehicles.

6.1 Potential Sources of Pollution

Construction activities that have the potential to contribute sediment to storm water discharges include:

- Grading and site excavation operations
- Soil import operations
- Vehicle tracking
- Topsoil stripping and stockpiling

The following is a list of construction materials that will be used and activities that will be performed that will have the potential to contribute to pollutants, other than sediment, or storm runoff:

- Vehicle fluids including oil, grease, petroleum and coolants
- Cement material associated with concrete operations
- Mortar mix
- Raw landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizers, mulch, pesticides)
- Sanitary facilities
- General litter and debris
- Other hazardous material

6.2 Pollution Prevention Measures

The construction will require the excavation and regrading of soils on site. The total area of disturbance is approximately .65 acres. During construction, temporary and permanent soil erosion and sediment control measures shall be implemented, to minimize impacts to the surrounding areas and waterbodies, following these guidelines:

- Minimizing disturbed areas and providing temporary seeding and mulching as required if construction operations cease for more than 7 days within any previous area.
- Constructing a stabilized construction access at the points of egress and ingress for construction vehicles. Stabilized construction entrances will be at least 50-feet long and a minimum of 16-feet wide and will consist of a layer 3-inch clean stone or recycled concrete equivalent at least 12-inches thick. The stabilized construction site entrances will be installed before construction begins on site. The entrances will remain until all areas of the site have been stabilized.
- All construction and demolition debris shall be placed in appropriate containers and removed from site.
- Maintain temporary fence enclosures of construction activity on property for safety purposes.
- Installation of temporary stormwater inlet protection structures on all existing drainage structures adjacent to the site and all newly developed drainage structures as constructed.
- Placing inlet filters over the grate of each existing drainage structure adjacent to the project and over each stormwater inlet or catch basin as it is constructed to prevent sedimentation within the storm sewer system.

- Cleaning inlet filters and the upstream sides of all silt fencing after each erosion producing storm.
- Erosion control measures (i.e., silt fence) will be implemented and maintained on a regular basis during construction until permanent restoration is completed. Installing silt fence barriers along the perimeter of site, along the base of slopes and around the perimeter of topsoil stockpiles. The repair and/or replacement of perimeter controls and covers will be conducted as needed to keep them in functioning condition.
- Water spraying to minimize dust generated by the transferring of material, stockpiles, and truck movement on paved and unpaved surface areas. Dirt haul roads will be sprinkled with water or given a surface of crushed stone or woodchips as required. Vehicles will be cleaned, as necessary, prior to using public streets. Paved roads will be sprinkled with water.
- Stockpile stabilization and slope stabilization. Keeping topsoil stockpiles less than 15 feet high and keeping side slopes at or less than 2:1. Stockpiles are to be protected during the entire construction site period. Stockpiles will be located in designated areas away from concentrated flows of storm water, drainage courses and inlets.
- Any chemicals will be securely stored in approved containers in order to prevent any accidental release.

6.3 SWPPP Implementation

The following contractor will be responsible for implementation and maintenance of the SWPPP:

The above Contractor shall be responsible for installing, constructing, repairing inspecting and maintaining the erosion and sediment control practices including SWPPP.

7.0 CONSTRUCTION SEQUENCE

Construction will be completed in a single-phase. Single-phase construction allows for an entire project to be completed in a continuous schedule with no lapses or breaks. Construction will follow normally expected construction standards.

The contractor will be responsible for installing and maintaining the required relevant sediment and erosion control measures in accordance with the details provided on the Erosion and Sediment Control Plan or as may be required by actual field conditions during construction and/or as directed by the engineer. All erosion and sediment control measures will be installed in accordance with the Erosion and Sediment Control Plan and/or pursuant to the prevailing "New York Guidelines for Urban Erosion and Sediment Control" manual.
Specific control measures include not permitting site construction activity (earthwork) during heavy rain, frozen conditions, or wet conditions.

The following sequence of activities comprises the construction work to be conducted at the site:

1. All erosion and sediment control measures will be implemented as required prior to any ground disturbance to prevent the transport of sediment to offsite areas (i.e., adjacent properties or roadway).
    a. Installation of sediment barriers (silt fence) along the limits of disturbance for the duration of the work and in addition to temporary construction entrance.

b. Drainage inlets will be protected from sediment buildup through the use of sediment barriers and sediment traps as required.

2. Clearing and grubbing of vegetation.
3. Demolition of existing structures.
4. Provide silt fence along the bottom of all slopes for stabilization.
5. Stabilize all stockpiled materials by seeding and/or construction straw bale dikes around the base of the stockpiled material.
6. After construction is completed, all remaining disturbed areas shall be permanently stabilized.
7. At the conclusion of construction phase, clean out all drainage systems of any accumulated sediment of construction debris.

Ongoing Construction Activities:

1. Proper maintenance of erosion control measures to will be ensure by daily follow-up inspections after heavy or prolonged storms.
2. Maintenance measures to be installed include, but are not limited to, cleaning of sediment basins or traps; cleaning or repair of sediment barriers; repair/replacement of damaged silt fencing, replacement of damaged haybales, and cleaning and repair of inlet protection.
3. Supplemental hay bales and silt fencing will be required to be stored on-site in case initial hay-bales and silt fencing become damaged or are not working properly.
4. Immediately clean all materials that are spilled, dropped, washed, or tracked onto any paved surfaces (roadways, parking lot, sidewalks, walkways, etc.) resulting from the contractor's work.

8.0 OPERATION AND MAINTENANCE PLAN FOR POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

Post-construction stormwater management practices (SMPs) are permanent measures installed during construction that are designed to reduce or eliminate pollutant discharges from the site after construction is completed.

Following the completion of construction, a routine inspection and maintenance program will be implemented by the Owner/Operator. The Owner will be required to submit a written Operation and Maintenance Assessment annually, prepared by a New York State Licensed Professional Engineer.

Routine maintenance is required for the following components of the stormwater management system.

- Catchbasins
- Manholes
- Trench Drains

The above components should be inspected after each major storm event (greater than 2-year, 24-hour rainfall) and no longer than every three months (seasonally).

In accordance with requirements of New York State Stormwater Design Manual Section 3.5, the Owner/Operator will erect and maintain a sign

9.0 CONCLUSION

The project improvements indicated on the design drawings and shown in this report, demonstrate that the stormwater management practices selected are in conformance with the requirements of the New York State Stormwater Design Manual and the New York State Department of Environmental Conservation (NYSDEC) General Permit (GP-0-15-002).

10.0 REFERENCES

1. New York State Stormwater Management Design Manual,
2. FEMA maps (MAP# 36119C0358F)

Appendix A

Figures

Figure 1

USGS Site Map

D&B Engineers and Architects, P.C.

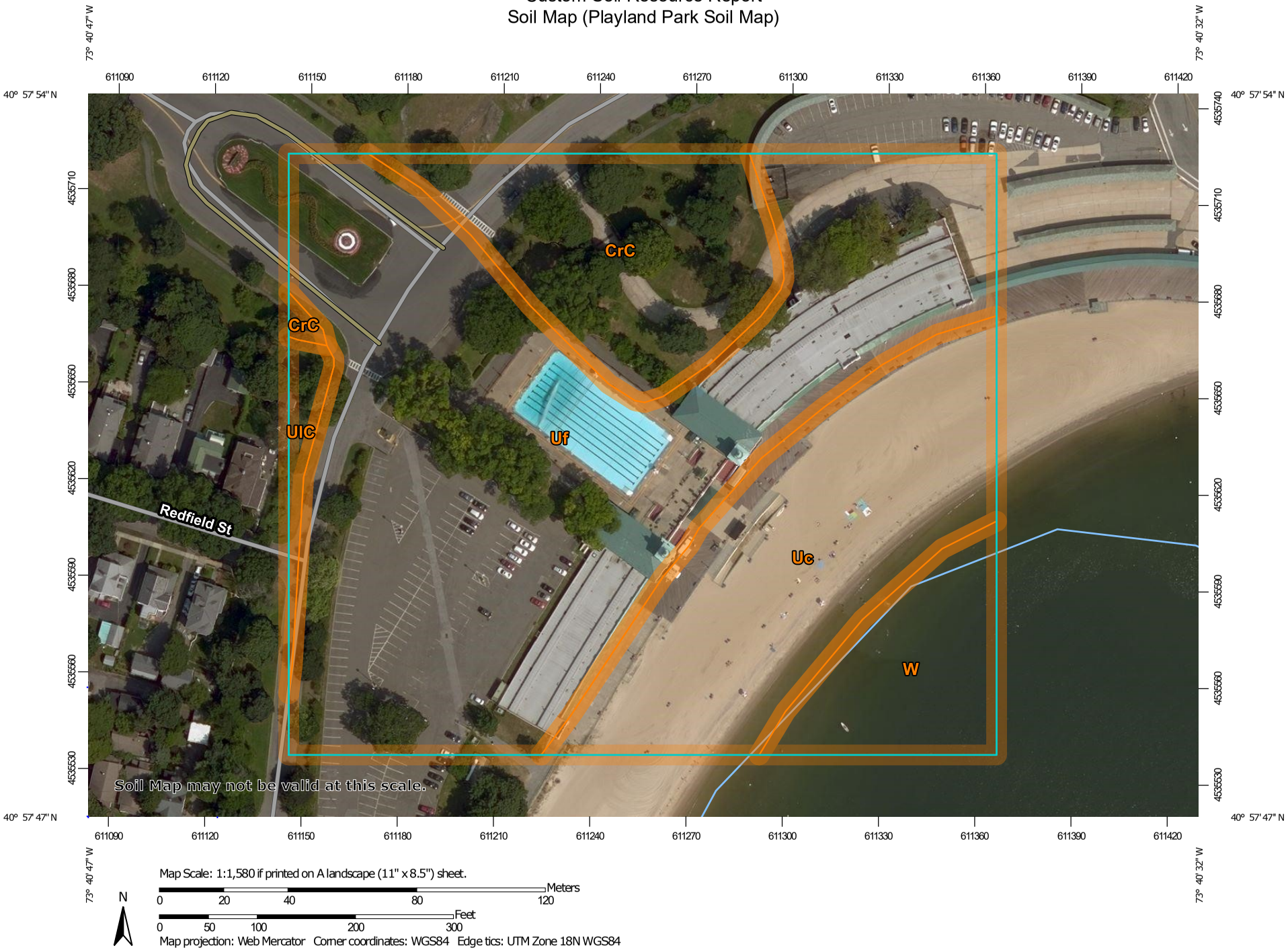
AGREEMENT NO. 19-907
PLAYLAND PARK REHABILITATION
CITY OF RYE, NEW YORK

USGS TOPO MAP

FIGURE 1

Figure 2
Soils Map and Information

Custom Soil Resource Report
Soil Map (Playland Park Soil Map)



Map Scale: 1:1,580 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 14, Sep 3, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 21, 2014—Aug 27, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Playland Park Soil Map)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrC	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	1.5	14.5%
Uc	Udorthents, wet substratum	2.2	21.3%
Uf	Urban land	5.6	55.0%
UlC	Urban land-Charlton-Chatfield complex, rolling, very rocky	0.1	1.4%
W	Water	0.8	7.8%
Totals for Area of Interest		**10.2**	**100.0%**

Map Unit Descriptions (Playland Park Soil Map)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Westchester County, New York

CrC—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w698
Elevation: 0 to 1,550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton, very stony, and similar soils: 50 percent
Chatfield, very stony, and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hollis, very stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope

Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Uc—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: bd7g
Elevation: 50 to 2,400 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, wet substratum, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 72 inches: very gravelly loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 4.6 inches)

Minor Components

Udorthents

Percent of map unit: 5 percent
Hydric soil rating: No

Urban land
Percent of map unit: 5 percent
Hydric soil rating: Unranked

Fredon
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Paxton
Percent of map unit: 2 percent
Hydric soil rating: No

Ipswich
Percent of map unit: 2 percent
Landform: Tidal marshes
Hydric soil rating: Yes

Raynham
Percent of map unit: 2 percent
Hydric soil rating: Yes

Hinckley
Percent of map unit: 2 percent
Hydric soil rating: No

Uf—Urban land

Map Unit Setting

National map unit symbol: bd7j
Elevation: 50 to 2,400 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Udorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Riverhead
Percent of map unit: 2 percent
Hydric soil rating: No

Udorthents, wet substratum
Percent of map unit: 2 percent
Hydric soil rating: No

Unadilla
Percent of map unit: 2 percent
Hydric soil rating: No

Chatfield
Percent of map unit: 2 percent
Hydric soil rating: No

Sutton
Percent of map unit: 2 percent
Hydric soil rating: No

UIC—Urban land-Charlton-Chatfield complex, rolling, very rocky

Map Unit Setting
National map unit symbol: bd7n
Elevation: 100 to 1,000 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 40 percent
Charlton and similar soils: 20 percent
Chatfield and similar soils: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting
Landform: Hills, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Acid loamy till derived mainly from schist, gneiss, or granite

Typical profile
H1 - 0 to 8 inches: loam
H2 - 8 to 24 inches: sandy loam
H3 - 24 to 60 inches: sandy loam

Properties and qualities
Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.5 inches)

Description of Chatfield

Setting
Landform: Hills, ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile
H1 - 0 to 7 inches: loam
H2 - 7 to 24 inches: flaggy silt loam
H3 - 24 to 28 inches: unweathered bedrock

Properties and qualities
Slope: 2 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 3.2 inches)

Minor Components

Leicester
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: No

Sutton
Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 5 percent
Hydric soil rating: Unranked

Hollis
Percent of map unit: 2 percent
Hydric soil rating: No

Sun
Percent of map unit: 2 percent

Landform: Depressions
Hydric soil rating: Yes

Palms

Percent of map unit: 1 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

W—Water

Map Unit Setting

National map unit symbol: bd7z
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Figure 3
FEMA Flood Map

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/12/2019 at 4:44:58 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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