Issue for Bid
June 1, 2021

SPECIFICATIONS

FOR

IONA PREPARATORY SCHOOL

PAUL VERNI FINE ARTS CENTER

255 WILMOT ROAD
NEW ROCHELLE, NY 10804

ARCHITECT
Peter Gisolfi Associates
Architects, Landscape Architects, LLP
566 Warburton Avenue
Hastings-on-Hudson NY 10706
Tel. (914) 478-3677
Fax (914) 478-1600

CONSULTANTS

MEP & F/P
JMV Consulting Engineering, P.C.
37 W. 39th Street, STE 703
New York, NY 10018
P: (212) 852-9855

STRUCTURAL/CIVIL
DR Pilla Associates, PC
143 Main Street
Nyack, NY 10960
P: (845) 727-7793
F: (914) 997-9671

ROOFING
Watsky Associates
20 Madison Avenue
Valhalla, NY 10595
P: (914) 948-3450
F: (914) 948-9493

TABLE OF CONTENTS

STRUCTURAL:

MECHANICAL:

PLUMBING:

SPRINKLER:

ELECTRICAL:

FIRE ALARM:

END OF TABLE OF CONTENTS

For evaluation of Bid Proposals only, the bidder shall provide values for each category listed.

Schedule of Values	**Base Bid**
General Conditions/Temporary Provisions	_____
Insurance	_____
Site Removals and Disposal	_____
Soil erosion and sedimentation control	_____
Unclassified Excavation & Disposal	_____
Mass Rock Removal (200 CY)	_____
Trench Rock Removal (100 CY)	_____
Trenching & Backfilling	_____
Imported Fill	_____
Site Grading	_____
Site Concrete	_____
Concrete Pavement	_____
Full Depth Asphalt Pavement	_____
Asphalt Overpaving	_____
Asphalt Striping	_____
Granite Belgium (Block) Curb	_____
Low Boulder Walls	_____
Topsoil (Including delivery and installation)	_____
Planting & Seeding	_____
Site Barrier Rails & Handrails	_____
Site Drainage	_____
Street Opening Including Traffic Protection	_____
Interior Building Demolition	_____
Cast-in-Place Concrete	_____
Masonry	_____
Structural Steel	_____
Cold Form Metal Framing	_____
Metal Decking	_____
Miscellaneous Steel	_____
Rough Carpentry	_____
Finish Carpentry	_____
Millwork	_____
PVC Roofing	_____
PVC Standing Seam Roofing	_____
Flashings & Metal Work	_____
Roof Accessories	_____

Hollow Metal Frames & Doors	_____
Wood Doors & H.M. Frames	_____
Hardware	_____
Glazing	_____
Aluminum Windows & Storefront	_____
Gypsum Board Walls & Ceiling	_____
Metal Studs	_____
Insulation	_____
Theater Carpet Flooring	_____
LVT Flooring	_____
VCT Flooring	_____
Porcelain Tile	_____
Stage Oak Sprung Flooring	_____
Painting & Finishing	_____
Miscellaneous Specialties	_____
Elevator	_____
Mechanical	_____
Plumbing	_____
Electrical	_____
Fire Protection - Sprinkler	_____
Fire Alarm	_____
Punchlist	_____
Closeout	_____
Others (specify)	_____
_____	
_____	
_____	
_____	
Total (must equal Base Bid amount)	_____

The sum of _____

Dollars ($_____).

2. **ALTERNATES**

Submit the total ADD or DEDUCT price for the following work:

2a. **DEDUCT** ALTERNATE No. 1 - Limited Scope at Existing Building

Limit scope at the existing Verni Center Building to the area outlined on Drawings A-050a, A-101a, A-150a, and A-170a. The new sprinkler system shall emcompass the entire building. The contractor shall include the removal and re-installation of existing hung ceiling panel system as necessary for the installation of new sprinkler system throughout the existing Verni Center building. Replace ceiling panels with new sprinkler heads are indicated.

Submit the amount to be DEDUCTED from the Base Bid for the limited scope of work at the existing Verni Center Building.

DEDUCT
The sum of _____

Dollars ($_____).

2b. **DEDUCT** ALTERNATE No. 2 - Cement Parging In Lieu Of Ground Face CMU

Eliminate ground face CMU base shown on Details 7,8/A-390 and provide decorative cement parging shown on Detail 9/A-390

Submit the amount to be DEDUCTED from the Base Bid to eliminate ground face CMU base & provide the cement parging base detail.

DEDUCT
The sum of _____

Dollars ($_____).

2c. **DEDUCT** ALTERNATE NO. 3 - Alternate Stage Flooring

Provide Action Floor ActionCush II floating floor system instead of the Action Thrust I Floating Floor System at the stage floor.

Submit the amount to be DEDUCTED from the Base Bid to install ActionCush II instead of Base Bid Action Thrust I system as noted in Specification Section 09 64 66.

DEDUCT
The sum of _____

Dollars ($_____).

2d. **DEDUCT** ALTERNATE No. 4 - VCT in lieu of LVT in Corridors

Provide 24"x12" Vinyl Composition Floor Tiles (VCT) instead of 24"x12" Luxury Vinyl Floor Tiles (LVT) throughout the corridors.

Submit the amount to be DEDUCTED from the Base Bid to provide 24"x12" vinyl composition floor tiles (VCT) instead of the Base Bid 24"x12" luxury vinyl floor tile (LVT) throughout the corridors.

DEDUCT
The sum of _____

Dollars ($_____).

2e. **DEDUCT** ALTERNATE No. 5 - Gypsum Board Modification

Provide 5/8" thick type 'X' gypsum board instead of 5/8" thick high impact gypsum board where noted on the partition types on Drawing A-800.

Submit the amount to be DEDUCTED from the Base Bid to provide 5/8" thick type 'X' gypsum board instead of Base Bid 5/8" thick high-impact gypsum board.

DEDUCT
The sum of _____

Dollars ($_____).

2f. **ADD** ALTERNATE No. 6 - Theater Wood Base Upgrade

Provide solid white oak wall base instead of solid pine wall base in the Theater as shown on Drawing A-601

Submit the amount to be ADDED to the Base Bid provide solid white oak base instead of the Base Bid solid pine base in the theater.

ADD
The sum of _____

Dollars ($_____).

2g. **ADD** ALTERNATE No. 7 - Classroom Floor Tile Upgrade

Provide 17.7"x17.7" Toli Fasol Plus solid vinyl floor tiles instead of 12"x12" vinyl composition floor tiles (VCT) in all classrooms and offices.

Submit the amount to be ADDED to the Base Bid to provide 17.7"x17.7" Toli Fasol Plus solid vinyl floor tiles instead of Base Bid 12"x12" vinyl composite floor tiles (VCT) in all classrooms and offices.

ADD
The sum of _____

Dollars ($_____).

3. QUANTITY ALLOWANCES

The Base Bid shall include the value of the quantity allowance for the work described in each of the following Allowances. These amounts should include all Contractor marks ups. The total value should be noted here and also in the Base Bid Schedule of Values. In addition, provide the requested unit price for the work. This unit price will be used to calculate the contract adjustment for any additional (ADD) or less (DEDUCT) quantity. All unit prices will be subject to review before being accepted for use in contract adjustments. If necessary, provide a separate written clarification of the scope and any qualifications for the unit pricing being requested.

3a. Unit Price No. 1 – Mass Rock Removal

The Base Bid shall include the cost to remove an allowance of 200 cubic yards of mass rock using a machine mounted hammer. Submit the unit prices per cubic yard to be used to calculate the contract adjustment for additional (ADD) or less (DEDUCT) quantity of mass rock removal.

The total cost for this Allowance that is included in the Base Bid is

$_____Dollars.

The unit price per cubic yard for mass rock removal is

$_____Dollars/CY

3b. Unit Price No. 2 – Trench Rock Removal

The Base Bid shall include the cost to remove an allowance of 100 cubic yards of trench rock using a machine mounted hammer. Submit the unit prices per cubic yard to be used to calculate the contract adjustment for additional (ADD) or less (DEDUCT) quantity of trench rock removal.

The total cost for this Allowance that is included in the Base Bid is

$_____Dollars.

The unit price per cubic yard for trench rock removal is

$_____Dollars/CY

1. In submitting this Proposal, I have received and included in this Proposal the following Addenda:

ADDENDUM NO.	DATED

2. The undersigned hereby certifies that he has full authority to make the Proposal and does further declare that he, she, or they are the only person or persons interested in the Proposal and has not entered into any collusion in preparing the Proposal.

3. The undersigned acknowledges that there will be no cost to the Owner pertaining to the submission of this Proposal and the Owner(s) has the right to reject any and all bids.

4. The undersigned acknowledges that he is fully aware of the time constraints and coordination required as outlined in the Information for Bidders and will be prepared to submit a construction schedule and Schedule of Values upon receipt of Letter of Intent.

6. The undersigned acknowledges that he is aware that, at the Board's discretion, the Contract will be awarded as described in the Information for Bidders, or the Proposals will be rejected within forty-five (45) days of the date of opening proposals.

Respectfully submitted,

Dated _____ By _____
Name of Firm

_____
Signature

_____
Printed/Typed Name

_____
Title

INSURANCE CERTIFICATION FORM TO BE
SUBMITTED WITH THE BID

STATE OF NEW YORK COUNTY

OF_____ S.S.:

_____ (name), President/CEO/Owner/Managing Member of _____(bidder), hereby deposes and says that the bidder currently has, or immediately upon being awarded the contract, will obtain insurance coverage, from an insurer licensed and admitted to do business in New York, that meets the following requirements:

1. Workers' Compensation and Disability:

Coverage	Statutory
Extensions	Voluntary compensation
	All states coverage employers
	Employer's liability - unlimited

2. Commercial General and Umbrella Liability

Coverage	Occurrence using ISO occurrence Form CG 00 01 07 98 or later form
Limits per project	General Aggregate - $2,000,000.00 on a per project basisProducts - Completed/Operations - $2,000,000.00
	Personal & Advertising Injury - $1,000,000.00
	Fire Damage (any one fire) - $100,000.00
	Medical Expenses (any one person) - $10,000.00
	Owners and Contractors Protective Liability Insurance:

   a. $2,000,000 per occurrence, $4,000,000 general aggregate for contracts greater than $1,000,000, or any contracts involving scaffolds or work above a height of one story.

   b. $1,000,000 per occurrence, $2,000,000 general aggregate for contracts less than or equal to $1,000,000 that do not involve scaffolds or workabove a height of one story.

Excess Liability (excess coverage shall be on a follow-form basis):

   a. $10,000,000 for contracts greater than $1,000,000, or any contracts involving scaffolds or work above a height of one story.

3. Automobile Liability (all vehicles hired or non-hired): $1,000,000.00 per accident

Print Name: _____

Signature: _____

Sworn to before me this_____

Day of_____ 20_____

_____

Notary Public

DRAFT

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

and the Contractor:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location and detailed description)

«Iona Preparatory School»
«255 Wilmot Road, New Rochelle, NY 10804»
«Design of a new performing arts center for Iona Preparatory School in New Rochelle, New York»

The Architect:
(Name, legal status, address and other information)

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »

« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of the construction of the new Performing Arts Center for Iona Preparatory School, including site work as detailed on the drawings, specifications, and any addenda, bulletins, and requests for information referenced thereto.

1. Project Location: 255 Wilmot Road, New Rochelle, NY 10804
2. Owner: Iona Preparatory School

B. Architect Identification: The Contract Documents, which will be issued for bid were prepared for the Project by Peter Gisolfi Associates Architects – Landscape Architects, LLP, 566 Warburton Avenue, Hastings-on-Hudson, New York 10706. These documents shall be revised to include addenda issued during the preparation period and shall be distributed as "Issued for Construction" documents.

C. The Work consists of the construction of one new multi-use building. The Work includes:

1. New Construction, including but not limited to:
   a. Site work; including but not limited to:
      (1) Curbs
      (2) Pavement
      (3) Railings and Fences
      (4) Site Lighting
      (5) Grading
      (6) Layout
      (7) Landscape Planting
      (8) Landscape Accessories
      (9) Retaining Walls
      (10) Drainage
      (11) Utility Piping
   b. Foundations and structural work;

c. Mechanical, electrical and plumbing work;
d. Fire protection work;
e. Exterior wall construction;
f. Roofing;
g. Construction of interior partition walls;
h. Installation of finishes including, but not limited to: floors, walls and ceilings, rough and finish carpentry, cabinetry and millwork, doors, vision panels, hardware, teaching and display boards, signage, etc.
i. Installation of elevator and stairs
j. Installation of storefronts, windows and doors;
k. Special construction associated with:
    (1) Theater
    (2) Arts Room
    (3) Scene Shop
    (4) Control Booth
    (5) Classrooms
    (6) Offices
    (7) TV/Radio Studio (Verni)
    (8) Production Booth (Verni)
    (9) Digital Media (Verni)
    (10) Performance Space (Verni)
    (11) Toilet rooms
    (12) Lobbies
    (13) Corridors
    (14) Exterior canopy
    (15) Mechanical, electrical, elevator, and tel-data rooms, janitors' closets, storage rooms and closets

D. All materials, assemblies, forms and methods of construction and service equipment shall comply with the requirements of the latest edition of the Building Code of New York State (2010), the National Fire Protection Association, the National Electrical Code, the Village of Dobbs Ferry, the Town of Greenburgh, and all other federal, state and local codes and standards referenced in the technical Specifications and drawings.

E. All architectural drawings and dimensional information for this project are based on the British system of measurement and must be in feet and inches. Landscape and site dimensions are also based on the British system and are shown in feet and decimals equivalents of inches.

F. Many areas of the building require special attention (special acoustical provisions and restrictions) to meet the allowed background and intrusive noise levels. These areas are designated as "Noise Critical Spaces." Noise Critical Spaces include spaces that must be quiet, and spaces that contain noise producing equipment.

The following areas have been designated as Noise Critical Spaces:
    (1) Theater
    (2) Arts Room
    (3) Scene Shop
    (4) Control Booth
    (5) Classrooms
    (6) Offices

(7) TV/Radio Studio (Verni)
(8) Production Booth (Verni)
(9) Digital Media (Verni)
(10) Performance Space (Verni)
(11) Lobbies
(12) Corridors
(13) Mechanical and electrical rooms

G. All penetrations by ducts, pipes and conduit of partitions and slabs enclosing noise critical spaces and mechanical and electrical rooms shall be sleeved, packed and sealed airtight with non-hardening sealant.

1.3 CONTRACTS

A. The Project will be constructed under an Agreement for Construction Services where the Basis of Payment is Lump Sum.

1.4 WORK SEQUENCE

A. A Construction Implementation and Phasing Plan shall be prepared and submitted to the Owner, the Owner's Representative, and the Architect for approval prior to the start of construction.

1.5 USE OF PREMISES

A. The Construction Manager and its subcontractors shall have use of the Project Site for construction during construction period, as directed by the Owner or the Owner's Representative.

1.6 OWNER-FURNISHED PRODUCTS

A. Whenever there are items noted "Owner Supplied" or "Supplied by Owner," Construction Manager and its subcontractors shall be responsible for installation of said items, unless otherwise noted.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Construction Manager and its subcontractors. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Construction Manager and its subcontractors or by others when so noted.

3. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.11 MISCELLANEOUS PROVISIONS

A. RESPONSIBILITY & INTENT

1. The Construction Contractor and its subcontractors shall provide all labor, materials, equipment, appliances and services necessary to execute and complete all work as required by the Contract Documents and the applicable Building Codes. Construction Contractor and its subcontractors shall conduct pre-construction survey and provide photo/videos of any existing damages in areas where construction is to take place prior to the start of work.

2. It is the intent that the work included under each Section of the Specifications shall cover the manufacture, fabrication, delivery, installation and/or erection, with all incidentals thereto, unless otherwise noted or specified. "Provide", means to "furnish and install".

3. The Construction Contractor and its subcontractors is cautioned that the "Work Included" is general and in no way limits or qualifies the Contract requirements

4. It is the intent of the Contract Documents to provide for complete installation of all portions of the work. Except where work, or a portion thereof, is specifically noted as by Owner, it is understood that all items, materials and equipment are to be furnished and installed, complete, ready for operation or use.

5. Where additional or supplemental details or instructions are required to complete an item or items of work, the Architect shall furnish the necessary

information to the Construction Contractor and its subcontractors. No work shall be performed, installed or fabricated which depends upon the furnishing of such information, without the written approval of the Architect of the specific condition. The furnishing of such data shall not be the grounds for a claim for extra work by the Construction Contractor and its subcontractors.

6. The Construction Contractor and its subcontractors will be deemed to have based their pricing on a complete installation. Where additional details or instructions are required to complete the work, the Construction Contractor and its subcontractors are deemed to have made an allowance in their pricing for the completion of such work, consistent with adjoining or similar details and/or the best accepted practices of the trade, whichever is more expensive.

7. Where the scope of the work of a Section in the Specifications or Drawings calls for service connections, supports, or installation, of any item or group of items being furnished by other sections, the omission of any given item from the Drawings shall not relieve the Construction Contractor and its subcontractors of the responsibility for installing, connecting or supporting such item at no increase in Contract cost. The Construction Contractor and its subcontractors is deemed to have examined the plans and specifications of all other Sections to ascertain the full scope of his work including but not limited to connections, supports and installation of equipment furnished by other trades or Sections.

8. Whenever any additional materials and/or workmanship not shown or specified are required to complete the work of the Contract Document in accordance with the obvious intent thereof, the Construction Contractor and its subcontractors shall provide these materials and workmanship at no additional cost to the Owner.

9. Salvageable Materials: Any existing materials, equipment, misc. etc. scheduled for demolition are the property of the Owner. If requested, Construction Contractor and its subcontractors will remove and store any such items to a location designated by the Owner.

B. SALES TAX EXEMPTION

1. The Owner is exempt from payment of Federal, State, Local Taxes and sales and compensating use taxes of the State of New York and of cities and counties on all materials and supplies incorporated into the completed Project. These taxes are not to be included in any of the bids or charges. This exemption does not apply to tools, machinery, equipment or other property leased by or to the Construction Contractor and its subcontractors, or to supplies and materials which, even though they are consumed, are not incorporated into the completed Project, and the Construction Contractor and its subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such unincorporated supplies and materials.

2. The Construction Contractor and its subcontractors shall obtain any and all necessary certificates or other documentation from the appropriate governmental agency or agencies, and use such certificates or other documentation as required by law, rule or regulation.

PART 2 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 26 00

SPECIAL CONDITIONS

1. GENERAL

a. All work included in these specifications shall be governed by the Contract Documents.

b. The Division and Section format is based on the AIA-CSI Uniform System for Construction Specifications.

c. The Contractor shall be required to comply with applicable regulations, rules and requirements of the New York State Building Code, New York State Education Department and all other city, state, county and federal codes and regulations having jurisdiction under this project.

d. The Contractor shall be required to comply with the following sections of the Labor Law:

(1) Section 220, subdivision 2, re: 8-hour day, 5-day week;
(2) Section 220, subdivision 3 and 220-d, re: prevailing wage rates and supplements;
(3) Section 220-e, re: anti-discrimination including all subparts; and
(4) Section 222-e, re: elimination of dust hazards.

2. RESPONSIBILITY & INTENT

a. The Contractor shall provide all labor, materials, equipment, appliances and services necessary to execute and complete all work as required by the Contract Documents and the applicable Building Codes. Contractors to conduct pre-construction survey and provide photo/videos of any existing damages in areas where new construction is to take place prior to the start of work.

b. It is the intent that the work included under each Section of the Specifications shall cover the manufacture, fabrication, delivery, installation and/or erection, with all incidentals thereto, unless otherwise noted or specified. "Provide", means to "furnish and install".

c. The Contractor is cautioned that the "Work Included" is general and in no way limits or qualifies the Contract requirements.

d. It is the intent of the Contract Documents to provide for complete installation of all portions of the work. Except where work, or a portion thereof, is specifically noted as by Owner, it is understood that all items, materials and equipment are to be furnished and installed, complete, ready for operation or use.

Where additional, or supplemental, details or instructions are required to complete an item or items of work, the Architect shall furnish the necessary information to the Contractor. No work shall be performed, installed or fabricated which depends upon the furnishing of such information, without the written approval of the Architect of the specific condition. The furnishing of such data shall not be the grounds for a claim for extra work by the Contractor. The Contractor will be deemed to have based his bid on a complete installation where additional details or instructions are required to complete the work, the Contractor is deemed to have made an allowance in his bid for the completing of such work, consistent with adjoining or similar details and/or the best accepted practices of the trade, whichever is more expensive.

e. Where the scope of the work of a Section in the Specifications or Drawings calls for service connections, supports, or installation, of any item or group of items being furnished by other sections the omission of any given item from the Drawings of a particular Contract shall not relieve the Contractor of the responsibility for installing, connecting or supporting such item at no increase in Contract cost. The Contractor is deemed to have examined the plans and specifications of all other Sections to ascertain the full scope of his work, including but not limited to, connections, supports and installation of equipment furnished by other trades or Sections.

f. Whenever any additional materials and/or workmanship not shown or specified are required to complete the work of the Contract Document in accordance with the obvious intent thereof, the Contractor shall provide these materials and workmanship at no additional cost to the Owner.

g. Salvageable Materials: All existing materials, equipment, misc. etc. scheduled for demolition are the property of the Owner. If requested, contractors will remove and store any such items to a location designated by the Owner.

h. Each contractor shall be responsible for dust protection in their respective areas of work. If there is an area of work containing multiple contract contractors then the contractor for general construction will erect the dust protection partition. However, all contractors will be required to maintain the partition. Therefore, if one contractor(s) removes or damages the partition that contractor(s) will be responsible to replace the partition in kind.

3. PRODUCT ACCEPTANCE STANDARDS

a. Where the words "or acceptable equal" or other synonymous terms are used, it is expressly understood that they shall mean that the acceptance of any such submission is vested in the Architect, whose decision shall be final and binding upon all concerned. All submissions are subject to such review.

b. The intent of this article is to encourage and permit competition on qualified products by reputable and qualified suppliers and manufacturers, whose products, reputation and performance warrant approval for the conditions, intent of design and performance considerations.

c. Whenever a product is specified in accordance with Federal ASTM Designation, American National Standards Institute or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. Where necessary and requested substantiate compliance.

d. Whenever any product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names or similar references, such reference is intended to establish the measure of quality which the Architect has determined as requisite and necessary for the project. The right is reserved to approve or disapprove proposed deviations of design, function, construction or similar differences which will affect the design intent. The Architect shall have the right to reject any substitutions of submission of materials not manufactured in the U.S.A. or which have not been used successfully in the Architect's opinion for five years in this area. This also applies to acceptance of non-specified products.

e. Acceptance of Non-Specified Products

(1) For acceptance of products other than those specified, the Contractor shall submit a request, in writing, to the Architect and Owner. The request shall clearly define and describe the product for which approval is requested. Requests shall be accompanied by manufacturer's literature, specifications, drawings, cuts, performance data, list of reference or other information necessary to completely describe the item.

(2) The Contractor shall submit to the Owner for review two (2) copies of a complete list of suppliers, materials and equipment they propose to use in connection with this project.

(3) Substitution of products will be considered only under the following conditions:

(a). The Contractor shall place orders for specified materials and equipment promptly. No excuse or proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed ten (10) days after approval by the Architect of the item listed in the specifications.

(b). The reason for the unavailability is beyond the control of the Contractor. Unavailability will be construed as being due to strikes, lockouts, bankruptcy, discontinuance of the manufacture of a product, or Acts of God.

(c). Requests for such substitution shall be made in writing to the Architect within ten (10) days of date that the Contractor ascertains he cannot obtain the material or equipment specified.

(d). Request shall be accompanied by a complete description of material or equipment which the Contractor wishes to use as a substitute as described above.

(f). After any material or piece of equipment has been accepted, no change in brand or make will be permitted unless satisfactory

written evidence is presented and approved by the Architect that the manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

(g). For any item or items which the Owner may have pre-purchased before the start of the work because of excessive lead time required for such items, it will be the Contractor's responsibility to receive, store and install such items purchased by the Owner.

4. CONDITIONS AT THE SITE

a. The contractor has visited the site and agrees that he is cognizant and fully aware of the systems involved with his own work and the work of other trades and realizes what logistics are required to bring manpower and materials to the work areas and to remove from the work areas any demolition, debris, garbage and equipment that is his responsibility.

b. The contractor must be aware that this work will be performed in an occupied school campus and must abide by all of the school rules and regulations. Noise and dust will be kept to a minimum level as defined by the Construction Manager. To that end, there will be some phasing and the contractor agrees to cooperate with the normal day-to-day requirements. A three (3) day notice of noise disturbance is to be submitted to the Construction Manager with the specific time of the noise. The Owner will inform the school owner to obtain approval.

c. The use of radios, tape players and the like will be prohibited within the job site.

d. The Contractor's facilities, offices, storage rooms, tool sheds, equipment, temporary construction, scaffolding, surplus materials, waste, other materials and other items stored on or at the Site will be situated at such parts thereof as shall be designated by the Construction Manager and shall be relocated upon instruction of the Construction Manager. All such facilities, offices, storage rooms and tool sheds shall be adequate for the purpose intended and built and maintained in accordance with all Legal Requirements and insurance company recommendations. Each of the aforesaid items shall be removed from the Site when no longer required for the Work or as required by the Construction Manager.

e. During the execution of the Work and at all times while it is present on the Site working in any capacity whatsoever, the Contractor shall protect all unfinished Work and materials on the Site and all tools, plans, equipment and other apparatus used or to be used by the Contractor in connection with the Work, from rain, water, frost and other elements and from all other kinds of damage including, without limitation, vandalism, theft and waste. All materials stored on the Site shall be stored in a suitable manner. The Contractor shall be fully responsible for the materials so stored, and neither the Owner nor the Owner’s Representatives shall be under any responsibility therefore. The Contractor shall secure and protect the Work and all tools, equipment and material from and against damage, loss or injury resulting from the Contractor's activities. Until such time as the obligations of the Contractor under the Contract for the performance of the Work shall have been fully satisfied, the Contractor shall be fully responsible for any damage, loss or

injury done to the Work, or any materials, tools, equipment or appliances incorporated into the Work or delivered to the premises for incorporation into the Work; and this shall be true irrespective of whether any particular portion of the Work to which such damage occurred has been completed so long as all of the Work shall not have been completed and accepted in accordance with the terms hereof and whether or not payment was made for such portion of the Work. Such risk of loss shall extend to damage or injury occasioned by Act of god, fire or other event or catastrophe whether natural or man-made. To the fullest extent permitted by law, except for the Construction Manager or Owner's intentional acts, neither the Owner's Representatives nor the Owner shall have any responsibility for any such injury, damage or loss.

f. The Contractor shall use only such workmen and other laborers on the Project as shall be compatible with all other laborers and workmen employed in connection with the Project; and no such laborer or workmen or retained by or on behalf of the Contractor shall be the cause of any labor disturbance, strike, picketing, jurisdictional union dispute or work slowdown. If any such dispute, strike, picketing, or slowdown shall occur due to the persons employed by or on behalf of the Contractor, then the Contractor shall immediately cease the continuation of such offending practice. The Contractor shall indemnify and hold harmless the Construction Managers and Owner from any and all damages, injuries, expenses (including legal fees) and all other liabilities (including consequential damages resulting from any such labor problem). If any such dispute, strike, picketing or slowdown shall occur due to the persons employed by or on behalf of any Subcontractor, then the Contractor shall compel his Subcontractor to cease the continuation of such offending practice. Any delay or loss of time due the above does not constitute reason for a delay claim.

g. The Contractor shall be responsible for instituting a safety program to be maintained and enforced through the period during which the Work is being prosecuted. A copy of the safety program and weekly safety meeting minutes shall be provided to the Construction Manager.

h. The Contractor shall man the Project with at least one full-time on-site supervisor responsible for loss, accident prevention, and administering and supervising the safety of its respective workers. Each such supervisor shall have a working knowledge of OSHA requirements with respect to the operations for which he is responsible. Contractor to provide a resume of the site supervisor to the Construction Manager for review and approval.

i. The Owner's Representatives may direct the Contractor to leave out portions of the Work. If the Owner, Architect, Engineer or Construction Manager shall fail to respond to any inquiry or provide any information to the Contractor as required hereunder, and if as a result thereof, the Contractor is delayed in the performance of any other work, the sole remedy of the contractor shall be to have a reasonable extension of the time in which to perform such Work after the date that such information is provided or obligation performed.

j. The consumption of alcoholic beverages or use of any controlled substances shall **not** be permitted on the property.

k. Each Contractor shall issue to all their field labor force, Laminated Photo ID Badges which shall be worn while working on the library property. The photo ID Badge will include a current photograph of the worker, their personal name and company name.

l. **No** smoking is permitted on the school site.

m. Parking permitted only in areas designated by the Construction Manager.

n. All contractors are to refrain from conversing with school personnel and students. Any construction employees found to do such will be dismissed from the site.

o. All contractors are to refrain from using indecent language. Employees doing so, will be dismissed from the site.

5. RULES TO BE COMPLIED WITH

a. The Contractor and each Subcontractor hereby accepts and assumes full and exclusive liability for the payments of contributions, taxes, or premiums which may be payable or required under an Unemployment Insurance Act or Federal Social Security Act as to employees engaged in the performance of work included in this Contract. He further agrees to relieve the Owner from the liability for contributions measured by wages to the employees of the Contractor of his Subcontractors engaged in performance of the work included in this Contract.

b. The Contractor shall further comply with the rules and regulations which may be issued by the U.S. Commissioner of Internal Revenue with the approval of the Secretary of the Treasury for the enforcement of the Federal Social Security Act as to employees engaged in the performance of the work included in this Contract.

c. The Contractor shall procure and pay for all other permits, licenses, certificates and approvals necessary for the execution of this Contract.

d. The work shall be performed in accordance with the rules and regulations of OSHA, and all city, state, county and federal authorities, codes and restrictions having jurisdiction.

e. All mechanical and electrical equipment supplied shall have a U.L. label.

f. The Contractor shall be responsible for any disturbance or deficiency created in the air conditioning or other mechanical, electrical or structural facilities within the building as a result of the alteration. If such disturbance or deficiency results, it shall be the Contractor's responsibility to correct the resulting conditions and to restore the services to the complete satisfaction of the Owner, Construction Manager, Architect and Engineers.

g. The Contractor shall comply with the rules of the building as to the hours of availability of the building elevators and the manner of handling materials, equipment and debris to avoid conflict and interference with building operations.

h. No asbestos or lead containing products to be used on this project.

i. Demolition to occur only per the schedule approved by the Owner / Owner’sRepresentative. Opening protection to be installed prior to commencing. Contractor must obtain approval from Construction Manager prior to commencement of demolition work. Failure to do so will result in a $500.00 back-charge per occurrence.

j. Storage of chemicals and painting supplies shall be outside the existing or new structures and shall follow manufacturer's storage guidelines.

k. Deliveries sent to the site need to be accepted and signed for by the Contractor. Deliveries will not be signed for by the Owner or Owner's Representatives.

l. Use of existing building facilities, for the area occupied by the library, during construction is prohibited including toilet rooms, telephones and water fountains. Contractor(s) will be backcharged $250.00 per occurrence if any individual related to the project is observed disregarding these rules.

m. No storage of materials will be permitted in the existing building at any time. Contractors must provide exterior storage containers as needed. Location shall be approved by Construction Manager.

6. TEMPORARY PROVISIONS (by GENERAL CONSTRUCTION CONTRACTOR, unless otherwise noted)

a. The General Construction Contractor shall install and maintain the temporary fencing including gates, posts, mesh, chains, locks and keys, and (2) Knox Boxes for Fire Department use. See the Construction Implementation Plan for locations and requirements. The Owner will be provided with six (6) keys.

b. General Construction Contractor shall be responsible for installing and maintaining all site safety signage as needed. Additionally, install signage on the entrance gate indicating the following: "Construction Entrance Only", "No Smoking Permitted - $1,000 Fine", "Hard Hat Area". Prepare additional temporary signs within the site to provide direction assistance and information to help construcion personnel and visitors locate the following:
   1. Access roads, parking and delivery area.
   2. Office and first-aid stations.
   3. Sanitary Facilites.
   4. Telephones.
   5. Emergency exits.
   6. Fire protection facilities.
   7. Barricades and obstructions.
   8. Hazardous elements of construction work.

c. Temporary partitions and doors shall be provided by the General construction Contractor.

d. Temporary port-o-sans shall be provided and maintained by the General Construction Contractor to accommodate all of the project contractors. Quantity of port-o-sans shall be in accordance with OSHA Standards.

e. The General Construction Contractor shall be responsible for minimizing dust and dirt. On the exterior, site shall be watered down frequently to prevent dust from rising. Street curb cuts and sidewalks shall be maintained clean at all times throughout the construction phase.

f. General Construction Contractor shall be responsible for restoring site. All areas to be seeded shall be cleaned of all construction debris and shall be roto-tilled, 4 inches of top soil added and hydro-seeded, as specified by the Architect.

g. All Contractors shall be responsible for minimizing dust and dirt.

h. All site elements must be restored to "As-Found" condition or better at the conclusion of the project.

7. TEMPORARY HEAT (By General Construction Prime Contractor)

a. Heat for temporary use must be provided by the Construction Prime Contractor as required to complete his work. If possible, and only with the Owner's Permission, it may be obtained through the building existing or new system. If, for any reason this system must be shut down due to field conditions, or is not completely in operation, the Contractor shall then be obliged to provide and maintain temporary heat required.

b. Damages to the existing heating system caused by any Contractor shall be repaired by that Contractor at no cost to the Owner.

c. The following conditions shall be maintained:

(1) During the placing, setting, and/or curing of interior carpentry, furring, spackle, and drywall, an ambient temperature of 60 degrees F shall be maintained, and such temperature shall be maintained 48 hours before, during and 48 hours after installation in each space where such covering is required.

(2) During the placing, setting and curing of all concrete, an ambient temperature of 50 degrees F shall be maintained in the area involved.

(3) Except as noted above, all areas in which work is in progress, shall be maintained at 45 degrees F during working hours.

8. TEMPORARY ELECTRIC LIGHT AND POWER (By Electrical Prime Contractor)

a. The Electrical Contractor shall provide temporary Electric Light and Power for the use of all the contractors. It shall be set up so that light and power is available 24 hours per day throughout the project. The Electrical Contractor shall also provide sufficient power and hook-ups for welding machines.

b. The Electrical Contractor shall provide temporary power to any contractor trailer used on site during the construction phase.

9. TEMPORARY WATER (By Plumbing Prime Contractor)

a. Water is available within and at the exterior of the building for use by each Contractor.

b. At all times take precautions against freezing, leakage and damaged caused by the water supply system.

c. The Contractor shall be responsible to ensure temporary water is available throughout the construction phase of the project.

d. The Contractors shall avoid the waste of water, and shall be responsible for any damages caused by his use of water during construction.

10. SIGNS

a. The Contractor shall maintain the premises free from advertising placards and inscriptions and other announcements, lettering or insignia of all kinds and shall remove forthwith, any signs or posters which may be placed, by others, on any structure or parts of the property, released by the Owner to the Contractor for construction purposes, or on any fence surrounding such property.

b. The installation of any item, element or assembly which bears on any exposed surface any name, trademark, or other insignia which is intended to identify the manufacturer, the vendor, or other sources from which such object has been obtained is prohibited. Also forbidden is the installation of any articles which bear visible evidence that an insignia, name or other device, has been removed. Name plates, giving performance requirements and capacity may be attached to operating equipment when located in mechanical and electrical spaces.

11. COLOR SELECTION

a. Color schedules will be issued by the Architect during the progress of the work and the Contractor, his Subcontractors and material suppliers shall cooperate in furnishing required color samples to aid on the final selection. Where special colors are selected, the Contractor shall furnish accurate reproductions of these colors, in duplicate, and on actual material to be furnished to the project, for final approval.

12. PARKING

a. Parking is limited to the construction area **only**. Work persons found parked in spaces allocated for school students or staff will be fined. Their respective prime contractor will be back-charged $50.00 per occurrence.

13. STORAGE AND ACCESS (Each Contractor)

a. Each Contractor shall make provisions to use storage trailers or other means for storing and securing materials to be incorporated in the Work. The Owner or Owner's Representatives will assume no responsibility for the Contractor's tools, equipment or materials left in, or out of the building.

b. All existing materials, equipment, miscellaneous items, etc. scheduled for demolition are the property of the Owner. If requested, contractors will remove

and store any such items to a location designated by the Owner or Owner's Representatives. All items not requested to be salvaged by the Owner shall be discarded by the Contractor.

14. SALES TAX EXEMPTION

a. The Owner is exempt from payment of Federal, State, Local Taxes and sales and compensating use taxes of the State of New York and of cities and counties on all materials and supplies incorporated into the completed Project. These taxes are not to be included in any of the bids or charges. This exemption does not apply to tools, machinery, equipment or other property leased by or to the Contractor or a Subcontractor, or to supplies and materials which, even though they are consumed, are not incorporated into the completed Project, and the Contractor and Subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such unincorporated supplies and materials.

b. The Contractor and Subcontractors shall obtain any and all necessary certificates or other documentation from the appropriate governmental agency or agencies, and use such certificates or other documentation as required by law, rule or regulation.

15. MATERIAL AND EQUIPMENT LIST

a. Within ten (10) days after the date of award of each Sub-Contract, each Sub-Contractor shall submit for approval a complete list of suppliers, materials and equipment proposed for use in connection with the project to the Architect. Include information concerning anticipated lead times for materials and equipment, based upon suppliers' experience with specified or approved materials and equipment (See Article 16 below).

b. After any material or piece of equipment has been approved, no change in brand or make will be permitted unless satisfactory written evidence is presented and approved by the Architect that the manufacturer cannot make a scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

16. SCHEDULING OF THE WORK

a. Execute the work in conjunction with the contract documents. In case of discrepancy between the plans and the actual conditions at the site report the conditions to the Architect.

b. Take every precaution to protect the existing work indicated to remain. If work that is to remain becomes damaged during the course of operations, it will be repaired and/or replaced to the Owner's satisfaction, at no additional cost by the contractor(s) that caused the damage.

c. If there are any deviations from the agreed-upon schedule, such a deviation shall be reported to all parties a minimum of 72 hours before a deviation takes effect, with mutual agreement.

d. Make necessary arrangements to have utilities and services temporarily disconnected while performing the work or as required, maintained for temporary use, and formulate a schedule of disruption with all parties, indicating when and how long such disruptions will continue, and the provisions to be provided for temporary utilities and/or services.

e. Schedule for completion shall be per information to Bidders. Time is of the essence.

f. Contractor shall provide a minimum of 48 hours advance written notice to the Construction Manager for deliveries of materials, site visits by inspectors, testing labs, manufacturers representatives or any other occasion that impacts the use of the site.

g. Contractors are required to place orders for long-lead-time items, such as steel, windows, doors, hardware, custom masonry, pre-manufactured equipment, etc. as soon after the written notice to proceed with the work as possible. No deviation in the time for substantial completion will be granted for reasons related to late delivery of material and equipment.

17. SHOP DRAWINGS, PRODUCT DATA, EQUIPMENT/DELIVERY SCHEDULES, SAMPLES AND COORDINATION DRAWINGS (collectively "Submissions")

a. Within 10 calendar days from the date of the Contract, the Contractor shall provide to the Architect and Construction Manager and Construction Manager a schedule of all Submissions. Submissions shall include (as relevant) all shop drawings, coordination drawings, fabrication drawings and erection drawings, schedules, reports, diagrams, layouts, setting plans, samples and other data required by Plans and Specifications and/or requested by the Architect and Construction Manager and Construction Manager pertaining to systems, methods of construction, equipment, materials, performance and test reports and data, wiring diagrams and controls, cuts, mock-ups, brochures, catalogs, and other data as may be necessary to describe the Work in sufficient detail, design and dimensions or as may otherwise be deemed necessary by the Architect and Construction Manager. Each of the Submissions shall be delivered in such number as the Architect and Construction Manager or Contract Documents may require for submission to the Architect for approval.

b. Architect's review of Submissions is for scope of Work. Acceptance review and approval of Submissions by Architect does not constitute approval and shall not relieve the Contractor from their:

(i) obligation to perform the Work in accordance with the Contract Documents or

(ii) responsibility for the proper matching and fitting of its work with all contiguous or adjacent work and existing conditions, unless the Contractor has informed the Architect in writing of any deviations between Plans and Specifications and the Submissions to be submitted under this Article 3 and Contractor has been relieved of responsibility in writing by the Architect.

c. The Contractor shall make such corrections in Submissions as required by Architect or the Construction Manager and Contractor shall deliver corrected Submissions to

the Architect as required until the Submissions are approved. If the Architect rejects any Submission due to non-conformance with the Contract Documents such rejection shall not form the basis for any claim by the Contractor for a delay or other damages.

d. All submissions shall be submitted, and resubmitted as required, in a timely fashion so as to cause no delay in the Work or the work of any Other Contractor.

e. The Contractor shall verify at the Project site all conditions, dimensions and elevations indicated on the Plans, and the Contractor shall advise Architect of any deviations that affect its Work. Approval of Submissions by the Architect is not verification by the Architect of field dimensions. The Contractor's obligations hereunder shall include taking field measurements for all Work, and approval of Submissions by the Architect or the Construction Manager shall not relieve the Contractor from correcting Work reflected in error on the Contractor's Submissions, not conforming to the field requirements or existing conditions or not complying with the terms of this Contract.

f. Submissions shall be identified with the name of the Project, dated and numbered sequentially with a consistent numbering system to be used for all revisions. Submissions shall be covered with a transmittal letter identifying the Project and the Specification number of each item, stating qualification, deviations or departures from the Contract Documents. All such Submissions shall be to proper scale and shall be prepared in accordance with industry standards. Reproducible electronic media as well as full size paper prints and drawings shall be submitted in such number as requested by the Architect.

g. Within 10 calendar days of the signing of this Trade Contract, Contractor will submit to Architect an initial schedule, in a form satisfactory to the Construction Manager and Construction Manager, showing equipment and material including quantities and delivery dates for all manufactured and fabricated goods, materials, products, equipment, fixtures and other items required for the Work. Such schedule shall be updated as required by Architect.

h. If it is anticipated that finished products will have a range of color, graining, texture or other characteristics, the Contractor shall construct a mock-up and provide a sufficient number of samples of the specified products exhibiting the full range of all such characteristics. Products delivered or erected without such a submission and not approved by the Architect shall be subject to rejection. Except for range samples, or otherwise provided, all samples shall be submitted in such numbers as required by the Architect. All samples shall be marked, tagged, or otherwise properly identified with the name of the Contractor, the Project, the purpose for which they are being submitted and the date of submission.

i. No portion of the Work shall be commenced until the applicable Submission has been approved by the Architect.

j. During the progress of Work the Contractor shall update and revise shop drawings to reflect any revisions and changes to the Work. Upon final completion of the Work, the Contractor shall provide the Architect with such number of final as-built sets of documents as required by the Architect relating its Work to the final as-built condition of the portion of the Project worked by the Contractor. Such as-builts

shall be submitted in electronic and full size paper form or as required by Construction Manager.

18. WELDING AND CUTTING

a. Appropriate fire extinguishing equipment shall be provided where welding or cutting is to be performed. Sprinklers subject to fusing from heat due to welding or cutting shall be temporarily shielded, with valves to remain open. Contractors will be back charged for all fines imposed for false fire alarms.

b. Welding or cutting shall not be performed in or near rooms or locations where flammable gases, liquids or vapors, lint, dust or loose combustible stocks are present unless suitably protected when sparks or hot metal from the welding or cutting operations may cause ignition or explosion of such materials.

c. Combustible construction or material shall be wetted down or protected by noncombustible shields or covers from possible sparks, hot metal or oxide.

19. TEMPORARY USE OF EQUIPMENT

a. No equipment intended for permanent installation shall be operated for temporary purposes unless directed herein.

20. DEFECTIVE, DAMAGED AND UNSATISFACTORY WORK

a. Work which has become defective, damaged, unsatisfactorily installed, permanently stained, marred, cracked and materials which do not conform to grade of quality required, will be rejected, removed immediately, reset as required with material and methods of like kind and quality to produce satisfactory, complete work to full satisfaction of the Architect at no additional costs or extension of contract time.

21. CLEANING AND RESTORATION

a. Care shall be taken by all workmen not to mark, soil or otherwise deface finished surfaces. In the event that any finished surface becomes defaced in any way by mechanics or workmen, the Contractor responsible shall clean and restore such surfaces to their original condition or replace to the Owner's and Architect's satisfaction.

b. Areas of the building in which painting and finishing work is to be performed shall be cleaned throughout by the Contractor just prior to the start of this work, and these areas shall be maintained in satisfactory condition for painting and finishing as directed by the Architect. This cleaning shall include the removal of trash and rubbish from the area; broom cleaning of floors; the removal of plaster, mortar, dust and other extraneous materials from finish surfaces.

c. In addition to the cleaning specified above and the move specific cleaning which may be required in various sections of the Specifications, the space shall be prepared for occupancy by a thorough cleaning throughout by the Contractor including washing, or cleaning by other approved methods, surfaces on which dirt or dust has collected and by washing glass doors on both sides. Provide and maintain adequate runner strips of non-staining reinforced Kraft building paper on

finished floors as required for protection. Equipment shall be left in an undamaged, bright, clean, polished condition.

d. Upon completion of his work, and also when directed, the Contractor shall remove from the building and premises all temporary work, all rubbish and debris, and shall leave the building and the premises in a neat, orderly, and "broom clean" condition.

e. Contractor and all Subcontractors shall cooperate in every possible way to expedite the use and occupancy of the building, and the completion of unfinished items.

f. Each Contractor shall clean each surface or unit associated with his/her trade to the condition expected in normal commercial building cleaning and shall comply with manufacturer cleaning instructions for all manufactured work. The following cleaning operations shall be completed by the associated trade performing the work before requesting an inspection for a Certificate of Substantial Completion:

1. Clean transparent materials including glass in doors and windows. Replace any damaged or broken glass.

2. Clean all exposed finishes to a dust free condition, free of stains, films and similar foreign substances.

3. Clean new floors as recommended by the manufacturers. Carpeted floors shall be vacuumed, while wood, ceramic tile, terrazzo, linoleum sheet floors and vinyl tile floors shall be damp mopped in accordance with manufacturer's suggested maintenance instructions.

4. Surfaces of mechanical and electrical equipment shall be wiped. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps of all construction dust.

5. Remove excess or spilled grout, mortar, spackle, or caulking from all new or existing surfaces.

6. Remove all excess, spilled, spattered, oversprayed, or dripped paint, stain, or other finishes from new or existing surfaces which are not meant to be painted, stained or finished.

g. Contractor shall remove temporary protection and facilities installed for protection of work during construction unless otherwise directed by the Owner, Architect or Construction Manager.

h. All Contractors shall comply with authorities and/or agencies having jurisdiction and shall adhere to any and all safety standards for cleaning. Contractors shall not:

1. Burn or bury waste materials.

2. Discharge volatile, harmful or dangerous materials into drainage systems or water supplies.

3. Dispose of waste materials in an unlawful or improper manner.

i. Any Contractor who is cited or fined for improper or unlawful disposal of waste materials shall be solely responsible for all monetary penalties arising from such action.

22. COORDINATION

a. The Contractor shall coordinate the work of all Sub-Contractors, arrange space conditions to accommodate the work of all trades and prepare composite drawings as required to scale clearly the work of each trade Contractor in relation to each other.

b. The Contractor will be held responsible to correct unsatisfactory conditions resulting from improper coordination.

c. Such drawings shall be reviewed by the Architect.

d. Contractors to communicate and supply shop drawings to each other to insure proper coordination.

e. Daily field reports are to be provided by all Contractors to the Construction Manager.

f. Coordination Meetings:

1. General: Prepare a written memorandum on required coordination activities. Include such items as required notices, reports, minutes of meetings, and attendance at meetings. Distribute this memorandum to each entity performing work at the project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.

2. Weekly coordination meetings: The Contractor for Construction shall schedule and hold weekly general project coordination meetings at regularly scheduled times that are convenient for the attendance of other prime contractors and other parties involved. These meetings are in addition to the specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Required attendance includes each prime contractor and every other entity identified by any prime contractor as being currently involved in the coordination or planning for the work of the entire project. Conduct meetings in a manner that resolve coordination problems. The Contractor for construction shall preside at each meeting, and shall record meeting results. The Contractor for Construction shall distribute copies of the meeting results to everyone in attendance, the Architect and Construction Managers, and to others affected by the decisions and actions resulting from each meeting.

g. Scaled and figured dimensions with respect to the items are approximate only; sizes of equipment have been taken from typical equipment items of the classes indicated. Before proceeding with the work, the contractor shall carefully check all dimensions and sizes and shall assume full responsibility for the fitting in of equipment and materials to the building and to meet architectural and structural conditions.

h. Separate plans shall also be prepared for sleeve locations and concrete pads for mechanical equipment required by all contractors for the performance of their work. These drawings shall be coordinated with the coordination drawings. When final information is received, such data shall be promptly inserted on the coordination drawings.

i. The HVAC Contractor shall provide electronic format CADD dwg files or pdf files, at a scale of 3/8" – 1'-0" showing all HVAC equipment, ductwork, and major piping, including elevations and dimensions to all fixed building elements, such as beams; columns, slabs; ceilings; including ceiling suspensions; framing; floor; walls; doors, including door swings; and windows affected by the equipment, ductwork, and piping. Show all registers, grilles, diffusers, radiators and convectors, and other terminal elements. Show location of all valves, dampers (fire, smoke, volume, and automatic), coils, humidifiers, smoke detectors, etc. requiring access for service and maintenance. Locate all access doors. Include large-scale details and sections as required to fully delineate the conditions in congested areas, leaving space for the work of the other contractors. Show plan layout of all equipment bases, pads, and inertia blocks. Clearly label all work by HVAC Contractor.

j. The Plumbing Contractor shall overlay on the electronic format CADD dwg files or pdf files coordination drawings prepared by the Construction Contractor and the HVAC Contractor all water supply, drain, waste, vent, sprinkler main and branch piping, risers and sprinkler heads and other major lines. Indicate piping elevations and locations of the fire hose cabinets, drinking fountains, etc. Indicate any conflicts with or locations where piping and equipment encroach on ductwork lines. Locate valves and other items requiring access for service and maintenance. Locate all access doors. Avoid interference with HVAC work and with building construction. Use same scale as drawing being overlaid. Clearly label all work by Plumbing Contractor.

k. The Electrical Contractor shall overlay on electronic format CADD dwg files or pdf files coordination drawings prepared by Construction, HVAC, Plumbing and Fire Protection Contractors all main conduit and bus runs, cable trays, light fixtures, major equipment, and switch gear and panel boards. Show elevations and clearances. Show all items requiring access for service and maintenance. Locate all access doors. Avoid interference with HVAC, Plumbing, and Fire Protection work and with building construction. Use same scale as drawings being overlaid. Clearly label all work by Electrical Contractor.

l. Each Contractor shall use the signed completed coordination drawings as a working reference. Compare all shop drawings, prior to their submittal to the Architect, with the coordination drawings and revise the shop drawings to fit the coordination drawing condition. If revisions to the coordination drawings are required because of shop drawings, make revisions as directed by Construction Manager and notify all affected contractors with copy of notification to Construction Manager.

Maintain up-to-date record of all revisions on own coordination drawing copies; keeping one copy at the project site.

m. No extra compensation will be paid to any contractor for relocating any duct, pipe, conduit, or other material installed without coordination among trades involved or among other affected contractors. Each Contractor who causes any additional work to other contractors by improperly coordinated work or work not installed in accordance with the signed coordination drawings shall reimburse the affected other contractors for the cost of the additional work.

23. TRADE BREAKDOWNS

a. After the execution of the Agreement, the Contractor shall promptly prepare a trade breakdown for review. The above trade breakdown will be submitted before the work is commenced. Breakdown shall be for each work area as requested by the Architect or Construction Manager.

b. The Contractor shall submit this breakdown updated monthly to show the amount of work completed. This shall be delivered together with the monthly requisition for payment.

24. MANUFACTURER'S DIRECTIONS

a. Where manufactured articles, materials and equipment are specified, but specific installation instructions are not included they shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's latest printed instructions.

b. The Contractor is required to maintain at the job site the current edition of such printed instructions. Where such directions are at variance with the specifications the Contractor shall require clarification from the Architect.

25. JOB PROGRESS MEETINGS

a. Job progress meetings shall be scheduled by the Owner during the course of construction. The Contractor or the Contractor's duly authorized representative and such Sub-Contractors as required by the Contractor or the Owner or the Architect shall be present at job progress meetings. The Contractor and trade Contractors shall answer questions on progress, workmanship, approvals required, delivery of materials and other subjects concerning the work. The purpose of such meeting is to coordinate the efforts of all concerned so that the work proceeds without delay to completion as required by the contract. Each contractor must send a qualified representative, knowledgeable in the project and authorized to make decisions on behalf of the company, to every meeting. Failure to attend a project meeting or arriving late will result in a $500.00 back-charge, per occurrence.

b. The Owner, or the Construction Manager or the Architect may require any schedule to be modified so that changes in the work, delays or acceleration of any segment of the work shall be reflected in such schedule. The Contractor shall cooperate with the Owner in providing data for such changes in or modification of schedules.

26. MEASUREMENTS

a. Verify dimensions and measurements of the site and be responsible for the correctness of them. No extra charges or compensation will be allowed on account of difference between actual dimensions and measurements indicated on drawings; any difference found shall be submitted to the Architect in sufficient time for his consideration and direction before proceeding with the work involved.

b. It is the duty of the Contractor to take his own measurements of the work and be responsible for same.

c. The Contractor shall thoroughly examine the drawings and specifications, carefully checking the figured dimensions, before commencing work, and report to the Architect if any discrepancy, error or defect appears, but shall not be held responsible for their existence.

27. LOCATION OF APPARATUS

a. The location of apparatus, equipment, fixtures, piping outlets, etc., shown or specified but not specifically dimensioned shall be considered as only approximate. The actual location shall be as directed and as required to suit the conditions at the time of installation. Before installation, the Contractor shall consult the Architect, and ascertain the actual location required. He shall also consult with other trade Contractors and examine their drawings so as to avoid conflicts with other work and apparatus.

28. PUNCH LIST PROCEDURE

a. After submission of the list of items to be corrected by the Contractor as referred to in Article 9.2.8 of the General Conditions, the Architect reserves the right to issue a revised list of corrections to be made (Punch List). If such a revised list is necessary, the Architect will furnish to Contractor a "Punch List" of items requiring completion or correction.

b. It shall be the Contractor's responsibility to reproduce and distribute all necessary copies as needed to the various trades immediately, and see that the items requiring correction or completion are given prompt attention. No certificates of Substantial Completion will be issued by the Architect until corrections are made, or the Architect is satisfied that they will be made.

29. OPERATING AND MAINTENANCE INSTRUCTIONS

a. Three (3) sets of operating and maintenance instructions covering completely the operating and maintenance of all equipment furnished under the Contract shall be delivered to the Owner. These shall include operating equipment and flow diagrams of all systems. Three (3) sets of lubricating charts and manuals for each item or equipment shall be furnished.

b. Upon completion of the work and at a time designated a competent engineer or factory representative shall be provided for a sufficient period of time to instruct representatives of the Owner in the operation and maintenance of each piece of equipment and of each system as a whole. Such period shall not exceed five (5) days for the work of each Section of the Specification.

c. The Contractor shall certify by endorsement thereon, that each for the manuals is complete and accurate. The Contractor shall assemble these manuals for all Sections of the work, review them for completeness prior to submission. The Contractor shall provide suitable transfer cases and deliver the manuals suitably bound, indexed and marked.

d. Operational instructions must be video recorded.

31. KEYS AND MAINTENANCE KITS

a. All keys, maintenance kits or stock, replacement parts of materials, spare construction materials, and equipment required under the Contract shall be supplied by Contractor.

32. PROJECT CLOSE-OUT DOCUMENTATION

a. Prior to final payment, the Contractor shall submit to the Architect the following documents in an original and one copy unless otherwise noted:

b. A complete listing of all trade Contractors, business addresses and items supplied by each such trade Contractor.

c. A listing of manufacturers of major materials, equipment and systems installed in the work.

d. Payments of Debts and Claims and Consent of Surety: Adequate evidence that he has paid all obligations arising out of the Construction Contract. He shall submit AIA Document No. G-706, Contractor's Affidavit of Payment of Debts and Claims, together with AIA Document G-707, Consent of Surety, indicating written consent of the surety to final payment.

e. Release of Liens: The Contractor shall also submit AIA Document G-706-A, Contractor's Affidavit of Release of Liens, indicating that the releases for waivers submitted are complete to the best of his knowledge, information and belief and, if there are any exceptions that they be so stated specifically in this form.

f. Certificate of Substantial Completion AIA Document G-704.

g. Contractor's one year guarantee as outlined in the Supplementary General Conditions Article 3.5.3. Submit all other guarantees and warranties as outlined in the contract documents.

h. Submit individual Final Waiver's of Lien from subcontractors and suppliers as may be required by the Owner.

i. Final Approvals and Certificates: All final approvals and certificates as required by the specifications, drawings and all applicable codes and regulations.

j. The Contractor shall submit to the architect, before completion of work, and before final payment, a detailed "as built" plan showing locations, elevations, sizes and connections of drainage structure and pipes.

k. Submit a current certificate of insurance.

l. Submit a Punch List Item Letter stating all items have been completed.

m. Contractor to submit site documents (A201:3.11.1), Certificate of Current Insurance (A201:9.10.2), Contractors Guarantee of Insurability (A201:9.10.2), Certification of Wages and Final Application for Payment (AIA G702/703).

n. Turn over to Owner all Procedures manuals and spare parts.

o. A Close-out meeting will be held to review the final documents.

p. As a predecessor to release of "retainage", the contractor shall submit all close-out documentation, including as-built drawings. No retainage reduction will be permitted until close-out requirements are approved.

33. PROTECTION

a. A minimum of five (5) days prior to the start of construction, the Contractor must submit to the Construction Manager a written and diagrammatic description of the means and methods the Contractor will initiate to protect the site during the construction period. The Construction Manager will forward this information to the Owner and Architect for review and comment. The Contractor may not commence construction until he has received an acceptance of the protection procedures from the Owner.

b. During construction, the General Contractor shall be responsible for maintaining a watertight structure. This shall include additions and existing buildings. The Contractor shall be responsible for temporary roofing, tarps and other protection at roofs, cavity walls, etc.. Should the Contractor fail to provide adequate protection causing flooding, damage or other disturbance to the existing building, Contractor shall be responsible for all costs associated with clean up and repairs. Inasmuch as flooding and damage have safety implications to the general public, clean up and repairs may be made by the Owner without warning to the Contractor. Administration costs incurred by the Owner, Construction Manager, and Architect will also be back charged to the Contractor. The Contractor, by entering into Contract with the Owner, agrees to be liable for these costs.

c. Temporary partitions are to be constructed where shown on drawings or where otherwise required for safety of the public or to prevent dust from entering occupied areas. Partitions shall be dustproof from floor to ceiling (if existing condition is a drop-in tile ceiling, Contractor shall remove tile and install partition to structure above.) In addition to framing and sheetrock or plywood, partition to have plastic on the work area side. If an access door is required, an alternating 3 layer plastic system shall be used. The door shall be a standard hollow metal door with lockset and closer. Keys shall be distributed to the Prime Contractors, Owner, Architect and Construction Manager.

34. SURVEYING

a. Certificates: Submit a certificate signed by the land surveyor or professional engineer certifying the location and elevation of improvements including the following:

1. Foundation Survey: After completion of foundations, as-built survey shall be submitted prior to continuing with the work.

2. Anchor Bolt Survey: After installation of all column anchor bolts, surveyor shall survey as-built conditions. No steel erection shall proceed until all corrections, if any, are completed.

3. Steel Survey: After completion of steel erection, surveyor shall survey steel indicating actual elevations to top of steel, plumbness and alignment of all columns and beams. No masonry work shall proceed until survey is submitted and corrections, if required, are made.

4 Final Property Survey: Before Substantial Completion, the Surveyor shall prepare a final property survey showing significant features (real property) that have resulted from construction of the project. Include on the survey a certification, signed by the Surveyor, to the effect that principal lines and levels of the project are accurately positioned was shown on the drawings.

b. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of "Submittals" and "Project Closeout" Sections.

35. PRE-CONSTRUCTION PHOTOGRAPHS

a. Prior to beginning work, the contractor shall photographically record existing conditions for all project areas using digital video in MPEG-2 format. Video shall be made at high resolution (1440 x 1152) and shall adequately zoom in on selected elements for clear representation of existing conditions. All video recording shall be done in the presence of the Consultant. Submit the completed video on DVD disk(s) to the Consultant for the record.

b. Photograph any and all damaged or misaligned materials or surfaces which may in any way be misconstrued as having occurred during the implementation of this Contract. Inspect all existing conditions on all paths of travel on the site, adjacent right of ways, and within the building with the Consultant. With clear labeling and convenient indexing, provide written documentation for each video disk referencing both the disk and site locations of recorded images of any and all damage that could be misconstrued as being caused by the Contractor's work and/or access. Repair all damage to existing conditions and along the paths of travel caused by Contractor's Operations.

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

a. General project coordination procedures.
b. Conservation.
c. Coordination Drawings.
d. Administrative and supervisory personnel.
e. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

C. Related Sections: The following Sections contain requirements that relate to this Section:
a. Division 1 Section "Submittal Requirements" for preparing and submitting the Contractor's Construction Schedule.
b. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
c. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

B. Coordination: Contractor shall coordinate its construction operations with those of sub-contractors and entities to ensure efficient and orderly installation of each part of the

Work. Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

a. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
b. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
c. Make adequate provisions to accommodate items scheduled for later installation.

C. Contractor shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

a. Prepare similar memoranda for Owner, Owner's Representative, and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

a. Preparation of Contractor's Construction Schedule.
b. Preparation of the Schedule of Values.
c. Installation and removal of temporary facilities and controls.
d. Delivery and processing of submittals.
e. Progress meetings.
f. Preinstallation conferences.
g. Project closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

a. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 SUBMITTALS

A. Coordination Drawings:

1. The Contractor shall prepare Coordination Drawings, composite shop drawings, and/or field installation layout drawings:

a. if limited space availability necessitates maximum utilization of space for efficient installation of different components;
b. if coordination is required for installation of products and materials fabricated by separate entities
c. for such work directed by the Architect and/or required by the job requirements.

2. These coordination drawings, composite shop drawings, and/or field installation layout drawings shall be coordinated in the field among the subcontractors to verify the proper relationship to the work of other trades based on field conditions and shall be checked for accuracy and approved by the Contractor before submission to the Architect for their review and concurrence. Drawings shall be at a scale of not less than 3/8 inch equals one foot, unless otherwise noted and shall:

    a. show all structure and other information needed for coordination
    b. show horizontal and vertical dimensions to avoid structural framing, ceilings, partitions, and other services
    c. show penetrations through interior and exterior walls, floors, ceilings, and roofing
    d. indicate required installation sequences

3. Review of coordination drawings shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with architectural, structural, mechanical, electrical, and other work.

4. Any subcontractor who fails to promptly review and incorporate his work on the drawings shall assume full responsibility for any installation conflicts affecting his work and shall remedy those conflicts without additional cost to the Owner and without change to the schedule.

5. Coordination meetings to resolve interferences in the work will be held at the project site under the direction of the Architect. Representatives of all trades involved must be present at each meeting.

6. Any changes to reviewed coordination drawings shall be approved in writing by the Architect/Engineer prior to the start of work in the affected area.

7. Coordination drawings include but are not necessarily limited to:
    a. Structure
    b. Partition/room layout
    c. Ceiling tile and grid
    d. Light fixtures
    e. Access panels
    f. Sheet metal, coils, boxes, grilles, diffusers, etc.
    g. HVAC piping and valves
    h. Smoke and fire dampers
    i. Soil, waste, and vent piping
    j. Water piping
    k. Roof drain piping
    l. Major electrical conduit runs, panelboards, feeder conduit, and racks of branch conduit
    m. Above ceiling miscellaneous metal
    n. Fire protection systems and components
    o. Heat trace for piping
    p. Equipment supports, anchors, guides, and seismic restraints.

8. Refer to Mechanical Section "Basic Mechanical Materials and Methods" and Electrical Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.

B. Staff Names: Within 10 days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

a. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

a. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

a. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
b. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
c. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Owner’s Representative and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

a. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
b. Agenda: Discuss items of significance that could affect progress, including the following:

a. Construction schedule.
b. Phasing.
c. Critical work sequencing.
d. Designation of responsible personnel.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for processing Applications for Payment.
g. Distribution of the Contract Documents.
h. Submittal procedures.
i. Preparation of Record Documents.
j. Use of the premises.
k. Responsibility for temporary facilities and controls.
l. Parking availability.
m. Office, work, and storage areas.
n. Equipment deliveries and priorities.
o. First aid.
p. Security.
q. Progress cleaning.
r. Working hours.

C. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

a. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
b. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.

10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.
14) Documentation of information for payment requests.

c. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

D. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

a. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work

b. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.

8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

c. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 33 00
SUBMITTALS

1. GENERAL

A. The submittal requirements include, but are not necessarily limited to:

(1) Insurance and General Conditions
(2) Schedules
(3) Shop Drawings, Product Literature and Samples
(4) Applications for Payment
(5) Requests for Changes

2. INSURANCE AND GENERAL CONDITIONS

A. The following information is to be sent directly to the Architect & Owner in care of the Project Executive or designee:

(1) *All insurance certificates:* The insurance coverage required is detailed in the General Conditions and in Division 1 of the Specifications. In addition to the Certificate of Insurance, the Contractor shall provide the Owner with copies of any endorsements subsequently issued amending coverage or limits.

(2) *All other information* required under the general conditions including, but not limited to, schedules of value, materials and equipment lists, directories of personnel, etc.

3. CONSTRUCTION SCHEDULE

A. Under the General Conditions, Paragraph 3.10 and its subparagraphs, **the General Construction Contractor (aka Contractor) must submit a Construction Schedule to the Architect & Owner within ten days of the notice to proceed**. The specific requirements for the type and format of the construction schedule, revisions thereto, and penalties for non-compliance are detailed in the General Conditions.

B. Upon approval of the construction schedule, the Contractor shall distribute copies of the reviewed construction schedule to:

1. the Owner.
2. the Architect.
3. the Engineers.
4. the job site file.
5. the Subcontractors

C. The Contractor shall instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.

4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Within 14 calendar days from the date of the Contract, the Contractor shall provide to the Architect & Owner a schedule of all Submissions. Submissions shall include (as relevant) all shop drawings, coordination drawings, fabrication drawings and erection drawings, reports, diagrams, layouts, setting plans, samples and other data required by Plans and Specifications and/or requested by the Architect & Owner pertaining to systems, methods of construction, equipment, materials, performance and test reports and data, wiring diagrams and controls, cuts, mock-ups, brochures, catalogs, and other data as may be necessary to describe the Work in sufficient detail, design and dimensions or as may otherwise be deemed necessary by the Architect and Owner.

B. All Submittals for items that are considered long lead items by the Architect & Owner must be submitted within twenty-five (25) days of notice to proceed. All other submittals must be submitted in sufficient time to allow at least ten (10) working days for the Architect's review. Approval signatures of Contractors and all Sub-contractors affected by the Work shown therein must appear on all shop drawings before submission to Architect. A copy of Shop Drawings shall be provided for Owner's review as requested.

(1) The following are considered long lead items for this project:

(a) Storefront and Window Assemblies
(b) Masonry
(c) Steel
(d) Mechanical Equipment

C. Shop Drawings:

(1) All shop drawings must be accompanied by the submittal cover sheet (transmittal form) prepared and distributed by the Owner's Representative&/or Owner. **One (1) electronic copy of all shop drawings shall be sent directly to the Architect for all non-engineered items or directly to the Engineer for all engineered items.** All shop drawings must be presented in a clear and thorough manner. Copies of all transmittals must be sent to the Owner's Representative&/or Owner.

(2) Each shop drawing shall contain a title block with provisions for the following:

(a) Number and Title of Drawing.

(b) Date of Drawing or Revision, and Revision Number (1st, 2nd, 3rd, etc.)

(c) Name of Project.

(d) Name of Contractor or Sub-contractor submitting Drawing, and name of supplier and manufacturer

(e) Specification Section Title and Number.

(f) Space for Architect's stamp and received stamps. (8" x 3")

(3) Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.

(4) Minimum sheet size: 8-1/2 inches by 11 inches.

(5) Each shop drawing shall have listed on it all Contract Reference Drawing Numbers plus Shop Drawing Numbers on related work by other Sub-contractors if available.

(6) Each shop drawing submission shall have indicated on the drawing under submission number (whether first, second, third, etc.) Shop drawings for work of one trade shall be checked by Sub-contractors of related trades, and shall have received their stamp of approval before being submitted to Architect.

(7) Shop drawings which involve a change from or variance with Contract Drawings shall be so noted by Contractor and Architect duly advised in writing of recommended change and reasons thereof.

(8) Architect's review of Submissions is for scope of Work. Acceptance review and approval of Submissions by Architect does not constitute approval and shall not relieve the Contractor from its:

(a) Obligation to perform the Work in accordance with the Contract Documents or
(b) Responsibility for the proper matching and fitting of its work with all contiguous or adjacent work and existing conditions, unless the Contractor has informed the Architect in writing of any deviations between Plans and Specifications and the Submissions to be submitted under this Article 3 and Contractor has been relieved of responsibility in writing by the Architect.

(9) All contractors are advised to refer to the coordination Section 01040 for the requirements to prepare coordination drawings which addressed trade space allocation.

D. Product Data:

(1) **Two (2) copies of all product data shall be sent directly to the Architect for all non-engineered items or directly to the Engineer for all engineered items. Copies of all transmittals must be sent to the Owner's Representative&/or Owner.**

(2) Contractor shall:

(a) Clearly mark each copy to identify pertinent products or models.
(b) Show performance characteristics and capacities.
(c) Show dimensions and clearances required.
(d) Show wiring or piping diagrams and controls.
(e) Modify Drawings and diagrams to delete information which is not applicable to the work.
(f) Supplement standard information to provide information specifically applicable to the work.

E. Samples

(1) The Contractor shall submit for review to the Architect samples of materials listed under each section of the specifications. Samples shall be properly labeled for identification, consisting of the following information: job titles, sample number, submission number, label large enough to receive Architect's stamps.

(2) The Contractor shall not commence work under sections of the specifications until the Architect's approval in writing is obtained for all listed samples.

(3) The Contractor shall not construe approval of advance samples as total guarantee of acceptance of materials. Materials will be subjected to field inspections, from time to time, as work progresses.

(4) Samples of specific manufactured products shall be accompanied with appropriate manufacturer's literature at time of submission.

(5) Samples shall be of sufficient size and quantity to clearly illustrate:

(i) Functional characteristics of the product, with integrally related parts and attachment devices.

(ii) Full range of color, texture and pattern.

F. Contractor's responsibilities:

(1) Review shop drawings, product data and samples prior to submission.

(2) Determine and verify:

(i) Field measurements.
(ii) Field construction criteria.
(iii) Catalog numbers and similar data.
(iv) Conformance with Contract Documents.

(3) Coordinate each submittal with requirements of the work and of the Contract Documents.

(4) Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.

(5) Begin no fabrication or work which requires submittals until return of submittals with Architect approval.

(6) The Contractor shall make such corrections in Submissions as required by Architect or the or Owner and Contractor shall deliver corrected Submissions to the Architect & Owner as required until the Submissions are approved. If the Architect rejects any Submission due to non-conformance with the Contract Documents such rejection shall not form the basis for any claim by the Contractor for a delay or other damages.

(7) The Contractor shall verify at the Project site all conditions, dimensions and elevations indicated on the Plans and the Contractor shall advise Architect of any deviations that affect its Work. Approval of Submissions by Architect is not verification by Architect of field dimensions. The Contractor's obligations hereunder shall include taking field measurements for all Work, and approval of Submissions by the Architect shall not relieve the Contractor from correcting Work reflected in error on the Contractor's Submissions, not conforming to the field requirements or existing conditions or not complying with the terms of this Contract.

(8) Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other Contractor.

G. Submittals received from sources other than the Contractor will be returned to the sender "without action".

H. Submittals received which are not required nor requested by the Contract Documents will be returned to sender "without action, submittal not required".

I. Submittals received which are required for "Architect's information" such as inspection and test reports, survey data and fabricator's design calculations, will not be returned.

J. Submittals shall contain:

(1) Field dimensions, clearly identified as such.

(2) Relation to adjacent or critical features of work or materials.

(3) Applicable standards, such as ASTM or Federal Specification numbers.

(4) Identification or deviations from Contract Documents.

(5) Contractor's stamp, dated and initialed or signed, certifying to review and approval of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with the requirements of the Work and of the Contract Documents. Submittals which do not have the Contractor's stamp, dated and initialed or signed, will be returned to the Contractor, without being reviewed, for resubmittal.

(a) The Contractor's stamp shall contain the words "Reviewed and Approved as being in conformance with requirements of Contract Documents".

K. Resubmission Requirements:

(1) The Contractor shall make any corrections or changes in the submittals required by the Architect and resubmit until approved.

(2) Each shop drawing submission after the first submission shall be clear of all previous stamps.

(3) The same number of copies required for original submission is required for resubmission.

L. ARCHITECT'S ACTION STAMP

(1) Except for submittals which are for "Architect's Information", the Architect will stamp each submittal to be returned with a self explanatory action stamp, appropriately marked, dated and initialed or signed, as follows:

PETER GISOLFI ASSOCIATES Architects • Landscape Architects, LLP
566 Warburton Avenue • Hastings-on-Hudson, NY 10706 • 914-478-3677

Submittal has been reviewed for general conformance with the design concept of the project and general compliance with the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; for all fabrication processes, means, methods, and techniques of construction; for coordinating work with all other trades; and for performing all work in a safe and satisfactory manner. Corrections or comments made on submittals shall not relieve the Contractor and Subcontractor(s) from compliance with the requirements and design intent of the Contract Documents.

The design professionals have reviewed only those areas of the submittal(s) marked with clouds or other designations indicating that those were the only areas changed since the design professional's previous review(s). Therefore, any changes made to areas outside of the clouded (or other clearly designated) areas have not been reviewed. Any changes made in these other areas shall be deemed to have been made by the Contractor or Subcontractor(s) without the knowledge or consent of the design professionals.

Reviewed	
Not reviewed	
No exception(s) taken	
Make correction(s) noted	
Revise and resubmit	
Rejected	

Reviewed by: Date:

Shop drawings that are returned: "Revise and Re-submit" or "Rejected" shall be corrected and resubmitted to the Architect promptly

M. DISTRIBUTION AFTER REVIEW

(1) The Architect shall distribute the reviewed shop drawings to the Owner's Representative&/or Owner for distribution as follows:
   (a) To the Contractor: two non-reproducible copies or one reproducible and one non-reproducible print;
   (b) To the Owner's Representative&/or Owner: two non-reproducible copies. One is for use by the Owner's Representative&/or Owner and the other is to be forwarded to the Owner by the Owner's Representative&/or Owner at the completion of the project.
   (c) To the Architect: two non-reproducible copies (one for the Architect's file and one for the Engineer's file).

(2) The Contractor shall obtain black line prints of the approved shop drawings and distribute reproductions of shop drawings and copies of product data which carry the Architect's stamp of approval to:
   a. Job site file.
   b. Record Documents file.
   c. Other affected contractors.
   d. Subcontractors.
   e. Supplier or fabricator.

(3) The Contractor shall distribute samples which carry the Architect's stamp of approval as directed by the Architect.

N. APPLICATIONS FOR PAYMENT

1. The Contractor shall submit a "pencil copy" of the requisition for payment to the Owner's Representative&/or Owner no later than the 2nd of the month for work completed up to that day. After the "pencil copy" is approved, four (4) notarized copies of the final requisition shall be submitted to the Owner's Representative&/or Owner no later than the 10th of the month for forwarding to the Architect for final approval.

2. The Application for Payment must be prepared using AIA form G-702.

3. The Application for Payment must be accompanied by the following:

   a. A current sworn statement from the Contractor setting forth all subcontractors and materialmen with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any subcontractor or materialman in the Application for Payment and the amount to be paid to the Contractor from such progress payment, together with a current, duly executed waiver of mechanics' and materialmen's liens from the Contractor establishing receipt of payment or satisfaction of the payment requested by the Contractor in the current Application for Payment.

   b. Commencing with the second (2nd) Application for Payment submitted by the Contractor, duly executed so-called "after the fact" waivers of mechanics' and materialmen's liens from all subcontractors, materialmen and, when appropriate, from lower tier subcontractors, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment, plus sworn statements from all subcontractors, materialmen and, where appropriate, from lower tier subcontractors covering all amounts described in Paragraph 5.4.2 of the Contract for Construction.

   c. Certified payroll sheets from the Contractor and all subcontractors furnishing labor during the period of the requisition.

   d. Progress photos

   e. Copies of daily reports and toolbox meeting minutes.

   f. Such other information, documentation and materials as the Owner or the Architect may request or require.

O. REQUESTS FOR CHANGES

1. In order to facilitate checking of quotations for extras or credits, all proposals, shall be accompanied by a complete itemization of costs including labor, materials and

sub-contracts. Labor and materials shall be itemized in the manner prescribed above and in the format described below. Where major cost items are sub-contracts, they shall be itemized also. All proposals without such itemization will be returned to the Contractor for resubmission, and owner may issue a construction change directive in lieu thereof.

a.	Materials (Itemized Breakdown)	_____
b.	Rental of Equipment (Itemized Breakdown)	_____
c.	Subtotal (Add lines 1-2)	_____
d.	Prime Contractor Overhead and Profit (5% x line 3)	_____
e.	Subtotal (Add lines 3-4)	_____
f.	Labor (Itemized Breakdown)	_____
g.	Insurance & fringes on Labor (Workmen's Comp., etc.)	_____
h.	Subtotal (Add lines 6-7)	_____
i.	Prime Contractor Overhead and Profit (10% x line 8)	_____
j.	Subtotal (Add lines 8 and 9)	_____
k.	Sub-Contract Work (same as 1-10 above)	_____
l.	Prime Contractor Overhead and Profit – (sub-contracted work) (5% x line 11)	_____
m.	Subtotal (Add lines 11 and 12)	_____
n.	Subtotal (Add lines 5, 10 and 13) _____	
o.	TOTAL CHANGE ORDER (Add lines 14 and 15)	_____

a. When performing any Work on the basis of the cost of labor and materials and Contractor or its Subcontractors are permitted or required to perform any overtime work, the cost of labor shall include additional wages over and above straight time rates as well as wages at straight time rates, however the allowance (mark up percentages) set forth above if applicable, shall not be computed nor paid with respect to such additional wages.

b. Superintendent or non-working foreman direct costs are not allowed.

c. **Contractors are strongly urged to refer to the General Conditions for any and all provisions governing additional work and/or changes to the work.**

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

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

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
2. Divisions 2 through End of specifications for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

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 tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be prequlified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent laboratory Qualification" and that specialize in the types of inspections and test to be performed and shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

B. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Owner's Representative.
2. Notify Architect and Owner's Representative seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's and Owner's Representative's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.6 QUALITY CONTROL

A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract), Article I of the Contract, and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

J. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of the date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

F. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. If a question arises concerning the name and address of an association indicated, please direct the inquiry to the Architect for clarification.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 33

STRUCTURAL TESTS AND SPECIAL INSPECTIONS

GENERAL

1.1 INTENT AND CONDITIONS

A. Intent
1. Define and coordinate structural testing and special inspection services.
2. Define and coordinate conventional testing and inspection services.
3. To assist in determining the probable compliance with the contract documents and Chapter 17 of the New York State Building Code.
4. These services do not relieve the Contractor of responsibility for compliance with the requirements of the contract documents.

B. Conditions
1. If inspection of fabricator's work is required, the Owner's representative may require testing and inspection of the work at the plant, before shipment. Owner, architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with the contract documents.
2. Testing and inspection shall be performed in accordance with the industry standards used as reference for the specified material or procedure unless other criteria are specified. In the absence of a referenced standard, testing shall be accomplished in accordance with generally accepted industry standards.
3. Failure to detect defective work or materials shall in no way prevent later rejection if defective work or materials are discovered.

1.2 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A325-10	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A370-12	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
A490-12	Standard Specification for Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength

C31/C31M-10 Standard Practice for Making and Curing Concrete Test Specimens in the Field
C33/C33M-11a Standard Specification for Concrete Aggregates

C39/C39M-12 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C109/C109M-11b Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
C136-06 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
C138/C138M-10b Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
C140-12 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
C143/C143M-10a Standard Test Method for Slump of Hydraulic Cement Concrete
C172/C172M-10 Standard Practice for Sampling Freshly Mixed Concrete
C173/C173M-10b Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method
C330/C330M-09 Standard Specification for Lightweight Aggregates for Structural Concrete
C567/C567M-11 Standard Test Method for Density Structural Lightweight Concrete
C780-11 Standard Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C1019-11 Standard Test Method for Sampling and Testing Grout
C1064/C1064M-11 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
C1077-11c Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
C1314-11a Standard Test Method for Compressive Strength of Masonry Prisms
D422-63(2007) Standard Test Method for Particle-Size Analysis of Soils
D698-07e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
D1140-00(2006) Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve
D1556-07 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft3)
D2166-06 Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

D2167-08) Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D3740-11 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction
E94-04(2010) Standard Guide for Radiographic Examination
E164-08 Standard Practice for Contact Ultrasonic Testing of Weldments
E329-11c Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
E543-09 Standard Specification for Agencies Performing Non-Destructive Testing
E605-93(R2011) Standard Test Methods for Thickness and Density of Sprayed Fire Resistive Material (SFRM) Applied to Structural Members
E709-08 Standard Guide for Magnetic Particle Examination
E1155-96(R2008) Determining FF Floor Flatness and FL Floor Levelness Numbers

C. American Welding Society (AWS):
D1.D1.1M-10 Structural Welding Code-Steel

D. New York State Building Code, 2015

1.3 RELATED REQUIREMENTS

A. Refer to PART 3 for technical scope sections regarding specific qualifications, inspections, tests, frequency and standards required.

1.4 DEFINITIONS

A. Testing: Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.

B. Inspection: Evaluation of systems, primarily requiring observation and judgment.

C. Structural Tests and Special Inspections: Structural Tests and Special Inspection Services herein include items required by Chapter 17 of the New York State Building Code, and other items which in the professional judgment of the SER, are critical to the integrity of the building structure.

D. Conventional Testing and Inspections: Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.

E. Project Architect (Architect) The prime consultant in charge of overall design and coordination of the Project.

F. Structural Engineer of Record (SER): The Licensed Engineer in responsible charge of the structural design for the Project relative to the Construction Documents.

G. Licensed Structural Engineer: A professional engineer with education and experience in the design of structures similar to this Project and licensed in State in which Project is located.

H. Testing Agency (TA):

1. Testing Agency: Approved independent testing agency acceptable to the COR AND SER and as noted below:
2. Authorized to operate in the State in which the project is located and experienced with the requirements and testing methods specified in the Contract Documents.
3. Meeting applicable requirements of references stated in paragraph 1.4.
4. Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.

I. Special Inspector (SI): A properly qualified individual or firm performing special inspections.

J. The categories of special inspector are:

1. Special Inspector - Technical I, II and III: Usually an employee of a testing agency:
   a. Technical I (Sections 033000)
      1) ACI Certified Concrete Field Testing Technician – Grade I.
      2) ACI Certified Concrete Strength Testing Technician.
      3) ACI Certified Concrete Laboratory Testing Technician – Grade 1.
      4) ACI Certified Concrete Construction Inspector-In-Training.
      5) Inspector shall be employed by a testing laboratory, experienced in the type of work being performed, and under the direct supervision of a licensed civil/structural engineer.
   b. Technical I (Section 05 12 00) - Non-destructive Testing Technician SNT-TC-1A Level I, and/or AWS Certified Associate Weld Inspector (CAWI).
   c. Technical II (Section 03 3000)
      1) ACI Certified Concrete Laboratory Testing Technician - Grade II.

2) ACI Certified Laboratory Aggregate Testing Technician.
3) ACI Certified Concrete Construction Inspector.
4) Inspector shall be employed by a testing laboratory, experienced in the type of work being performed, and under the direct supervision of a licensed civil/structural engineer.

d. Technical II (Section 051200) - Non-destructive Testing Technician ASNT TC-1A Level II, (NDE Technician II), AWS/CAWI, with minimum 3 years' experience, or an AWS/CWI.
e. Technical III (Section 033000) - A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years' experience and licensed in the state in which the project is located and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.
f. Technical III (Section 051200) - ASNT Level III with a minimum of 10 years' experience or an AWS/CWI with a minimum of 10 years' experience.

2. Special Inspector - Structural I and II:
a. Structural I (Sections 033000, 051200, - Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a licensed civil/structural engineer.
b. Structural II (Sections 03 10 00, 03 20 00, 03 30 00, 05 12 00, 31 63 29) - Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.

1.5 RESPONSIBILITIES/AUTHORITY

A. Structural Testing and Special Inspection
1. Special Inspectors:
a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
c. Use the approved design drawings and specifications, supplemented by the approved shop drawings for review of the work.
d. Test and/or inspect the work assigned for conformance with the building department approved design drawings, specifications and applicable material and workmanship provisions of the Code. Perform testing and inspection in a timely manner to avoid delay of work.
e. Bring discrepancies to the immediate attention of the contractor for correction, confirm that they are corrected and, if uncorrected after a rea-

sonable period of time, bring to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.

f. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Structural Testing and Special Inspection Summary Schedule.

g. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the Code.

2. Testing Agency:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
   b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   c. When engaged as a special inspector, provide structural testing and special inspection services as previously described.
3. Project Architect
   a. Complete and sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction. Provide a completed copy of the schedule to all signed parties including Building Official.
   b. If appropriate, arrange and attend a pre-construction meeting to review the scope of structural testing and special inspection. Include Contractor, Building Official, SER, Testing Agency and other parties concerned.
   c. Coordinate the flow of reports and related information to expedite resolution of construction issues.
4. Structural Engineer of Record (SER):
   a. Identify items requiring structural testing and special inspection including special cases.
   b. Define "type" of special inspector required for "description" of work indicated on the structural testing and special inspection schedule.
   c. Complete and sign the Structural Testing and Special Inspection Summary Schedule prior to commencement of construction.
   d. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   e. Review reports submitted by special inspectors.
   f. If engaged as a special inspector, provide structural testing and special inspection services as previously described.
5. Contractor:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.

b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
c. Post or make available the Structural Testing and Special Inspection Summary Schedule within its office at the job site. Also, provide adequate notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
d. Provide the special inspectors access to the approved design drawings, approved shop drawings and specifications at the job site.
e. Review reports submitted by special inspectors.
f. Retain at the job site all reports submitted by the special inspectors for review by the building official upon request.
g. Provide the special inspector safe access to the work requiring inspection and/or testing.
h. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
i. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.

6. Fabricator:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencing construction.
   b. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record that the work was performed in accordance with the approved plans and specifications.
7. Building Official (Typical responsibilities noted for information only):
   a. Determine work, which in the Building Officials opinion, involves unusual hazards or conditions in accordance with the IBC.
   b. Review special inspector qualifications.
   c. Accept and sign the completed Structural Testing and Special Inspection Summary Schedule.
   d. Review all fabricators who perform work in their shop, which requires special inspection.
   e. Review reports and recommendations submitted by the special inspectors.
   f. Review the "final signed reports" submitted by the special inspector(s). These documents should be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.
8. Owner
   a. Establish direct funding to provide for cost of structural testing and special inspection services.
   b. Provide special inspector with approved design drawings, specifications and approved shop drawings.
   c. Provide special inspectors and testing agencies with full access to site at all times.

d. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.

B. Conventional Testing and Inspection
1. Testing Agency:
   a. Test or inspect the work assigned, for conformance with building department approved plans, specifications and applicable workmanship provisions of the IBC.
   b. Bring non-conforming items to the immediate attention of the Contractor, and if uncorrected to the Architect of Record.
   c. Submit test and/or inspection reports to the Architect of Record, the Contractor and other designated persons.
2. Contractor:
   a. Provide adequate notification to testing agency so they may properly prepare for and schedule their work.
   b. Provide testing agency with access to the approved design drawings, approved shop drawings and specifications at the job site.
   c. Correct in a timely manner, deficiencies identified in test and/or inspection reports.
   d. Provide testing agency with safe access to the work requiring testing and inspection.
   e. Provide labor and facilities to provide access to the work and to obtain and handle samples, to facilitate testing and inspection and for storage and curing of test samples.
   f. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
3. Architect of Record (or other prime consultant):
   a. Coordinate the flow of reporting and related information to expedite resolution of construction issues.
4. Inspections by Building Official
   a. Contractor shall provide adequate notice for inspections performed by the Building Official, as required by the 2000 IBC, the New York State Building Code, and local ordinance.
5. Periodic Site Observations by Design Consultant
   a. Special structural testing and inspection, conventional testing and inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or Structural Engineer of Record, nor shall it relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications.
6. Limits of Authority
   a. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Architect or Structural Engineer of Record. They

may not assume any duties of the Contractor, and they have no authority to stop or reject "Work".

1.6 Payment

A. Owner or Architect/Structural Engineer of Record acting as the Owner's Agent shall directly employ and pay for services of the special inspectors to perform required Structural Testing and Special Inspection.

B. Owner shall employ and pay for services of the testing agency to perform required Conventional Testing and Inspection.

C. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for all shipping costs related to delivery of this work. Testing agency will pay for shipping costs of samples transported from site to lab.

D. If exploratory work is required to determine the cause of defects, the cost of such work shall be paid by the Contractor, if the work is found to be defective, in the judgment of the Architect/Engineer. Contractor shall reimburse the Owner for all costs incurred in this event.

E. Any tests required to qualify the Contractor, or the workmen for any phase of the work, shall be performed at no additional cost to the Owner. Structural Tests and Special Inspections:

1.7 INSPECTION NOTICES

A. Contractor: Provide minimum of 24 hours notice for all items requiring testing or inspection. Do not place items requiring testing and inspection services prior to or during placement until testing and inspection services are available. Do not enclose or obscure items requiring testing and inspection services after placement until testing and inspection services are performed.

1.8 REPORTS

A. Testing agency and/or special inspectors shall submit a report in accordance with the Structural Testing and Special Inspection Schedule and shall conduct and interpret tests and inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.

B. Submit reports for structural testing and special inspection, in timely manner to the Contractor, and COR.
   1. Submit reports for ongoing work, to provide the information noted below:
      a. Date issued.
      b. Project title and number.
      c. Firm name and address.
      d. Name and signature of tester or inspector.
      e. Date and time of sampling.
      f. Date of test or inspection.
      g. Identification of product and specification section.
      h. Location in project, including elevations, grid location and detail.
      i. Type of test or inspections.
      j. Results of tests or inspections and interpretation of same.
      k. Observations regarding compliance with Contract Documents or deviations therefrom.
   2. Submit final signed report stating that, to the best of the special inspector's knowledge, the work requiring testing and/or inspection conformed to the Contract Documents.

1.9 FREQUENCY OF TESTING AND INSPECTION

A. For detailed requirements see individual technical specification sections, and Part 3 of this section.

1.10 PROTECTION AND REPAIR

A. Upon completion of testing, sample-taking, or inspection, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the COR. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.11 TESTS TO DEMONSTRATE QUALIFICATION

A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the SER may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.

B. The SER reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

PRODUCTS (NOT USED)

EXECUTION

1.12 SCOPE OF STRUCTURAL TESTS AND SPECIAL INSPECTIONS

A. Refer to individual specification section articles for Quality Control testing and inspection items.

1.13 STRUCTURAL TESTS AND SPECIAL INSPECTIONS PROGRAM SUMMARY

A. The parties involved shall complete and sign the Structural Testing and Special Inspection Schedule. The completed schedule is an element of the Contract Documents and after permit issuance, becomes part of the approved plans and specifications. The completed schedule shall include the following:
   1. Specific listing of items requiring inspection and testing.
   2. Associated specification section which defines applicable standards by which to judge conformance with approved plans and specifications in accordance with the New York State Building Code. The specification section should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
   3. Frequency of reporting, i.e., intermittent, weekly, monthly, per floor, etc.
   4. Parties responsible for performing inspection and testing work.
   5. Required acknowledgments by each designated party.

B. See attached "Structural Testing and Special Inspection Schedule".

1.14 TECHNICAL SECTIONS

A. Section 02200 - Earthwork - Grading, Excavation Filling
   1. (Not Used)
   2. Definitions
      a. Refer to PART 1 for standard definitions.
      b. Special Inspector - Technical
         1) Technical I Technician shall be under the direct supervision of a Technical III. Work shall be performed in a qualified geotechnical/testing laboratory.
         2) Technical II Technical with a minimum of 2 years experience, or a graduate engineer, and is an employee of a qualified and approved

geotechnical/testing laboratory, under the direct supervision of a Technical III.

3) Technical III A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.

3. Structural Testing and Special Inspection Requirements
   a. Classification of materials used and encountered during construction per ASTM:D2488 and ASTM:D2487.
      Technical I - Performance of laboratory testing of materials, as needed (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.).
   b. Field Density Tests: Provide periodic results of field compaction and laboratory work for general compliance with Contract Documents and Geotechnical Reports.
4. Observe all subgrades/excavation bases below footings and slabs and verify design bearing capacity is achieved.
5. Document presence of groundwater within excavations.
6. Provide reports of subgrade observations for general compliance with Contract Documents and Geotechnical Report.
7. Verify cut and fill slopes as specified in the contract documents.
8. Conventional Testing and Inspections Requirements
   a. Contractor shall verify that footings comply with frost depth requirements and shall report any variances to the SER in a timely manner.

B. Section 033000.1 - Concrete Form Work
1. General
   a. (Not Used)
2. Definitions
   a. Refer to PART 1 for standard definitions.
   b. Special Inspector - Structural
      1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
      2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the State in which the project is located. The licensed engineer shall review and approve all inspection reports.
      3) Special Inspector - Structural may be an employee of the SER.
3. Structural Testing and Special Inspection Requirements
   a. Verify formwork dimensions for all concrete, excluding:
      1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock

2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f 'c no greater than 2500 psi.
3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
5) Concrete patios, driveways and sidewalks on grade.

4. Conventional Testing and Inspection Requirements
   a. (Not Used)

C. Section 033000.2 - Concrete Reinforcement
1. General
   a. Refer to Section 05100 - Structural Steel for inspections involving welding reinforcing steel.
2. Definitions
   a. Refer to PART 1 for standard definitions.
   b. Special Inspector - Technical
      1) (Not Used)
   c. Special Inspector – Structural
      1) Structural I Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
      2) Structural II Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the State in which the project is located. The licensed engineer shall review and approve all inspection reports.
      3) Special Inspector - Structural may be an employee of the SER.
3. Structural Testing and Special Inspection Requirements
   a. Inspect reinforcement in all cast in place concrete, excluding:
      1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
      2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f 'c no greater than 2500 psi.
      3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.

4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).

b. Verify the following:
1) Verify reinforcing bar grade.
2) Verify reinforcing bars are free of dirt, excessive rust, and damage.
3) Verify reinforcing bars are adequately tied, chaired, and supported to prevent displacement during concrete placement.
4) Verify proper clear distances between bars and to surfaces of concrete.
5) Verify reinforcing bar size and placement.
6) Verify bar laps for proper length and stagger.
7) Verify mechanical splices are placed in accordance with the plans, specifications and reviewed shop drawings.
8) Verify weldability of reinforcing steel, other than ASTM A706. Verify welding of reinforcing bars meets requirements set forth in Section 05100.
9) Verify epoxy coating is present at locations noted on the plans and specifications, include tie wires, chairs, bolsters, etc. Verify coating damage is repaired in accordance with the contract documents.

4. Conventional Testing and Inspection Requirements
a. (Not Used)

D. Section 033000.3 - Cast-in-Place Concrete
1. General
a. (Not Used)
2. Definitions
a. Refer to PART 1 for standard definitions.
b. Special Inspector - Technical
1) Technical I ACI Certified Grade I inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
2) Technical II ACI Certified Grade II inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
3) Technical III A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years experience and licensed in the State in which the project is located and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approved all reports.
4) Testing laboratory shall have C.C.R.L. certification at the National Bureau of Standards.
c. Special Inspector - Structural
1) Structural I Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural

systems of this type. Inspections shall be performed under the direct supervision of a Structural II.

2) Structural II Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the State in which the project is located. The licensed engineer shall review and approve all inspection reports.

3) Special Inspector - Structural may be an employee of the SER.

3. Structural Testing and Special Inspection Requirements

a. Sample and test all cast in place concrete.

1) Prepare compression test specimens (ASTM C31), one set of four standard cylinders of concrete for each compressive strength test, mold and store cylinders for laboratory-cured specimens.

2) Perform compressive strength tests (ASTM C39). One set of four cylinders for each day's pour between one and 25 cubic yards. If a day's pour exceeds 25 cubic yards, one set of four cylinders for each additional 50 cubic yards, or fraction thereof. One specimen at seven days, two at 28 days, and one specimen retained in reserve for later testing if required. For post tensioned concrete, make and test an additional cylinder at three days to verify strength prior to stressing. (When frequency of testing will provide less than five strength tests for a given class of concrete, conduct at least five strength tests from randomly selected batches. If fewer than five batches are used, conduct one test from each batch.)

3) Slump (ASTM C143): One test at point of discharge for each set of compression test specimens; additional tests

4) Air entrainment (ASTM C231): Test the first batch of air entrained concrete and one additional test for each set of compression test specimens.

5) Concrete Temperature: Test concrete temperature hourly when air temperature is 40F and below and when 80F and above, and each time a set of compression test specimens is made.

b. Perform concrete mix verification.

1) Verify mixer truck trip ticket conforms to approved mix design

2) Verify that total water added to mix on site does not exceed that allowed by concrete mix design.

3) Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits.

c. Inspect preparation and placement of all concrete, excluding:

1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock

2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f 'c no greater than 2500 psi.

3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
5) Verify the following:
   a) Verify acceptable general condition of concrete base prior to placement.
   b) Verify that concrete conveyance and depositing avoids segregation and contamination
   c) Verify that concrete is properly consolidated
   d) Verify reinforcement remains at proper location
   e) Unless noted, inspections shall be continuous.

d. Observe protection and curing methods for all concrete, excluding:
1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock
2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a f 'c no greater than 2500 psi.
3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
5) Verify the following:
   a) Verify specified curing procedures are followed.
   b) Verify that specified hot and cold weather procedures are followed.
   c) Inspect all bolts installed in concrete.
   d) Verify specified size, type, spacing, configuration, embedment, and quantity.
   e) Verify proper concrete placement and means have been taken to achieve consolidation around all bolts.
   f) Conventional Testing and Inspection Requirements

E. Section 042000 - Masonry
1. General
   a. Special inspection of masonry is required during preparation of masonry wall prisms or test specimens, sampling and placing of masonry units, placement of structural reinforcement, cleanout of grout space immediately prior to closing of elements, and during all grouting operations.

b. Inspections noted below as being periodic shall be performed at least once per 500 square feet, except 100% of shear walls, masonry beams, and masonry columns shall be inspected.

2. Definitions
   a. Refer to PART 1 for standard definitions.
   b. Special Inspector - Technical
      1) Technical I Technician shall be under the direct supervision of a Technical III regularly engaged in testing and inspection of this type of work. The licensed engineer shall review and approve all inspection reports.
      2) Technical II Graduate civil/structural engineer, with experience in this type of work. Supervised by a Technical III. The licensed engineer shall review and approve all inspection reports.
      3) Technical III A civil/structural engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.
   c. Special Inspector - Structural
      1) Structural I Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
      2) Structural II Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
      3) Special Inspector - Structural may be an employee of the SER.
3. Structural Testing and Special Inspection Requirements – Level 1
   a. Samples and Tests for Special Inspections
      1) Masonry Unit Test – shall be performed in accordance with IBC Section 2105, as follows:
         a) Units conform to ASTM C 55 or ASTM C 90.
         b) Test units according to ASTM C 140 prior to the start of construction.
         c) During construction one set of tests for each 5,000 SF of wall area, but not less than on set for the project.
      2) Prism Tests - number and frequency in accordance with SER should indicate which wall types IBC Section 2105, as follows: require testing.
         a) A set of 3 masonry prisms for each masonry type requiring testing, shall be built and tested in accordance with ASTM C1314 prior to the start of construction.
         b) During construction a set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 for each 5,000

SF of wall area in question, but not less than one set of 3 masonry prisms for the project.

c) The compressive strength of masonry determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed specified f'm.

3) Preparation, storage, handling of prism tests. (Contractor shall provide labor and materials to construct all prism tests.)

b. Masonry Preparation and Placement
   1) Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
   2) Condition of Units: On a periodic basis, verify that masonry units are clean and sound and dry.
   3) Proportions of site-prepared mortar: On a periodic basis, verify proportions of prepared mortar are consistent with previously submitted materials.
   4) Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.
   5) Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.
   6) On a periodic basis, verify hot and cold weather procedures are followed.
   7) On a periodic basis, verify wall cavities are protected against entry of precipitation.

c. Masonry Reinforcement:
   1) Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls, and positioning of steel.
   2) Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls, and alignment.
   3) Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
   4) Dowels and Anchors: On a periodic basis, inspect the installation of masonry anchor bolts, joist anchors, inserts, straps, and dowels.
   5) Prior to Masonry Grouting and Capping
   6) Grout Spaces: On a periodic basis, verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.

7) Reinforcement: On a periodic basis, verify placement of reinforcement and connectors remains consistent with construction documents.
8) Site Prepared Grout: On a periodic basis, verify proportions of site prepared grout are consistent with previously submitted materials.

d. During Grouting Operations
1) Grouting: On a periodic basis, verify proper grouting technique including consolidation to approved height of grout space, reconsolidation and vibration.
2) Dry Packing: On a periodic basis, verify proper application of dry packing.

e. General Compliance
1) On a periodic basis, verify that work is being performed in accordance with the contract documents and the approved submittals and that materials used are consistent with prior submittals.

4. Structural Testing and Special Inspection Requirements – Level 2
a. Samples and Tests for Special Inspections
1) Masonry Unit Test – shall be performed in accordance with IBC Section 2105, as follows:
a) Units conform to ASTM C 55 or ASTM C 90.
b) Test units according to ASTM C 140 prior to the start of construction.
c) During construction one set of tests for each 5,000 SF of wall area, but not less than on set for the project.
2) Prism Tests - number and frequency in accordance with SER should indicate which wall types IBC Section 2105, as follows: require testing.
a) A set of 3 masonry prisms for each masonry type requiring testing, shall be built and tested in accordance with ASTM C1314 prior to the start of construction.
b) During construction a set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 for each 5,000 SF of wall area in question, but not less than one set of 3 masonry prisms for the project.
c) The compressive strength of masonry determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed specified f'm.
3) Preparation, storage, handling of prism tests.

b. Masonry Preparation and Placement
1) Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
2) Condition of Units: On a periodic basis, verify that masonry units are clean and sound and dry.
3) Proportions of prepared mortar

4) Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.
5) Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.
6) On a periodic basis, verify hot and cold weather procedures are followed.
7) On a periodic basis, verify wall cavities are protected against entry of precipitation.

c. Masonry Reinforcement:
1) Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls, and positioning of steel.
2) Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls, and alignment.
3) Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
4) Dowels and Anchors: Inspect the installation of all masonry anchor bolts, joist anchors, inserts, straps, and dowels. Continuous

d. Prior to Masonry Grouting and Capping
1) Grout Spaces: Verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.
2) Reinforcement: Verify placement of reinforcement and connectors remains consistent with construction documents.
3) Site Prepared Grout: Verify proportions of site prepared grout are consistent with previously submitted materials.

e. During Grouting Operations
1) Grouting: On a periodic basis, verify proper grouting technique including consolidation to approved height of grout space, reconsolidation and vibration.
2) Dry Packing: On a periodic basis, verify proper application of dry packing.

f. General Compliance
1) On a periodic basis, verify that work is being performed in accordance with the contract documents and the approved submittals and that materials used are consistent with prior submittals.

5. Conventional Testing and Inspection Requirements
a. Not Used.

F. Section 051000 - Structural Steel
   1. General
      a. If special inspection of fabricators work is required, testing agent may test and inspect structural steel at plant before shipment. Owner and SER reserve right to reject material not complying with Contract Documents at any time before final acceptance.
   2. Definitions
      a. Refer to PART 1 for standard definitions.
      b. A.S.N.T: The American Society for Non-destructive Testing.
      c. N.D.E.: Non-destructive Evaluation.
      d. A.W.S./C.A.W.I. : American Welding Society/Certified Associate Weld Inspector.
      e. A.W.S./C.W.I. American Welding Society/Certified Weld Inspector.
      f. R.C.S.C Research Council On Structural Connections
      g. Special Inspector – Technical Shall be employed by a testing agency and shall be supervised by an A.W.S./C.W.I. with a minimum of 10 years experience or an A.S.N.T. Level III with a minimum of 10 years experience. These individuals shall satisfy the following requirements:
         1) Technical I Non-destructive Testing Technician S.N.T.-TC-1A Level I, and/or A.W.S. Certified Associate Weld Inspector (C.A.W.I.)
         2) Technical II Non-destructive Testing Technician A.S.N.T. TC-1A Level II, (NDE Technician II), A.W.S./C.A.W.I., with minimum 3 years experience, or an A.W.S./C.W.I.
         3) Technical III A.S.N.T. Level III with a minimum of 10 years experience or an A.W.S./C.W.I. with a minimum of 10 years experience.
      h. Special Inspector -Structural
         1) Structural I Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
         2) Structural II Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
         3) Special Inspectors - Structural may be an employee of the SER.
   3. Structural Testing and Special Inspection Requirements
      a. High Strength Bolting (Field Installed):
         1) General
            a) On a periodic basis, visually inspect mating surfaces and bolt type for all slip-critical bolted connections for general conformance with the contract documents prior to bolting.
            b) Determine the requirements for bolts, nuts, washers, paint and installation/tightening standards are met.

c) Observe calibration procedures when such procedures are required in the contract documents and verify that selected procedure is used to tighten bolts.

2) Slip Critical Bolts and Tension Bolts
   a) Test bolt tightening in 10% of all bolts. Test a minimum of two bolts in each connection. Verify that all plies of connected elements have been brought into contact, at 100% of connections. Verify all tips are removed from "twist"-off bolts.
3) Bearing Bolts
   a) On a periodic basis, visually inspect to confirm all plies of connected elements have been brought into contact, at 100% of connections. (Applies only to bolts designed for values not requiring exclusion of threads from failure plane, all other bolts require testing as for tension bolts.)
4) Standard
   a) Test High Strength bolted connections per R.C.S.C. "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."

b. High Strength Bolting (Shop Installed):
   1) For shop fabricated work, perform tests required for field installation, except that bolt testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, or is approved by building official and SER.

c. Welding (General): The Special Inspector shall perform the following on a periodic basis:
   1) Prior to start of fabrication determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
   2) Verify qualifications of all welders as AWS certified.
   3) Verify Manufacturer’s certificate of compliance for weld filler materials.
   4) Verify proposed welding procedures and materials.
   5) Verify adequate preparation of faying surfaces.
   6) Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required.

d. Welding (Field):
   1) Fillet Welds: On a periodic basis, visually inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1.
   2) Partial Penetration Welds: Test 100% of all partial penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1. Test 25% of all partial penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld.

3) Full Penetration Welds: Test 100% of all full penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1 Test 25% of all full penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld.
4) Stud Shear Connector Welds: Visually inspect 100% of installed studs for full 360° flash. Test all questionable studs, not showing full 360° flash by bending studs to 15° from vertical, away from weld discontinuity, per AWS D1.1. All ceramic welding ferrules shall be removed by contractor. Randomly test all other studs by bending to 15° from vertical as noted:
    a) Studs welded thru deck 15%
    b) Studs welded to bare steel 5% Alternatively, sound 100% of installed studs, for full penetration weld, using an 8 lb. maul. Test questionable studs as noted above. Welding ferrules need not be removed.
5) Steel Joist/Joist Girder Welds: Provide testing and inspection for field welds previously described.
6) Deck Welds: On a periodic basis, visually inspect size, location, length and burn thru for 100% of puddle welds on metal deck designed as a structural element, per AWS D1.3.
7) Cold Formed Metal Framing Welds: On a periodic basis, visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element.
8) Welding of Reinforcing Bars: Visually inspect 100% of all reinforcing bar welds as the welding is performed, per AWS D1.4.
    a) Verify weldability of reinforcing steel other than ASTM A706.
    b) Verify proper joint preparation is provided and proper electrodes are used and properly stored and dried. Technical II
9) Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.

e. Welding (Shop):
    1) Perform inspections as for field welding except weld testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, and is approved by building official and SER.
f. Mechanical Fasteners (Misc.):
    1) Fasteners: Visually inspect specified size, spacing, embedment, and location.
g. Structural Configuration:

1) Submittals: Verify mill test reports and other submitted documentation, for compliance with contract document. Structural I
2) Materials: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:
    a) Structural Steel
    b) Bolts
    c) Electrodes
    d) Mechanical fasteners
    e) Deck gauge Technical I
3) Detail Compatibility. On a periodic basis:
    a) Review project documents affecting integrity of the structure, including contract documents and pertinent submittals (approved shop drawings).
    b) Visit site, at intervals appropriate to the stage of construction, to perform review of the structure and visually confirm general compliance with the project documents.
    c) Inspect the following to verify member orientation, configuration, type, and size complies with details indicated on the contract documents an approved shop drawings: -Bracing and stiffening members. -Proper applications of joint details at connections for structural members. -Other work critical to the integrity of the building structure.

4. Conventional Testing and Inspection Requirements
    a. High Strength Bolting
        1) Bolt Material Test: Test a minimum of two bolts of each ASTM class specified, for bolt hardness and tensile properties. SNT-TC-1A
        2) Fabrication and Erection Tolerances Verify in-place structure satisfies specified tolerances.

G. Section 072500 - Spray Applied Fire-resistive material
1. General
    a. Testing agency shall be familiar with the requirements and testing methods required in IBC Standards and with approved UL assembly requirements.
2. Definitions
    a. Refer to PART 1 for standard definitions.
    b. Special Inspector – Technical Shall be supervised by an engineer licensed to practice in the state where the work is performed. Inspector shall be acceptable to the building official, the Owner and the SER and shall satisfy the following minimum requirements:
        1) Technical I Shall be familiar with the interpretation and use of IBC Standard 7-6, and have prior field experience in testing and inspection of spray-applied Fire-resistive material.
3. Structural Testing and Special Inspection Requirements

a. Spray Applied Fire-resistive material
    1) Procedures and Preparation Verity substrates to receive Fire-resistive material are prepared in accordance with manufacturer's instructions and are free of materials which may prevent adequate adhesion. Inspect batching to comply with manufacturer's requirements for first 3,000 s.f. applied.
    2) Thickness Test thickness of applied Fire-resistive material as per ASTM E605.
    3) Density Test density per ASTM E605.
    4) Bond Strength Test bond strength of cured fire-resistant material per ASTM E 736.

4. Conventional Testing and Inspection Requirements
    a. Not used.

END OF SECTION 01 45 33

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Temporary elevator usage.
9. Temporary stairs.
10. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.

3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.
8. Fire protection.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Architect and shall be included in the Contract Sum.

B. Water Service: Use water from Owner's existing water system without metering and without payment of use charges.

C. Electric Power Service: Use electric power from Owner's existing system without metering and without payment of use charges.

1.5 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 7 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Pavement: Comply with Division 2 Section "Hot-Mix Asphalt Paving."

C. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

D. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

E. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry.

F. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

H. Paint: Comply with requirements in Division 9 Section "Painting."

I. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

J. Water: Potable.

2.2 EQUIPMENT

A. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

B. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

C. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

D. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

F. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work in conjunction with Construction Implementation Plan submitted to the Owner and Owner's Representative by the Contractor for approval. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company and Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

B. Sewers and Drainage: Provide temporary connections to remove effluent that can be discharged lawfully.

1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.

C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Contractor shall provide temporary water to the new building for use by all Contractors and will take precautions against freezing; leakage and damage caused by the water supply system.
2. Contractor requiring water service shall provide rubber hoses as necessary.
3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
4. Contractors shall avoid the waste of water, and shall be responsible for any damages caused by their use of water during construction.
5. Contractor shall provide temporary connections where needed to permit Owner to maintain service at all times.

D. Sanitary Facilities: Contractor to provide and maintain temporary port-o-sans toilets.

E. Heating, Cooling, and Ventilation: Heating, cooling, and ventilation for temporary use must be provided by the Contractor as required for the duration of the Project. After receiving approval from the owner and/or Owner’s Representative, it may be obtained through the existing building system. Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

Damages to the existing heating system caused by the Contractor shall be repaired by him at no cost to the Owner.

1. The following conditions shall be maintained:

a. During the placing, setting, and/or curing of interior carpentry, furring, spackle, and drywall, an ambient temperature of 60 degrees F shall be maintained, and such temperature shall be maintained 48 hours before, during and 48 hours after installation in each space where such covering is required.

b. During the placing, setting and curing of all concrete, an ambient temperature of 50 degrees F shall be maintained in the area involved.

c. Except as noted above, all areas in which work is in progress, shall be maintained at 45 degrees F during working hours.

d. Where finished Work has been installed maintain at 65 deg F for finishing activities and areas.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Temporary electric light and power is to be provided by the Contractor. It shall be set up so that light and power is available 24 hours per day throughout the project.

Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

1. Install power distribution wiring overhead and rise vertically where least exposed to damage.
2. Connect temporary service to Owner's existing power source, as directed by electric company officials.
3. The Contractor shall provide temporary connections where needed to permit the Owner to maintain service at all times.
4. Temporary relocations of interior exit signs in existing building shall be performed by the Contractor at no additional cost to the Owner.
5. All trade trailers shall be powered by the contractor requiring same.

H. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

I. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

2. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
3. Provide metal conduit enclosures or boxes for wiring devices.
4. Provide WP and GFI receptacles in all exterior or wet locations.

J. Lighting: Temporary lighting shall be based on 1 watt per square foot covering each and every square foot of floor area in the building. Sufficient wiring, lamps, and outlets shall be installed to insure proper lighting. The minimum lamp size shall be 75 watts. All temporary lighting shall be removed upon completion of work or at direction of Architect or Owner's Representative.

K. Telephone Service: Provide temporary coin operated telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.

1. At the telephone, post a list of important telephone numbers.

2. Install a coin-operated telephone station at a convenient grade-level location for convenience of personnel.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas as indicated on Drawings.

1. Provide a reasonably level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
2. Provide gravel paving course of subbase material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
3. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 2 Section "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 2 Section "Hot-Mix Asphalt Paving."

D. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

E. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
3. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Prepare Project identification and other signs as required by the Owner or the Owner's Representative. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

Upon complete of the project, or as may be directed by the Architect, signs, framing, supports and foundation shall be removed from the project site.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

H. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere onsite.

I. Temporary Elevator Usage: Refer to Division 14 Sections for temporary use of new elevators.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Site Safety Signage: The Contractor shall be responsible for installing and maintaining all site safety signage as needed. Additionally, install signage on the entrance gate indicating the following: "Construction Entrance Only", "No Smoking Permitted - $1,000 Fine", "Hard Hat Area", "No Deliveries Between 8:00 and (:30 a.m. and between 2:30 and 3:30 p.m." and signage as required by the Construction Implementation Plan.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

C. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

E. Tree and Plant Protection: Comply with requirements in Division 2 Section "Tree Protection and Trimming."

F. Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest-control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Engage this pest-control service to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence:

1. The Contractor shall maintain all temporary construction fencing required on the Construction Implementation Plan including gates, chains and padlocks, and shall maintain security by limiting number of keys for all trades, and restricting distribution to authorized personnel including Architect and Owner's Representative. Contractor shall provide Owner with one set of keys.

H. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

I. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- thick exterior plywood.

J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.

K. Temporary Partitions: The Contractor shall erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 4-inch studs, 5/8-inch gypsum wallboard with joints taped and painted on occupied side, and 1/2-inch fire-retardant plywood on construction side.
2. Construct dustproof, floor-to-ceiling partitions of not less than nominal 4-inch studs, 2 layers of 3-mil polyethylene sheets, inside and outside temporary enclosure. Cover floor with 2 layers of 3-mil polyethylene sheets, extending sheets 18 inches up the side walls. Overlap and tape full length of joints. Cover floor with 3/4-inch fire-retardant plywood.

    a. Construct a vestibule and airlock at each entrance to temporary enclosure with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weatherstrip openings.
7. On the exterior, site shall be watered down frequently to prevent dust from rising. Streets shall be maintained clean at the Owner's Representative's request.

L. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.

a. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

M. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Temporary Facility Changeover: Except for using permanent fire protection as soon as it is available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00

PRODUCT and SUBSTITUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products and substitutions made after award of the Contract.

B. Related Sections include the following:
1. Division 1 Section "References" for applicable industry standards for products specified.
2. Division 1 Section “Submittals” for requirements for submitting the Contractor’s Construction Schedule and the Submittal Schedule.
3. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.

1.3 DEFINITIONS

A. Measurement: All drawings, details, and all product information shall use the “British” measurement system (feet and inches). Submittals based on the Metric System shall be rejected.

B. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials

are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

C. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to the Contract Documents requested by the Owner or Architect.
3. The Contractor’s determination of and compliance with governing regulations and orders issued by governing authorities.

D. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

E. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

F. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.

g. Projected delivery date or time span of delivery period.
h. Identification of items that require early submittal approval for scheduled delivery date.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.

   a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Architect's Action: Architect will respond in writing to Contractor within two weeks of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Submit requests in the form and according to procedures required for change-order proposals.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   g. A statement indicating the substitution’s effect on the Contractor’s Construction Schedule compared to the schedule witho9ut approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
   h. Cost information, including a proposal of change, if any, in the Contract Sum.

i. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
j. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor through Owner's Representative of acceptance or rejection of proposed substitution within two weeks of receipt of request, or one week of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Where manufactured articles, materials and equipment are specified, but specific installation instructions are not included they shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's latest printed instructions.

C. The Contractor is required to maintain at the job site the current edition of such printed instructions. Where such directions are at variance with the specifications the Contractor shall require clarification from the Architect

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 2 through End of Specifications for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
2. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 60 days after commencement of the Work Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is timely, fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.

8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
11. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
12. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
13. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
14. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that he substitution will overcome the incompatibility.
15. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
16. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval of that substitution.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents; that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

2.4. PRODUCT ACCEPTANCE STANDARDS

A. Where the words "or acceptable equal" or other synonymous terms are used, it is expressly understood that they shall mean that the acceptance of any such submission is vested in the Architect, whose decision shall be final and binding upon all concerned. All submissions are subject to such review.

B. The intent of this article is to encourage and permit competition on qualified products by reputable and qualified suppliers and manufacturers, whose products, reputation and performance warrant approval for the conditions, intent of design and performance considerations.

C. Whenever a product is specified in accordance with Federal ASTM Designation, American National Standards Institute or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. Where necessary and requested substantiate compliance.

D. Whenever any product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names or similar references, such reference is intended to establish the measure of quality which the Architect has determined as requisite and necessary for the project. The right is reserved to approve or disapprove proposed deviations of design, function, construction or similar differences which will affect the design intent. The Architect shall have the right to reject any substitutions of submission of materials not manufactured in the U.S.A. or which have not been used successfully in the Architect's opinion for five years in this area. This also applies to acceptance of non-specified products.

E. Acceptance of Non-Specified Products

(1) For acceptance of products other than those specified, the Contractor shall submit a request, in writing, to the Architect and Owner. The request shall clearly define and describe the product for which approval is requested. Requests shall be accompanied by manufacturer's literature, specifications, drawings, cuts, performance data, list of reference or other information necessary to completely describe the item.

(2) The Contractor shall submit to the Owner for review two (2) copies of a complete list of suppliers, materials and equipment he proposes for use in connection with this project.

(3) Substitution of products will be considered only under the following conditions:

(a). The Contractor shall place orders for specified materials and equipment promptly. No excuse or proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed ten (10) days after approval by the Architect of the item listed in the specifications.

(b). The reason for the unavailability is beyond the control of the Contractor. Unavailability will be construed as being due to strikes, lockouts, bankruptcy, discontinuance of the manufacture of a product, or Acts of God.

(c). Requests for such substitution shall be made in writing to the Architect within ten (10) days of date that the Contractor ascertains he cannot obtain the material or equipment specified.

(d). Request shall be accompanied by a complete description of material or equipment which the Contractor wishes to use as a substitute as described above.

(f). After any material or piece of equipment has been accepted, no change in brand or make will be permitted unless satisfactory written evidence is presented and approved by the Architect that the manufacturer cannot make scheduled delivery of approved material, or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicate that the approval of such other material is in the best interest of the Owner.

(g). For any item or items which the Owner may have pre-purchased before the start of the work because of excessive lead time required for such items, it will be the Contractor's responsibility to receive, store and install such items purchased by the Owner.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 70 00

EXECUTION REQUIREMENTS CHECK AGAINST CONTRACT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related documents include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section "Submittal Procedures" for submitting surveys.
3. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
4. Division 1 Section "Closeout Procedures" final cleaning.

1.3 SUBMITTALS

A. Qualification Data: For land surveyor 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.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

D. Certified Surveys: Submit two copies signed by land surveyor.

E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Location of Apparatus: the location of apparatus, equipment, fixtures, piping outlets, etc., shown or specified but not specifically dimensioned shall be considered as only approximate. The actual location shall be as directed and as required to suit the conditions at the time of installation. Before installation, the Contractor shall consult the Architect, and ascertain the actual location required. He shall also consult with other trade Contractors and examine their drawings so as to avoid conflicts with other work and apparatus.

B. Measurements: Verify dimensions and measurements of the site and be responsible for the correctness of them. No extra charges or compensation will be allowed on account of difference between actual dimensions and measurements indicated on drawings; any

difference found shall be submitted to the Architect in sufficient time for his consideration and direction before proceeding with the work involved

1. It is the duty of the Contractor to take his own measurements of the work and be responsible for same.

2. The Contractor shall thoroughly examine the drawings and specifications, carefully checking the figured dimensions, before commencing work, and report to the Architect if any discrepancy, error or defect appears, but shall not be held responsible for their existence

C. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

D. General: The Contractor shall engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

E. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

F. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

G. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

H. Certificates: submit a certificate signed by the land surveyor or professional engineer certifying the location and elevation of improvements including the following:
1. Foundation Survey: After completion of foundations, as-built survey shall be submitted prior to continuing with the work.
2. Anchor Bolt Survey: After installation of all column anchor bolts, surveyor shall survey as-built conditions. No steel erection shall proceed until all corrections, if any, are completed.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

L. Care shall be taken by all workmen not to mark, soil, or otherwise deface finished surfaces. In the event that any finished surface becomes defaced in any way by mechanics or workmen, the Contractor responsible shall clean and restore such surfaces to their original condition or replace to the Owner's and Architect's satisfaction.

M. Areas of the building in which painting and finishing work is to be performed shall be cleaned throughout by the Contractor just prior to the start of this work, and these areas shall be maintained in satisfactory condition for painting and finishing as directed by the Architect. This cleaning shall include the removal of trash and rubbish from the area; broom cleaning of floors; the removal of plaster, mortar, dust and other extraneous materials from finish surfaces.

N. In addition to the cleaning specified above and the move specific cleaning which may be required in various sections of the Specifications, the space shall be prepared for occupancy by a thorough cleaning throughout by the Contractor including washing, or cleaning by other approved methods, surfaces on which dirt or dust has collected and by washing glass doors on both sides. Provide and maintain adequate runner strips of non-staining reinforced Kraft building paper on finished floors as required for protection. Equipment shall be left in an undamaged, bright, clean, polished condition.

O. Upon completion of his work, and also when directed, the Contractor shall remove from the building and premises all temporary work, and all rubbish and debris and shall have left the building and the premises in a neat orderly "broom clean" condition.

P. Contractor and all Subcontractors shall cooperate in every possible way to expedite the use and occupancy of the building, and the completion of unfinished items.

3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

2. Work which has become defective, damaged, unsatisfactorily installed, permanently stained, marred, cracked and materials which do not conform to grade of quality required, will be rejected, removed immediately, reset as required with material and methods of like kind and quality to produce satisfactory, complete

work to full satisfaction of the Architect at no additional costs or extension of contract time.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 70 00

SECTION 01 73 10

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. The Contractor shall perform cutting and patching to work in place if necessary.

C. Related Sections include the following:

1. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.
2. Divisions 2 through End of Specification Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

a. Requirements in this Section apply to mechanical and electrical installations. Refer to Mechanical and Electrical Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

A. Cutting: Removal of construction in place which may be necessary to permit installation or performance of other Work or to uncover work requested by the Architect and/or Owner's Representative.

B. Patching: Fitting and repair work required to restore surfaces to the conditions of the original work in place or to the satisfaction of the Architect and/or the Owner's Representative after installation of other Work or after inspections have occurred.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

D. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Proceed with patching after construction operations requiring cutting are complete and Owner’s Representative has given approval to proceed with patching.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 01 73 10

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement for Construction Services (hereinafter referred to as the Contract) and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through end of specification sections.

1.3 QUALITY ASSURANCE

A. Codes: All work shall comply with all state, county and local Building Code and Standards.

B. Personnel: Delegate the responsibility for maintenance of the record documents to one person on the Contractor’s staff.

C. Accuracy of Records: Coordinate all changes in the record documents within 24 hours after having received the reviewed information. Make proper entries on each page of drawings and specifications to accurately record the change.

PREREQUISITES TO SUBSTANTIAL COMPLETION

The commissioning must be complete, except for functional testing and controls training, prior to Substantial Completion, unless approved in writing by the Owner’s Project Manager.

1.4 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   a. The Architect reserves the right to issue a revised punch list. If such a revised punch list is necessary, the Architect will provide a copy to the Owner.
   b. Punch List Distribution: It shall be the contractor's responsibility to reproduce and distribute all necessary copies of any punch list to the various Subcontractors immediately and see that the items requiring correction or completion are given prompt attention.
   c. Completion of Punch List Items: No Certificate of Substantial Completion will be issued by the Architect until corrections required by said punch list are made or the Architect is satisfied that they will be made. See General Conditions for computation of value of uncompleted punch list items which shall be retained
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Shop Drawings Manufacturers' Literature and Test Data: Submit to the Owner, before final acceptance, a copy of all reviewed shop drawings (with all corrections noted), plus sets of all reviewed catalog cuts, equipment manuals, etc. Material shall be indexed to specification section

C. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect and Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

PREREQUISITES TO FUNCTIONAL COMPLETION

A. All TAB work and the commissioning of Division 17 must be complete prior to Functional Completion, unless approved in writing by the Owner's Project Manager. Exceptions to this are the planned control system training performed after occupancy and any required seasonal or approved deferred testing. This includes for all systems, but is not limited to:

1. Completed and signed start-up and prefunctional checklist documentation
2. Requested trend log data
3. Submission of final approved TAB report
4. Completion of all functional testing
5. Required training of Owner personnel completed and approved
6. Submission of the approved O&M manuals
7. All identified deficiencies have been corrected or are approved by the Owner to be excepted from this milestone

B. The Owner's Project Manager will determine the date of Functional Completion after reviewing the Commissioning Agent's recommendation for Functional Completion.

1.5 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit consent of surety to final payment.
5. Submit pest-control final inspection report and warranty.
6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 PROJECT CLOSE-OUT DOCUMENTATION

A. Prior to final payment, the Contractor shall submit to the Architect the following documents in an original and one copy unless otherwise noted:

1. A complete listing of all trade Contractors, business addresses and items supplied by each such trade Contractor.
2. A listing of manufacturers of major materials, equipment and systems installed in the work.
3. Payment of Debts and Claims: Adequate evidence that the Contractor has paid all obligations to date arising out of the contract. Contractor shall submit AIA Document No. G-706 (or other approved form), Contractor's Affidavit of Payment of Debts and claims.
4. Release of Liens: Contractor and Subcontractors shall also submit AIA Document G-706A (or other approved form) Subcontractor's Affidavit of Release of Liens, indicating that the releases for waivers submitted are complete to the best of his knowledge.
5. Certificate of Substantial completion AIA Document G-704.
6. Contractor's one year guarantee. Submit all other guarantees and warranties as outlined in the contract documents.
7. Submit individual Final Waiver's of Lien from subcontractors and suppliers as may be required by the Owner.
8. Final Approvals and Certificates: All final approvals and certificates as required by the specifications, drawings and all applicable codes and regulations.
9. The Contractor shall submit to the architect, before completion of work, and before final payment, a detailed "as built" plan showing locations, elevations, sizes and connections of drainage structure and pipes.
10. Submit a current certificate of insurance.
11. Submit a Punch List Item Letter stating all items have been completed.
12. Turn in site documents (A201:3.11.1), Certificate of Current Insurance (A201:9.10.2), Contractors Guarantee of Insurability (A201:9.10.2), Certification of Wages and Final Application for Payment (AIA G702/703).
13. Turn over to Owner all Procedures manuals and spare parts.
14. A Close-out meeting will be held to review the final documents.
15. As a predecessor to release of "retainage", contractor shall submit all close-out documentation including as-built drawings. No retainage reduction will be permitted until close-out requirements are approved.

1.7 PROJECT RECORD DOCUMENTS

A. General: Prior to the start of construction, the Architect will furnish to each prime contractor a complete set of drawings for the project. These will be marked up with "as built" conditions as noted below. As-builts will be reviewed once a month at a meeting with the Owner's Representative, Architect and contractors. The right to payment will be forfeited for that month if as-builts are not up to date. The purpose of the project drawings (as-built drawings), is to record the actual locations of the work in place including but not limited to underground lines, concealed piping, and ductwork within buildings, concealed valves and control equipment, and to record changes in the work. Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's and Owner's Representative's reference during normal working hours.

B. Record drawings: The Contractor shall keep one reproducible print of all of the Architect's Construction Documents commencing with the original and including all revisions thereto, as the record copies of the drawings from which the Project is constructed shall show on these drawings by marked revisions, any deviations between the work as shown on these drawings and the work as actually installed due to changes it was required to make because of field conditions or conflicts between the work of two or more trades.

The Contactor shall mark up a copy of the "Project Record" with an erasable colored pencil (not ink or indelible pencil) and a "cloud" on back around the areas affected to show:

1. General:
   a. Accepted changes in the work.
   b. Details not shown in the original contract documents.
   c. Accepted change orders.
   d. Relocation of work.
   e. Changes in dimensions.
   f. Changes in floor elevations.
   g. Substitutions: include the updating of all equipment schedule sheets.

2. Mechanical, Plumbing and Electrical:
   a. Location of concealed work.
   b. Designation of all utilities as to the size and use of such utilities.
   c. The location of all utilities including unchanged original design and modifications to the original design:
      - plumbing
      - heating, ventilating, air conditioning
      - electrical assemblies and services
      - appurtenances concealed in building structures
      - access doors

   d. The numbering information necessary to correlate all electrical energy consuming items (or outlets for same) to the panel or switchboard circuits from which they are supplied

3. A set of the final shop drawings will suffice in lieu of marked-up design drawings for the following items:
   a. Duct Work.

b. Sprinkler Piping.
c. Plumbing Piping.
d. Heating Piping.
e. Electrical Service Work

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders, Record Drawings and Product Data, where applicable.

D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.

E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

F. Submittal Procedure: The project record drawings are to be submitted when all the work is completed, and forwarded to the Architect and his consultants for review.

1. Reproducible Drawings: All project record drawings must be submitted in the form of easily reproduced sepia transparencies or other quality reproducible method.

2. Shop Drawings: Project record drawings submitted in the form of Shop Drawings to the Architect shall be keyed into reproducible copies of the Construction Drawings with indications of the applicable shop drawings and other data for complete cross numbers or other data on both shop drawings and construction drawings by indicating the specific areas each shop drawing covers with a key plan and indicating shop drawing number, etc. Size, dimensions, and information indicated on shop drawings need to be duplicated on construction drawings.

3. Material Data: Reviewed catalog cuts, certified performance data for all materials and equipment, etc. shall be indexed by Project Manual Section and submitted to the Architect for review along with the above drawings before final payment.

- Heating and air conditioning equipment
- Plumbing
- Electrical work

1.8 OPERATION AND MAINTENANCE MANUALS

A. Assemble a three (3) complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. These shall include operating equipment and flow diagrams of all systems. Three (3) sets of lubricating charts and manuals for each item or equipment furnished. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

a. Emergency instructions and procedures.
b. System, subsystem, and equipment descriptions, including operating standards.
c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
d. Description of controls and sequence of operations.
e. Piping diagrams.

2. Maintenance Data:

a. Manufacturer's information, including list of spare parts.
b. Name, address, and telephone number of Installer or supplier.
c. Maintenance procedures.
d. Maintenance and service schedules for preventive and routine maintenance.
e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

C. The Contractor shall certify by endorsement thereon, that each for the manuals is complete and accurate. The Contractor shall assemble these manuals for all Sections of the work, review them for completeness prior to submission. The Contractor shall provide suitable transfer cases and deliver the manuals suitably bound, indexed and marked.

1.9 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual. Deliver to the Architect upon completion of all the work under this Contract his written warranty made out to the Owner and in a form satisfactory to the Architect and the Owner, warranting all the work under the contract to be free from faulty materials, and free from improper workmanship. Under the warranty, the contractor shall replace work in accordance with AIA Document A-111 such work as may be found by the Owner to be improper or imperfect and to make good all damage caused to other work or materials by the imperfection or removal and replacement of he imperfect work.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

D. Extended Warranties and Special Warranties

Certain extended warranties by Contractors or maintenance contracts longer than one year's duration are required under various sections of the specifications. At the completion of the work all such warranties or maintenance contracts covering material, workmanship, maintenance , or other items as specified, shall be forwarded in duplicate to the Architect, together with a letter addressed to the Owner giving a summary of each said warranty as follows:

- Character of work covered by warranty
- Name of Contractor furnishing warranty
- Period of warranty
- Condition of warranty

Contractor shall issue four (4) copies of a special written agreement of warranty if called for under Item 1.03 of each specification section. Examples of items requiring a special agreement of warranty include certain equipment.

E. Format:

The warranties shall cover all the work done under this Contract. All subcontractor warranties shall bear the endorsement of the Contractor in writing, as per the following format:

To:

Attention of: Peter Gisolfi Associates

Re: (Work Covered in Warranty) _____

Name of Contractor _____

Address of Contractor _____

Re: _____ (name of project)

Dear

The undersigned warranties to the Owner that he will be responsible for all faulty or defective materials, equipment and workmanship, in the _____ work* and that he will remedy any defects and pay for all damage to other work resulting from his work which shall appear within a period of year(s) from the date of Substantial Completion as defined in the Contract Documents.

(Add additional conditions of warranty as noted in various technical sections of the Specifications.)

During the warranty period, upon written notice from Owner, the undersigned shall proceed with due diligence at the undersigned's sole expense to remove and replace properly any defective materials and equipment or perform any labor necessary to correct any such defect in the above. In case that the undersigned fails to remedy such defects, than the Owner may furnish such materials and equipment or labor as are necessary to correct the work, and the undersigned agrees to reimburse the Owner for any expense therefore promptly and fully.

Witness: Signed:** _____

Date: Signed:** _____

* (the contractor shall insert "all of the work as that term is defined in the Contract Documents")

** Signatures must be notarized.

Contractor - endorsement of above warranty.

Date: Signed:** _____

F. Cost:

Contractor warranties shall provide for the correction of work performed without additional charge. Any additional expense or damage resulting from imperfect work or the removal or replacement of imperfect work shall also be covered by the Contractor warranty.

1.10 Final Payment Requirements:

Before final payment may be authorized, the following submittals must be complete, updated and on file:

1. Progress Payment Certificate
2. Change Orders
3. As-Built (Record) Drawings
4. Substantial Completion Items List
5. Statement of Satisfactory Completion
6. Warranties

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Upon completion of the work and at a time designated a competent engineer or factory representative shall be provided for a sufficient period to instruct representative of the Owner in the operation and maintenance of each piece of equipment and of each system as a whole. Such period shall not exceed five (5) days for the work of each Section of the Specification.

B. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.
2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner, through Owner’s Representative, with at least seven days' advance notice.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

C. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. 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.

D. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

E. Operational instructions must be videotaped.

3.2 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and anti-pollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.
r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 81 19
CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:

1. Requirements for the development of a Construction Indoor Air Quality Management Plan (alternately referred to as the IAQ Plan or the Plan).
2. Requirements for the preparation, storage and installation sequence of absorptive and emitting materials.
3. Requirements for use of filtration media during construction.
4. Requirements for completing IAQ Testing.
5. Requirements for completing a building flushout.

B. Related Sections
1. Section 01 81 23 - Volatile Organic Compound Limits.

C. Owner's Project Requirements:

1. Minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities.
2. Minimize factors that contaminate indoor air, such as: dust entering HVAC systems and ductwork, improper storage of materials on-site, poor housekeeping, shall be minimized.

1.3 REFERENCES

A. Abbreviations and Acronyms

1. SMACNA - The Sheet Metal and Air Conditioner National Contractors Association.
2. ASHRAE - The American Society of Heating, Refrigerating and Air-Conditioning Engineers.
3. ANSI – American National Standards Institute.
4. EPA – U.S. Environmental Protection Agency.
5. GBCI – Green Building Certification Institute.
6. IAQ – Indoor Air Quality.
7. LEED – Leadership in Energy and Environmental Design.
8. MERV – Minimum Efficiency Reporting Value.
9. USGBC – United States Green Building Council.
10. VOC – Volatile Organic Compound.

B. Definitions

1. Type 1 Materials: Materials and finishes that act as sources of VOC, formaldehyde, particulate contamination or other air-borne compounds. Type 1 materials can include "wet" products, such as paints, sealants, adhesives, caulks, sealers and fireproofing materials as well as “dry” products such flooring coverings with plasticizers, and engineered wood with formaldehyde. These materials are ‘emitting’ materials.
2. Type 2 Materials: Materials and finishes which are woven, fibrous, or porous in nature, and tend to absorb chemicals or particulates released by Type 1 materials. Examples include textiles, carpeting, acoustical ceiling tiles and gypsum board. Type 2 materials can become "sinks" for deleterious substances which may be released much later, or collectors of contaminants that may promote subsequent bacterial growth. These materials are ‘absorptive’ materials.
3. MERV: Filtration efficiency rating as determined by ASHRAE 52.2-1999.

C. Reference Standards:

1. SMACNA IAQ guidelines for Occupied Buildings under Construction, Second Edition 2007, ANSI/SMACNA 008-2008.
2. ANSI / ASHRAE 52.2-1999, “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size”.
3. EPA “Compendium of Methods for the Determination of Air Pollutants in Indoor Air”
4. United States Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEEDTM) Green Building Rating System, LEED 3.0 for New Construction.

1.4 INFORMATIONAL SUBMITTALS

A. Construction IAQ Management Plan:

1. Submit a draft IAQ Management Plan at a date to be determined by the Owner.
2. Summary of criteria to be included in the IAQ Management Plan:

a. Meet or exceed the standards included in the “IAQ Guidelines for Occupied Buildings under Construction”, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
b. Plan the sequence of installation of materials so that absorptive materials are protected from moisture damage when stored on-site and after installation according to the Sequence of Finish Installation Plan.
c. Include a Sequence of Finish Installation Plan highlighting measures to reduce the absorption of VOCs by materials that act as ‘sinks’.
d. Plan that filtration used on air handling equipment during construction and immediately prior to occupancy meet the requirements by Code/EPA/ASHRAE.
e. Plan the activities to occur immediately prior to occupancy those are required for a building outside air flush out and/or the performance pre-occupancy IAQ testing.

3. Refer to Detailed Requirements for IAQ management (3.04 of this Section).

B. Construction schedule outlining the start-up date and expected duration of all Construction IAQ Management control measures.

C. Schedule of operation of air handling units to be used during construction with manufacturer's cuts of the minimum MERV 8 filtration to be used.

D. Schedule of proposed activities:

1. For Building Flushout (for each air-handling unit or ventilation system):

a. Area of space served.
b. Volume of outside air to be delivered.
c. Volume of outside air required.
d. Start and end date of flushout.
e. Indoor temperature ranges that will be maintained.

2. For IAQ Testing (for each air-handling unit or ventilation system):

a. Proposed test equipment to be used.
b. Diagrams of proposed test locations.
c. Coordinated construction and testing schedule demonstrating that sufficient time has been allocated for the test activities.

E. A construction log identifying the start-up date and duration of all major IAQ Management Plan control measures, including:

1. Operation of HVAC equipment.
2. Filtration installation and replacement.
3. Building flush-out activities.
4. IAQ testing activities.

1.5 CLOSEOUT SUBMITTALS

A. Closeout Submittals are to be made at a date following substantial completion to be determined by the Owner.

B. A copy of the final Construction IAQ Report.

PART 2 - PRODUCTS

2.1 FILTRATION MEDIA

A. Minimum MERV 8 filtration (as approved by the mechanical engineer) when air-handling units are used during construction.

PART 3 - EXECUTION

3.1 IMPLEMENTATION AND COORDINATION:

A. Designate one individual as Construction IAQ Representative to:

1. Regularly visit the site and monitor the IAQ.

2. Communicate the progress of the IAQ to the Owner and Architect on regular basis.

B. Coordinate the IAQ requirements with all affected sub-contractors and trades.

C. Ensure that trades and sub-contractors are responsible for the implementation of specific control measures as indicated in the IAQ Plan.

D. It is the responsibility of the Contractor to establish a construction schedule which allows sufficient time for IAQ measures (including building flush-out and IAQ testing).

3.2 INSTALLATION OF FILTRATION:

A. During Construction (if air handlers are used during construction):

1. Install minimum MERV 8 filtration media at:

a. The ends of return air ductwork.
b. At air return grills (in an open plenum or chase).
c. At return air openings at mechanical rooms housing air-handling units.

2. Replace all filtration media immediately prior to occupancy.

B. For areas in which a Building Flushout is implemented:

1. Install new filtration immediately prior to the beginning of the flushout.
2. At the completion of the Building Flushout inspect the condition of the filtration and replace any the have collected significant dust and particulates through the flushout process.

C. Replace filtration media with new filtration media (per MERV rating approval by Mechanical Engineer) immediately prior to occupancy for each air-handing unit that was used during construction replace.

3.3 CONSTRUCTION IAQ MANAGEMENT – DETAILED REQUIREMENTS

A. General:

1. Follow the SMACNA Guidelines, as stated in Chapter 3 of the referenced “IAQ Guidelines for Occupied Buildings Under Construction”.
2. Outline IAQ measures in six categories as listed in below in 3.04.B. of this Section.
3. Organize in accordance with the SMACNA format.
4. Address measures to be implemented by the in each of the six categories (including subsections).
5. List all six categories and their subsections in the Plan; list as ‘Not Applicable’ items that do not apply to this project.

B. SMACNA Categories of IAQ Measures:

1. HVAC Protection:

a. Return Side.
b. Plenum Protection.

c. Supply Side.
d. Central Filtration.
e. HVAC Scheduling.
f. Equipment Cleaning.
g. Establishing Pressurization.

2. Source Control:

a. Product Substitution.
b. Modifying Equipment Operation.
c. Changing Work Practices.
d. Local Exhaust.
e. Air Cleaning.
f. Cover or Seal.

3. Pathway Interruption:

a. Depressurize Work Area.
b. Pressurize Occupied Space.
c. Erect Barriers to Contain Construction Areas.
d. Relocate Pollutant Sources.
e. Temporarily Seal the Building.

4. Housekeeping:

a. Routine Jobsite Cleaning.
b. Protection of Stored Materials.
c. Protection of Materials During and After Installation.

5. Schedule - Airing Out of New Materials:

a. Airing Out of New Materials.
b. Sequencing of Finish Applications.
c. Proper Curing of Concrete before Covering.
d. Installation During Unoccupied Hours.

6. Occupant Relocation:

a. Avoidance of Building Occupancy While Pollutants Are Present.
b. Economical and Effective Control Measures.

C. Requirements for Protection of Materials from Moisture Damage:

1. Establish measures to prevent installed materials or materials stored on site from moisture damage and dampness.
2. Establish measures to be taken if moisture damage does occur to Type 2 (absorptive) materials.

D. Requirements for Housekeeping:

1. Institute a regular housekeeping schedule. Select cleaning measures and frequency according to the pollutants generated in a space.

2. Where applicable, suppress dust by the use of low-odor wetting agents and sweeping compounds.
3. Use low-odor cleaning agents.
4. Clean up spills of water or solvent immediately.
5. Regularly clean hidden or hard-to-reach surfaces, such as wall cavities, tops of door, ledges, and behind water closets.

E. Requirements for Airing Out of Materials:

1. Remove carpet and carpet tiles from their packaging 24 to 72 hours prior to their installation and store in unoccupied ventilated areas (100% outside air supply, minimum of 1.5 air changes per hour, and no recirculation), away from acoustical ceiling tiles (and away from spaces where ceiling tiles have been installed).
2. Store carpeting according to manufacturer's recommendations for allowable temperature and humidity range.
3. Do not store carpeting with materials having high emissions of VOCs or other contaminants. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
4. Install finishes over concrete slabs and toppings (stone flooring at the lobby, VCT at back-of-house areas, miscellaneous carpet, paints or sealers) according to the manufacturer's instructions regarding the appropriate condition of the concrete slab.
5. Air out millwork unwrapped off site for a period of at least 3 days prior to delivery.

F. Requirements for Installation and Replacement of Filtration Media:

1. Provide a description of the filtration media in all ventilation equipment under the HVAC Protection section of the Plan.
2. Include a description of the replacement criteria for filtration media during construction
3. Provide confirmation of filtration media replacement for all equipment immediately prior to occupancy.
4. Require that filtration media meet the requirements of Item 2.01 (Filtration Media) of this Section.

G. Requirements for Sequence of Finish Installation for Materials:

1. Include a list of the Type 1 and Type 2 materials specified for the project.
2. Establish a Sequencing Plan to install Type 2 (absorptive) materials after the installation of Type 1 (emitting) materials where feasible.

H. Post Construction and Pre-Occupancy Indoor Air Quality Measures: Include in the Indoor Air Quality Management Plan strategies for completing one of the following options for each area served by a separate ventilation system or air-handling unit. A combination of the two options is allowable, but use only one of the options for each separate ventilation system or air-handling unit.

1. Air Flushout. Refer to 3.5.B in this Section for details.
2. Air Quality Testing. Refer to 3.5.C in this Section for details.

I. Non-Adherence: Include provisions in the Construction IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to rectify non-compliant conditions.

3.4 FLUSHOUT OR TESTING REQUIREMENT:

A. Comply with one of the following strategies:

1. Meet the Building Flush-out requirements for the entire Project.
2. Meet the IAQ Testing requirements for the entire project.

B. Building Flush-out:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cubic feet. of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of floor area to the space. Following occupancy ventilate occupied spaces at a minimum rate of 0.30 cfm per square foot of outside air or the design minimum outside air rate required, whichever is greater. During each day of the post-occupancy flush-out period begin ventilation a minimum of three hours prior to occupancy and continue during occupancy. Maintain these conditions until a total of 14000 cubic feet per square foot of outside air has been delivered to the space.
3. At the completion of the building flushout, replace the filtration media with new filters, except the filters solely processing outside air.

OR

C. IAQ Testing:

1. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using widely accepted testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air".
2. All interior finishes must be installed, including but not limited to millwork, doors, paint carpet and acoustic tiles. Movable furnishings such as workstations and partitions must be unwrapped and in place.
3. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

    a. Formaldehyde: 27 ppb.
    b. Particulates (PM10): 50 micrograms/cu. m.
    c. Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
    d. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m. This test is only required if carpets or fabrics with styrene butadiene rubber (SBR) latex backing material are installed.
    e. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

4. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat the procedure until all requirements have been met. Retest non-complying building areas from same locations as in the first test.

5. All IAQ tests and retests must be successfully completed prior to the occupation of the space.
6. The number of sampling locations will vary depending on the size of building and number of ventilation systems.
7. For each portion of building served by a separate ventilation system, use a number of sampling points not less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger. Include areas with the least ventilation and greatest presumed source strength.
8. Conduct all air-sample tests as follows:

    a. Prior to occupancy of the area to be tested.
    b. During normal work hours.
    c. With building ventilation system started at the normal daily start time and operated at the minimum outside airflow rate for the occupied mode throughout the duration of the air testing.
    d. With all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.

9. Collect air samples between 3 and 6 feet above the finish floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION

SECTION 02 33 13

UNDERGROUND UTILITY LOCATOR SERVICE

PART 1 GENERAL

1.01 DESCRIPTION

A. Retain an independent utility locator service company with a minimum of five (5) years experience to field locate, mark, and stakeout existing underground utilities and service connections.
   1. Include 24 hours of "locator service" to locate underground utilities.
   2. If required determine the exact location of utilities by hand excavated test pits or through vacuum methods. Support and protect all utilities to remain in place.
   3. Contractor shall field locate, mark, and stakeout underground utilities prior to excavation.
   4. Contractor will be responsible for the location of all utilities within areas of excavation, and all costs associated with the repair of utilities hit/damaged during construction.

1.02 SUBMITTALS

A. Submit detailed experience and qualifications description of underground utility locator service. Experience and qualifications package should include a description of the types of utility locator equipment and experience that can be provided.

1.03 DELIVERABLES

A. At the conclusion of this project, provide three (3) sets of paper and one (1) copy of electronic plans documenting all utilities located and identified. All documentation shall be referenced to existing data (horizontal and vertical) previously established.

1.04 COORDINATION AND SCHEDULING

A. General Location: Within areas of excavations all utilities shall be field located and their locations marked at least one (1) day prior to the performance of the required excavation.

B. Exact Location: The performance of hand excavated test pits or vacuum excavations to determine the utilities exact location shall be performed just prior to performing the work to minimize the time that excavated areas will be exposed to erosive conditions.

C. Coordinate work with the Director's representative to minimize utility disruptions and facility operations. The Director's Representative shall be notified at least three (3) working days prior to performing the work, and should be provided a schedule for the works progression.

PART 2 (Not Used)

PART 3 EXECUTION

3.01 WORK AREAS AND PERFORMANCE

A. The Director's Representative may limit or restrict scheduling of the utility locator service based upon project progress.

END OF SECTION

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

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. Demolition and removal of selected portions of building or structure.

B. Related Requirements:
1. Section 01 10 00 - "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01 50 00 - Temporary Facilities and Controls.
3. Section 01 81 19 - Construction Indoor Air Quality Management.
4. Section 01 73 10 - Cutting and patching procedures.

1.3 DEFINITIONS

A. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Items of interest or value to Owner that may be uncovered during demolition remain the property of Owner. Carefully salvage said items in a manner to prevent damage and promptly return to Owner.

1.5 PRE-DEMOLITION MEETING

A. The Contractor shall conduct a pre-demolition meeting to review the demolition work with all associated trades. The Contractor shall:

1. Discuss the condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

B. The Contractor shall furnish written minutes of the pre-demolition meeting to the Owner and Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The Contractor shall engage a Professional Engineer, licensed in the State of New York to survey condition of structure(s) to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition operations.

B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, the Contractor shall investigate and measure the nature and extent of conflict and promptly submit a written report to the Owner and Architect.

C. Prior to the start of demolition, the Contractor shall call to the attention of the Owner of any damage, cracks or other imperfections in the structure adjacent to the area(s) to be demolished.

D. The Contractor shall establish work and staging areas. The Contractor shall place demolition debris in appropriate containers once they have been size-reduced.

E. The Contractor shall berify that utilities have been disconnected and capped before starting selective demolition operations.

F. The Contractor shall review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

G. The Contractor shall confirm that existing conditions correlate with requirements indicated to determine extent of selective demolition required.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.

2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION - GENERAL REQUIREMENTS

A. **The Contractor is solely responsible for construction safety and shall hold the Owner, Architect and their assigned representatives harmless from litigation and all other legal related situations arising out of his failure to perform this portion of the work.**

B. **The Contractor is solely responsible for demolition operations including, but not limited to, sequence of operations, means, methods, supervision and control. Documentation of any means and methods provided to the Owner and Architect shall be for reference only.**

C. Demolition Plan: Before the Work of this Section is started, prepare a detailed demolition plan. The demolition plan shall include, but not be limited to, detailed outline of intended demolition and disposal procedures. The demolition plan will not relieve the Contractor of complete responsibility for the successful performance of the Work in accordance with all applicable Federal, State, and local codes and restrictions.

D. Demolish and remove existing construction only to the extent required by new construction and as indicated. The Contractor shall

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

1. PART I - 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 specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings
2. Foundation walls
3. Slabs-on-grade
4. Suspended slabs
5. Concrete toppings
6. Building frame members
7. Building walls

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.

1.3. DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4. SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture, signed and sealed by a qualified professional engineer registered in the State of New York, responsible for their preparation. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent

bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Comply with ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures.”

D. Formwork Shop Drawings: Prepared, signed, and sealed by a qualified professional engineer licensed in the State of the Project detailing fabrication, assembly, and support of formwork.

E. Samples: For waterstops and vapor retarder.

F. Welding certificates.

G. Qualification Data: For Installer, manufacturer, and independent testing agency.

H. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor barrier.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

I. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

J. Minutes of preinstallation conference.

1.5. QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. Welding: Qualify procedures and personnel according to NEW YORK STATE Construction Code.

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1. At least 40 days prior to the start of the concrete construction schedule, the contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete construction. The contractor shall send a pre concrete conference agenda to all attendees 20 days prior to the scheduled date of the conference. The contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:

a. Contractor's superintendent
b. Independent testing agency responsible for concrete design mixtures
c. Ready-mix concrete manufacturer
d. Concrete subcontractor – Finishing Foreman
e. Laboratory responsible for field quality control
f. Admixture manufacturer(s)
g. Fiber Reinforcement Manufacturer
h. Concrete pumping equipment manufacturer

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips,

semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor barrier installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection

3. Minutes of the meeting shall be recorded, typed and printed by the contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall also be transmitted to the following for information purposes: Owner's representative Resident engineer Consultant engineer.

4. The minutes shall include a statement by the concrete contractor indicating that the proposed mix design(s), and their placing, consolidating, finishing and curing procedures can produce the concrete quality required by these specifications.

1.6. DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement. Deliver reinforcement in bundles properly tagged showing quantity, grade, and suitable identifications marks to allow checking, sorting, and placing. Store reinforcement under cover on supports above the ground.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2. FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.3. STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.4. REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

C. Mechanical Splices: “Lenton” splices by Erico Products, Inc., or approved equal.

2.5. CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I / II. Supplement with the following:
2. Supplementary Cementitious Materials:

a. Fly Ash: ASTM C 618, Class F may be used up to a maximum of 25% total cementitious content.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120 may be used up to a maximum of 40% of total cementitious content.
c. The exact percentages of supplementary cementitious materials used shall be based on a successful test placement on-site.
d. In mass concrete, more than 2 feet thick, the usage rate may be up to 50% for fly ash and 80% for slag.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 of inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.

C. Lightweight Aggregate: ASTM C 330, 3/4-inch nominal maximum aggregate size.

D. Water: ASTM C 94 and potable.

2.6. ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures. Provide one of the following:

1. “AEA-92 and Air 40” by The Euclid Chemical Co.

2. “Sika Aer” by Sika Corp.
3. MB-VR or MB-AE” by Master Builders Solutions.

B. Chemical Admixtures

1. Water-Reducing Admixture: ASTM C 494, Type A and containing not more than 0.05 percent chloride ions. Provide one of the following:

   a. “Eucon WR 91” by the Euclid Chemical Co.
   b. “Pozzolith 322N” by Master Builders Solutions.
   c. “Plastocrete 160” by Sika Chemical Corp.

2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D and contain not more than 0.05 percent chloride ions. Provide one of the following:

   a. “Eucon NR or Eucon Retarder 75” by The Euclid Chemical Co.
   b. “Pozzolith Retarder” by Master Builders Solutions.
   c. “Plastiment” by Sika Chemical Co.

3. High-Range, Water-Reducing Admixture: ASTM C 494, Type F or Type G and containing not more than 0.05 percent chloride ions. Provide one of the following:

   a. “Eucon 37/ Eucon 1037” or “Plastol Series” by The Euclid Chemical Co.
   b. “Daracem 100 or ADVA Flow” by GCP Applied Technologies.
   c. “Rheobuild 1000” or “Glenium Series” by Master Builders Solutions.

4. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G Provide one of the following products.

   a. “Eucon 537” by The Euclid Chemical Company
   b. “Daracem 100” by GCP Applied Technologies
   c. “Rheobuild 916” by Master Builders Solutions

5. Non-Chloride, Non-Corrosive Accelerating Admixture: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year’s duration) using an acceptable ac-celerated corrosion test method such as that using electrical potential measures. Provide the following products:

   a. “Accelguard 80, 90 or NCA” by The Euclid Chemical Co.

6. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Engineer.

7. Prohibited Admixtures: Calcium chloride thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

8. Calcium Nitrite Corrosion-Inhibiting Admixture: Admixture shall contain Calci-um Nitrite by Weight of Solution: 30% plus or minus 2 percent (where called for in the specifi-cations or on the drawings). Products: Subject to compliance with requirements, provide the following at 3 gal/cy. Provide one of the following:

    a. “Eucon CIA” or” Eucon BCN” by The Euclid Chemical Co.
    b. “DCI or DCIS by GCP Applied Technologies
    c. “Rheocrete CNI” by Master Builders Solutions

9. Hydration Stabilizer Admixture: The admixture shall conform to ASTM C-494 Type S Provide one of the following:

    a. “Eucon Stasis” by the Euclid Chemical Co.
    b. “Master Set Delvo” by Master Builders Solutions
    c. “Recover” by GCP Applied Technologies
    d. “Sikatard 440”“ by Sika Corp.

10. Viscosity Modifier, Crystalline Waterproofing, Shrinkage Control Reducing / Compensating – meeting ASTM C494 Type S

2.7. WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, bu-tyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to con-crete, 3/4 by 1 inch. Available Products:

    1. Colloid Environmental Technologies Company; “Volclay Waterstop-RX.”
    2. Concrete Sealants Inc.; “Conseal CS-231.”
    3. Greenstreak; Swellstop.
    4. Henry Company, Sealants Division; “Hydro-Flex.”
    5. JP Specialties, Inc.; “Earthshield Type 20.”
    6. Progress Unlimited, Inc.; “Superstop.”
    7. TCMiraDRI; “Mirastop.”

2.8. VAPOR BARRIER

A. Vapor Barrier: A flexible, preformed sheet membrane conforming to the permeance requirements of ASTM E1745 for new material and mandatory conditioning tests ASTM E 154, Sections 8, 11, 12, 13).

    1. New Material: less than 0.01 perms (gr/ft2/hr/in-Hg)
    2. After conditioning: less than 0.01 perms (gr/ft2/hr/in-Hg)

B. The product must conform to Class A requirements with a minimum thickness of 15-mils. Provide one of the following:

1. “Stego Wrap (15-Mil) Vapor Barrier” (Stego Industries LLC, San Juan Capistrano, CA [877-464-7834])
2. “Griffolyn Vaporguard” (Reef Industries)
3. “Premoulded membrane with PLASMATIC CORE” (W.R. Meadows).

C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

D. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.9. FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 4 sieve.
   1. Available Products:

      a. Anti-Hydro International, Inc.; “Emery.”
      b. Dayton Superior Corporation; “Emery Non-Slip.”
      c. Emeri-Crete, Inc.; “Emeri-Topcrete.”
      d. Lambert Corporation; “EMAG-20.”
      e. L&M Construction Chemicals, Inc.; “Grip It.”
      f. Metalcrete Industries; “Metco Anti-Skid Aggregate.”

B. Non-Oxidizing Metallic Floor Hardener: The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer’s owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected Portland cement and necessary plasticizing agents. Product shall be “Diamond-Plate” by The Euclid Chemical Co.

C. Mineral Aggregate Dry Shake Hardener: The specified mineral aggregate hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specially processed graded mineral aggregate, selected Portland cement and necessary plasticizing agents. Product shall be "Surflex" by The Euclid Chemical Co. or "Master Top 100 by Master Builders Solutions.

D. Liquid Sealer/Densifier: High performance, deeply penetrating concrete densifier; odor-less, colorless, VOC - compliant, non-yellowing silicate / siliconate blend based solution de-signed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The compound must contain a minimum solids content of 20% of which 50% is siliconate. Provide Diamond Hard by The Euclid Chemical Company, or SealHard by L&M Construction Chemicals. Liquid Sealer Densifier shall

be applied in strict accordance with the directions of the manufacturer and the project specifications.

2.10. CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Available Products:

1. Euclid Chemical Company (The); “Escobar.”
2. Master builders Solutions; “Master Kure ER50.”
3. Vexcon Chemicals, Inc.; “Certi-Vex EnvioAssist.”

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, a naturally colored, non-woven polypropylene fabric with a 4 mil non perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention.

1. “Hydracure S-16” by PNA Construction Technologies, Inc., Matthews, NC (Website: www.pna-inc.com) (800.542.0214); or
2. “Transguarda 400” by Reef Industries (Armorlon Division), Incorporated, Houston TX (Website: www.reefindustries.com, Voice: 800.231.6074).

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, Dissipating. Product composed of hydrocarbon resins and dissipating agents that begin to break down upon exposure to UV light and traffic within 4 to 6 weeks after application, resulting in a film removable with standard degreasing agents and mechanized scrubbing actions so as to not impair the later addition of applied finishes. KUREZ DR VOX by The Euclid Chemical Company: Install in strict accordance with the manufacturer’s recommendation and supervision.

F. Clear Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m2 when applied at 300 sq. ft./gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products:

1. “Super Diamond Clear VOX, Super Aquacure VOX or Lusterseal WB 300” by The Euclid Chemical Company or Masterkure 1315WB by Master Builders Solutions.

2.11. RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: The joint filler shall be a two (2) component 100% solids compound, with a minimum shore A hardness of 80. Provide “Euco 700 or QWIKjoint 200” by The Euclid Chemical Company, or “Sikadur 51 SL” by Sika Chemical Corporation.

C. Semirigid Polyurea Joint Filler: Two-component, semirigid, 100 percent solids, UV-resistant aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240, and meeting requirements and recommendations of ACI 302.

1. The Euclid Chemical Company; EUCO QWIKJOINT UVR

D. Agent: The compound shall be a latex, non rewettable, polymer modified, bonding grout containing an acrylic or styrene butadiene bonding admixture.

E. Products: Subject to compliance with requirements, provide one of the following:

1. “Flex Con, SBR Latex, AKKRO-7T or Eucoweld 2.0” by The Euclid Chemical Co.
2. “Daraweld C” by GCP Applied Technologies.

F. Epoxy Bonding Adhesive: ASTM C 881, two-component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces.

1. “Dural 452 Series” by The Euclid Chemical Company
2. “Sikadur Hi-Mod Series” by Sika Chemical Corp.

G. Non-Shrink, Non-Metallic Grout: The non-shrink grout shall be a factory pre-mixed grout and shall conform to ASTM C1107, “Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).” In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 4’ x 4’ base plate. Provide “NS Grout or NC Grout” by The Euclid Chemical Co., “Five Star Grout” by U.S. Grout Corp., or “Masterflow 713” by Master Builders Solutions.

Where high fluidity and/or increased placing time is required use "Euco Hi-Flow Grout" by the Euclid Chemical Co. or "Masterflow 928" by Master Builder Solutions. In addition, the grout manufacturer shall furnish test Data from an independent laboratory indicating that the grout shall achieve 95% contact when placed under an 18" x 36" base plate.

H. Patching Mortar: “Versaspeed 100 or Versaspeed 100 LS” (horizontal repairs) or Tammspatch II, “EucoRepair V100 (vertical and overhead repairs) by The Euclid Chemical Co. or “Sikatop 121 or 122” (horizontal repairs), “Sikatop 123” (vertical and overhead repairs) by Sika Chemical Corp. These patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Engineer is required.

I. Form and Pour Repair Mortar: cement-based, single-component repair mortar with integral corrosion inhibitor that can be applied as a topping or repair mortar for concrete structures in thicknesses from 1 inch (25 mm) to full depth.

J. Macro Synthetic Fibers: ASTM C 1116, minimum of 2 inches (50 mm) length, aspect ratio of 50 to 90 and a UL Rating. The fiber shall have a minimum dosage of 4 lbs. per cubic yard or higher as required to achieve a minimum equivalent residual strength fe3 of 200 psi when measured in accordance with ASTM C 1609 “Test Method for Flexural Performance of Fiber Reinforced Concrete (Using Beam with Third Point Loading)” and meet ICC-ES Acceptance Criteria for Polyolefin Chopped Strands for use according to AC-383. Manufacturer: The Euclid Chemical Company, “Tuf-Strand SF” or GCP Applied Technologies “Strux 90/40.”

K. Reglets: Fabricate reglets of not less than 0.0217-inch-thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

L. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12. REPAIR MATERIALS

A. Repair Underlayment: Free flowing, self-leveling, pumpable cementitious base compound. Cement-based, polymer-modified, self-leveling product that can be applied in thick-nesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4,000 psi at 28 days when tested according to ASTM C 109.
5. Products: Subject to compliance with requirements, provide one of the following:

    a. "Flo Top or Super Flo-Top” by The Euclid Chemical Co.
    b. “Ardex” by Ardex Co.

B. Repair Overlayment:

1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and appli-cation.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.
5. Self-leveling, polymer modified high strength topping. Product shall be “Thin-Top Supreme or Tammspatch II” by The Euclid Chemical Co. The topping shall exhibit the following properties:
6. Chaplin Abrasion Test - 0.02 mm (0.0079”) maximum @ 28 days (British Standard 8204)

2.13. CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301, Section 4.2.3.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture de-signs based on laboratory trial mixtures.
2. The mix design shall be submitted on the Mix Design Submittal Form included at the end of this specification.

B. Supplementary Cementitious Materials: Use fly ash, pozzolan, and granulated blast-furnace slag, as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent Portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. The exact percentage of supplementary cementitious materials used shall be based on a successful test placement onsite.

C. Limit water-soluble, chloride-ion content in hardened concrete, per ACI 301.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or high range water reducing plasticizing admixture in concrete, as re-quired, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions. The use of Hydration Stabilizer admixture may be submitted for approval in lieu of water-reducing and retarding admixture.
3. Use high range water-reducing admixture in pumped concrete, self-consolidating concrete, fiber concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture at 3 gallons per cubic yard in concrete mixtures where indicated on the plans.

E. Air Content: All concrete exposed to freezing and thawing and/or required to be water-tight shall have an air content of 4.5% to 7.5%. All interior, slabs subject to vehicular abrasion, shall have a maximum air content of 3%.

F. Water/Cementitious Ratios: All concrete subject to freezing and thawing shall have a maximum water/cementitious ratio of 0.50 (4000 psi at 28 days or more). All concrete subjected to deicers and/or required to be watertight shall have a maximum

water/cementitious ratio of 0.45 (4500 psi at 28 days or more). All reinforced concrete subjected to brackish water, salt spray or deicers shall have a maximum water/cementitious ratio of 0.40 (5000 psi at 28 days or more). All trowel finished interior slabs, subjected to vehicular traffic, shall have a maxi-mum w/c ratio of 0.53.

2.14. CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Table 1: Concrete Requirements

Table 1: Concrete Requirements

Location	Compressive Strength @ 28 days	Nominal Maximum Size Aggregate	Supplementary Cementitious Materials	Maximum W/CM	Air Content	High Range Water Reducing Admixture	Structural Macro Fibers	Comments
Exterior Walls	5,000 psi	¾"	Fly ash and/or slag required	0.45	6% ± 1.5%	YES	NO	For location refer to drawings
Foundations	5,000 psi	¾"	Fly Ash and/or slag Required		OPTIONAL	YES		For location refer to drawings
Slabs on metal deck	5,000 psi	¾"	Fly Ash and/or slag required	0.45	3% maximum entrapped air only	YES	YES	For location refer to drawings
Retaining Walls	5,000 psi	¾"	Fly Ash and/or slag required	0.45	4.5% to 7.5%	YES		For location refer to drawings

B. Self-Consolidating Concrete: Use for all architectural concrete and heavily reinforced members so noted on the drawings. All self-consolidating concrete shall contain the specified high-range water-reducing admixture and viscosity-modifying admixture where required. Mini-mum slump-flow of 20" – 30" is required by the successful test placement. The proposed mix design shall be confirmed with a successful test placement onsite to verify proper workability, finishability, pumpability, and setting time.

C. Macro Synthetic Fibers Usage: Use in all non-reinforced slabs-on-grade, toppings, and slabs-on-metal deck. The minimum dosage shall be 4 lbs. per cubic yard or higher dosage may be required to achieve a minimum equivalent residual strength Fe3 of 200 psi when measured in accordance with ASTM C 1609 "Test Method for Flexural Performance of Fiber Reinforced Concrete (Using Beam with Third Point Loading)," and meeting ICC-ES. Acceptance Criteria for Polyolefin Chopped Strands for use according to AC-383.

2.15. FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16. CONCRETE MIXING

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and furnish batch ticket information.

3. PART 3 – EXECUTION

3.1. FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Pro-vide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2. EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3. REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4. VAPOR BARRIERS

A. Plastic Vapor Barrier: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.
2. The vapor barrier installation must be approved prior to concrete placement.

3.5. STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.6. JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated on the drawings. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.7. WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8. CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into pre-ceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time

necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Only use the specified non-corrosive, non-chloride accelerator in slabs below 50 degrees. Do not use calcium chloride, salts, or other admixtures containing more than 0.05% chloride ions by weight.

F. Freeze Resistant Concrete: ASTM C1622, "Standard specification for Cold Weather Admixture Systems and Chapter 9 of ACI 212.3R-10. The contractor shall prepare a plan for placing, finishing and curing procedures that assure the specified hardened properties achieved.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep sub-grade uniformly moist without standing water, soft spots, or dry areas.
3. Use evaporation retarder one or more times after the strike off when high temperatures, low humidity and wind will cause crusting and plastic cracking.

3.9. FINISHING FORMED SURFACES

A. Architectural Concrete Finish: Provide smooth, uniform finish upon form removal with no patching, stoning, or other form of repair, except washing, permitted unless otherwise noted,

for walls, columns, and other surfaces visible to view when the work is complete. Use Self-Consolidating Concrete. The surface shall match the approved jobsite mockup panel.

B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view and to receive a rubbed finish.

D. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one-part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one-part Portland cement and on-part fine sand with a 1:1 mixture of bonding agent and water. Add white Port-land cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10. FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Re-peat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
3. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate or aluminum granules over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to ex-pose slip-resistive aggregate or aluminum granules.

H. Mineral Aggregate Hardener: All slabs, in areas noted on the drawings, shall receive an application of the mineral aggregate hardener applied at the rate of 1.2 lbs/ft2. The hardener shall be applied in two applications by mechanical spreader. The first shake shall comprise 2/3 of the specified amount of hardener. This application shall be made after the initial floating operation unless climatic conditions dictate earlier application. The hardener shall be floated in and the second application made. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at least twice, to a smooth, dense finish.

After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.

I. Non-Oxidizing Metallic Floor Hardener: All slabs, in the loading dock area and other areas noted on the drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied at the rate of 1.5 lbs/ft2. Immediately following the first floating operation, uniformly distribute approximately 2/3 of the required weight of the non-oxidizing metallic floor hardener over the concrete surface, by mechanical spreader, and embed by means of power floating. The hardener shall be floated in and the second application made. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at least twice, to a smooth dense finish.

After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.

3.11. MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

E. Non-Shrink Grout: Use the specified non-shrink, non-metallic grout under all base plates and other locations noted on the drawings. Use High Flow Grout for base plates larger than 6 square feet.

3.12. CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a strippable curing compound.

3. Curing Compounds: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall

within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. After curing period has elapsed, remove strippable curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: All exposed troweled interior slabs, not receiving a penetrating liquid densifier, shall be cured with the specified curing and sealing compound. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage shall be 400 ft2/gallon on steel troweled surfaces and 300 ft2/gallon on floated or broomed surfaces for the curing/sealing compound.

3.13. LIQUID SEALER/DENSIFIER FLOOR TREATMENTS

A. Penetrating Liquid Sealer Densifier Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Apply to concrete no sooner than 10 days after placement. The concrete shall be kept continuously moist for 7 days and allowed to dry at least 2 days prior to the sealer densifier application.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and re-peat brooming or scrubbing. Rinse with water; remove excess material until surface is dry.

3.14. JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least three months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening. Concave joints are not acceptable.

3.15. CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and (check)stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area 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. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honey-combs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with specified polymer repair mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Pre-pare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Pre-pare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without

coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16. FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Water Content and Slump: Verify Water Content in accordance with AASHTO T-318 “Standard Method of Test for Water Content Using Microwave Oven Drying”. Test Slump in accordance with ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6. Compression Test Specimens: ASTM C 31.

    a. Cast and laboratory cure all test cylinder specimens
    b. When required, cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39; test first set of two laboratory-cured specimens at 7 days for information, second set of two specimens at 28 days for acceptance and third set of two specimens at 56 days if necessary.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

9. Strength of each concrete mixture will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

10. Test results shall be reported in writing to Architect, Structural Engineer, Concrete Producer, Contractor and all other firms listed on the test distribution list within 48 hours of testing. Re-ports of all tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, de-sign compressive strength at 28 days, compressive strength test, concrete mixture proportions and materials, compressive breaking strength, and type of break for all 7-day, 28-day and 56-day tests, water content and w/cm (Microwave Test) and air content.

11. Non-Compliant Test Reports: All test reports indicating non-compliance should be e-mailed or faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may con-duct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SECTION 03 30 50

SITE CONCRETE

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 the following but is not limited to:
1. Foundation systems including footings, piers, pilasters, and the like.
2. Sub-base for paving and utility cradling.
3. Lamppost footings.
4. Pavements and ramps.
5. Curbs and walls.
6. Bases and footings for steps and outdoor seating.
7. Drainage structures.
8. Curing and protection of all concrete and cement work.
9. Cutting, patching, grouting, repairing and pointing up as required.
10. All other work and materials as may be reasonably inferred and needed to complete the work of this section.

B. Related sections include the following:
1. Division 31, Section “Earthwork.”
2. Division 32, Section “Site Work Joint Sealants.”
3. Division 33, Section “Storm Drainage Utilities.”

1.03 SUBMITTALS

A. Submit concrete mix designs. Obtain approval before placing concrete.

B. Product data:
1. Submit complete materials list of items proposed for the work. Identify materials source.
2. Submit admixture, curing compound, retarder and accessory item product data.
3. Submit material certificates for aggregates, reinforcing and joint fillers.
4. Submit material designs for oil resistant coatings prior to any materials being delivered to the site.

C. Submit concrete delivery tickets. Show the following:
1. Batch number.
2. Mix by class or sack content with maximum size aggregate.
3. Admixtures.
4. Air content.
5. Slump.
6. Time of loading.

D. Submit shop drawings for concrete walls and stairs.

1.04 QUALITY ASSURANCE

A. Comply with Division 1 requirements.

B. Materials and methods of construction shall comply with the following standards:
1. American Society for Testing and Materials (ASTM).
2. American Concrete Institute, (ACI).

C. Maintain field records of time, date of placing, curing and removal of forms of concrete in each portion of work.

D. Do not change source or brands of cement and aggregate materials during the course of the work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver curing materials, admixtures and retarders in manufacturer's standard unopened containers with labels legible and intact. Store and protect from freezing and damage.

1.06 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect as least 24 hours prior to installation of concrete.

B. Establish and maintain required lines and grade elevations.

C. Do not install concrete work over wet, saturated, muddy or frozen subgrade.

D. Do not install concrete when air temperature is below 40 Degrees F. Use of calcium chloride, salt, or any other admixture to prevent concrete from freezing is prohibited.

E. Protect adjacent work.

F. Provide temporary barricades and warning lights as required for protection of project work and public safety.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland cement: ASTM C150, Type 1.
   1. Provide white Portland cement for integrally colored concrete.

B. Water: clean, fresh and potable.

C. Air-entraining admixture: ASTM C260.

D. Water-reducing admixture: ASTM C494.

2.02 MIXES

A. Provide ASTM C94 ready-mixed concrete. Batch mixing at site not acceptable.
   1. Strength: 4,000 psi minimum at 28 days.

B. Provide an approved water-reducing admixture in all concrete.

C. Provide an air-entraining admixture in all concrete. Air content 5% to 7%.

D. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.

2.03 MATERIALS DEFINITIONS

A. Fine Aggregate (sand) shall conform to AASHTO Designation M-6 having clear, hard, durable, uncoated grains, free from deleterious substances and shall range in size from fine to coarse within the following percentages by weight:

Passing 3/8" Sieve	100%
Passing No. 4 Sieve	95% – 100%
Passing No. 16 Sieve	45% - 85%
Passing No. 50 Sieve	10% - 30%
Passing No. 100 Sieve	2% - 10%

B. Coarse Aggregate shall conform to AASHTO Designation M-80 and shall be free of deleterious matter or coatings and gradation shall be within the following percentage by weight:

Passing 11/2" Sieve	100%
Passing 1" Sieve	95% – 100%
Passing 2" Sieve	25% - 60%
Passing No. 4 Sieve	0% - 10%

C. Water shall be clean and shall not contain any oil, acid, alkali, salts, vegetable matter, organic matter or other deleterious substances.

D. Reinforcement bars shall conform to the requirements of ASTM A615, grade 60 or ASTM A616, Grade 60 including Supplementary Requirement S1. Tie wire shall be

16 gauge annealed steel type. Chairs, bolsters, bar supports and spacers shall be sized and shaped for strength and support of reinforcing during installation and placement of concrete.

E. Wire fabric reinforcement shall conform to the requirements of either ASTM A185 or ASTM A497.

F. Forms: Wood or metal of sufficient to resist concrete placement pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects and distortion, and height equal to full depth of concrete work.
1. Provide 2" nominal thickness, surfaced plank wood forms for straight sections. Use flexible metal, 1" lumber or plywood forms to form radius bends.

G. Joint filler: ASTM D175, pre-molded non-extruding asphalt-impregnated fiberboard, thickness indicated.

H. Curing compound: ASTM C309, non-yellowing, non-staining liquid membrane-forming type containing a fugitive dye. Chlorinated rubber compounds not acceptable for exterior use.

I. Form release agent: Non-staining chemical form release agent free of oils, waxes and other materials harmful to concrete.

J. Oil Resistant Coating shall be Amercoat 66, Polyamide-cured epoxy, as manufactured by Ameron or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions where Concrete Work is to be installed and notify the Owner's Field Representative of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until satisfactory conditions have been corrected by the Contractor in a manner acceptable to the Owner's Field Representative.

3.02 PREPARATION

A. Provide minimum 6" depth of compacted granular base material at curbs. Compact granular base to 95% of the maximum dry density in accordance with ASTM D698 Standard Proctor Method.

B. Remove loose material and debris from base surface before placing concrete.

C. Install, align and level forms. Stake and brace forms in place. Maintain following grade and alignment tolerance:
1. Top of form: Maximum 1/8" in 10'-0".
2. Vertical face: Maximum 1/4' in 10'-0".

D. Coat form surfaces in contact with concrete with form release agent. Clean forms after each use and coat with form release agent as necessary to assure separation from concrete without damage.

E. Locate, place and support reinforcement as indicated.
1. Provide reinforcing bars at curbs, and other locations indicated, adequately supported and secured to prevent displacement.

F. Install, set and build-in work furnished under other specification sections. Provide adequate notification for installation of necessary items.

3.03 INSTALLATION

A. Method of Construction
1. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete", and as specified.

2. There shall be no less than six (6) sacks of cement per cubic yard. The Concrete shall contain no more than six (6) gallons of water per sack of cement, and shall produce a slump of not more than four (4) inches. Air Content shall be 7% (± 1%).
3. Weather Limitations
(a) Cold Weather Concreting - When the ambient temperature is above 40 degrees F, the plastic concrete shall have a temperature of at least 50 degrees F, at the time of placing. When the ambient temperature is 40 degrees F or below, the plastic concrete shall have a temperature of at least 60 degrees F. Concrete shall not be placed when the ambient temperature is less than 10 degrees F.

Maintenance of at least the minimum temperature shall be accomplished by heating the water or the aggregates, or both, as necessary. Heating methods which alter or prevent the entrainment of the required amount of air in the concrete shall not be used. Heating shall be in accordance with the ACI 306, Part 2.2 through 2.6.

(b) Hot Weather Concreting - When the ambient temperature reaches 75 degrees F, the plastic concrete shall have a temperature of no more than 90 degrees F, at the time of placing, and one or more of the following precautions shall be followed:
(1) During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required. When air temperature is between 85° F (30° C) and 90° F (32° C), reduce mixing and delivery time from 1 hours to 75 minutes, and when temperature is above 90° F (32° C), reduce mixing and delivery time to 60 minutes.

(2) Use a water reducing retarder as per manufacturer's recommendation. When more than one admixture is used, they shall be from the same manufacturer.

(3) Sprinkle coarse aggregate stockpile to cool by evaporation.

(4) Place concrete in compliance with ACI 305 and as herein specified. Cool ingredients before mixing to maintain concrete 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.

(5) In the case of truck mixing, do not rotate the drum during and after the addition of cement to the mix until mixing water is added at the construction site. This may require reduced loads or the utilization of horizontal type mixers.

(6) Prevent absorption by sprinkling subgrade and wood forms just before placing so that they will not absorb water from the mix.

(7) Erect windbreaks to prevent winds from drying exposed concrete surfaces while they are being finished.

(8) Screed and float concrete as it is placed and start curing immediately.

4. Concrete shall be deposited within thirty (30) minutes after mixing, as nearly as practicable, in its final position to avoid segregation due to rehandling or flowing.

5. Provide proper chutes, troughs and other devices to convey concrete to the various levels. In no case shall concrete be deposited from a height that will separate the aggregates.

6. In placing concrete around reinforcement, care shall be taken to work the concrete well around and into thorough contact with the steel and not disturb the reinforcement. Mechanical vibrators shall be used to insure consolidation, but over-vibrating which may cause segregation shall be avoided.

7. Moisten base to provide a uniform dampened condition at the time concrete is placed. Verify manholes or other structures are at required finish elevation and alignment before placing concrete.

8. Place and spread concrete to the full depth of the forms. Use only square-end shovels or concrete rakes for hand-spreading and consolidating

concrete. Exercise care during spreading and consolidating operations to prevent segregation of aggregate and dislocation of reinforcement.

9. Place concrete in a continuous operation between expansion joints. Provide construction joints when sections cannot be placed continuously.

10. Place concrete in one course, monolithic construction, for the full width and depth of concrete work.

11. Provide curb profiles indicated.

12. Provide concrete base for patching and repairing existing street paving damaged or removed to accommodate new curbs, walks and entrance apron paving.

B. Joints:
1. Construct control, expansion and construction joints properly aligned with face perpendicular to concrete surface.

2. Provide standard keyed-section construction joints where indicated.

3. Provide expansion joints using pre-molded joint filler at concrete work abutting curbs, walls, structures, walks, and other fixed objects.
   a. Locate expansion joints as indicated. When not indicated provide joints at maximum 20'-0" on center for curbs.

   b. Install joint fillers full-width and depth of joint. Provide sealant flush with adjacent finished surface.

   c. Protect the top edge of the joint filler during concrete placement.

C. Concrete finishing:
1. Perform concrete finishing using mechanical or hand methods as required.

2. As soon as the face forms are removed, all fins and other projections shall be carefully removed and offsets leveled, and rubbed with carborundum where necessary. Pointing and filling voids shall be performed only when approved by the Owner's Field Representative.

3. Complete surface finish as follows:
   a. Curbs: Provide a light broom finish.
   b. Walks: Provide a light broom finish.

4. Walks to be hand tooled edged with 1” radius curve.

5. Walk contraction joints to be scored as shown on plan maximum 6’ apart.

D. Curing
1. General
   a. Comply with all the requirements of ACI 301.
   b. Protect freshly placed concrete from premature drying and excessive cold

or hot temperatures.

c. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

d. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

2. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

   a. Provide moisture curing by following methods:
      (1) Keep concrete surface continuously wet by covering with water.

      (2) Continuous water-fog spray.

      (3) Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

3. Provide moisture-cover curing as follows:
   a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

4. Liquid membrane curing meeting the requirements of AASHTO Designation M-148 may be used upon approval of the Owner's Field Representative.

E. Oil Resistant Coating

1. All concrete surfaces to be coated must contain no additives or hardeners, and should not be treated with sealers or conventional curing compounds containing waxes, silicones, or silicates.

2. Do not use form release agents based on oils, which will deposit a residue on the concrete.

3. All surface preparation and installation shall be in accordance with the manufacturer's recommendations.

3.04 FIELD QUALITY CONTROL

A. Provide field quality control testing and inspection during concrete operations.

B. Testing:
1. Provide slump test on first load of concrete delivered each day and whenever requested due to changes in consistency or appearance of concrete.

3.05 PROTECTION

A. Protect concrete work form damage due to construction and vehicular traffic until final acceptance. Exclude construction and vehicular traffic from concrete pavements for at least 14 days.

3.06 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris and equipment. Repair damage resulting from concrete operations.

B. Sweep concrete sidewalks and pavement, wash free of stains, discoloration, dirt and other foreign material immediately prior to final acceptance.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

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 unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Face brick.
3. Mortar and grout.
4. Reinforcing steel.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Cavity-wall insulation.
9. Miscellaneous Masonry Accessories.

B. Related Sections include the following:

1. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.

2. Division 7 Section “Fluid Applied Membrane Air Barrier”

3. Division 9 Section “Non-Structural Metal Framing” for ‘Z’ clips within plane of rigid insulation connecting thinset ground face CMU back to structure.

C. Products installed, but not furnished, under this Section include the following:
1. Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

B. Shop Drawings: Show fabrication and installation details for the following:

1. Special Brick Units: Show sizes, profiles, and locations of each special brick unit required.

2. Special Ground Face CMU units at decorative base: Show sizes, profiles, details of inside and outside corners.
3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Verification: For the following:

1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
3. Special face brick shapes samples not less than 12 inches in length, showing the full range of colors and textures expected in the finished construction.
4. Weep holes/vents in color to match mortar color.
5. Accessories embedded in the masonry.

D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.

a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.

2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each material and grade indicated for reinforcing bars.
4. Each type and size of joint reinforcement.
5. Each type and size of anchor, tie, and metal accessory.

E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.5 QUALITY ASSURANCE

A. Mockups: Before installing unit masonry, build mockups to verify brick blend as specified. Final determination of the specified blend shall be following construction of the mockup. The mockup shall be revised until the blend is approved by the

Architect. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
2. Build mockup approximately 10 feet long by 10 feet high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup. Include backup wall framing and air barrier assembly.
3. Provide aluminum window head / jamb sample section installed within mockup along with all relevant flashing. Provide cut away view to inspect flashing materials and connection to air barrier assembly.
4. Provide aluminum window sill sample section installed within mockup with all relevant flashing. Provide cut away view to inspect installed flashing materials and connection to air barrier assembly.
5. Clean exposed faces of mockups with masonry cleaner as indicated.
6. Notify Architect seven days in advance of dates and times when mockups will be constructed.
7. Protect accepted mockups from the elements with weather-resistant membrane.
8. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
9. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

10. Demolish and remove mockups when directed.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
3. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
4. Protect sills, ledges, and projections from mortar droppings.
5. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
6. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PRODUCTS

1.8 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners, unless indicated as bullnose.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi or as noted on the drawings.
2. Weight Classification: Normal weight.
3. Provide Type I, moisture-controlled units.
4. Size (Width): Manufactured to the following dimensions:

a. 4 inches nominal; 3-5/8 inches actual.
b. 6 inches nominal; 5-5/8 inches actual.
c. 8 inches nominal; 7-5/8 inches actual.
d. 10 inches nominal; 9-5/8 inches actual.
e. 12 inches nominal; 11-5/8 inches actual.

5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

C. Decorative Concrete Masonry Units (Ground Face CMU): ASTM C 90, type I and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight, unless otherwise indicated.
3. Provide Type I, moisture-controlled units.
4. Size: Manufactured to dimensions indicated for nondecorative units.
5. Finish: Exposed faces of the following general description matching color, pattern, and texture of Architect's samples.
   a. Normal-weight aggregate, ground-face finish.
6. Manufacturer: Trenwyth Trendstone Plus with field applied sealer (Size and color selection as noted in Construction Drawings)
7. Sealer For Decorative CMU
   a. Clear sealer for decorative CMU shall be Trendcoat WB from Trenwyth Industries, Inc., or approved equal from Kingston Block.

1.9 BRICK

A. General: Provide shapes indicated and as follows for each form of brick required:

1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
3. Bricks to be installed in the Jack Arches shall be factory cut.

C. Face Brick: ASTM C 216 Grade SW, Type FBX, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Sizes: Modular to match existing.
5. Selection: Field Brick; The Belden Brick Company Modular Graystone Smooth & Modular Dutch Gray Smooth A; Percentages to be determined.
6. Selection: Soldier Course Brick; The Belden Brick Company Modular 470-479 Medium A.

1.10 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

1. White-Mortar Aggregates: Natural white sand or ground white stone.
2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C 404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

H. Water: Potable.

I. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Mortar Cement:

a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
b. Lafarge Mortar Cement; Lafarge Corporation.

2. Cold-Weather Admixture:

a. Accelguard 80; Euclid Chemical Co.
b. Morseled; W. R. Grace & Co., Construction Products Division.
c. Trimix-NCA; Sonneborn, Div. of ChemRex, Inc.

1.11 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60 and Grade 40.

1.12 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for interior walls.

a. Wire Size for Side Rods: W2.8 or 0.188-inch diameter.
b. Wire Size for Cross Rods: W2.8 or 0.188-inch diameter.

2. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

C. Stainless Steel Type 304 for exterior walls.

1.13 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

1. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

3. Stainless Steel Type 304 for exterior walls.

1.14 BENT WIRE TIES

A. General: Rectangular units with closed ends and not less than 4 inches wide. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.

1. Where coursing between wythes does not align, use adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches.
2. Where wythes are of different materials, use adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches.

B. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire except that reinforcing in exterior masonry shall be stainless steel wire.

1.15 RIGID ANCHORS

A. General: Fabricate from steel bars as follows:

1. 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
2. Finish: Interior masonry Hot-dip galvanized to comply with ASTM A 153. Exterior masonry construction shall be stainless steel.

1.16 MISCELLANEOUS MASONRY ACCESSORIES

A. Provide the following masonry accessories as manufactured by Hohmann & Barnard. Masonry accessories located in exterior construction shall be stainless steel and masonry accessories located in interior construction shall be hot dipped galvanized.

1. Stainless Steel Drip Plate with Foam Tite Seal (DP-FTSA) with preformed inside and outside corners
2. RB-Twin Rebar Positioner
3. PTA-422 Partition Top Anchors; 12 Ga, 8” long, Hot Dipped Galv, @4’-0” O.C.
4. Thermal 2-Seal Tie with 9 gauge Type 304 stainless steel continuous wire
5. #342S Rectangular Plastic Weep Hole w/ S.S. Screen insert
6. Mortar Net Wall Defender.
7. NS-Closed Cell Neoprene Sponge for Control Joints and Expansion Joints
8. T2 Termination Bar
9. Mighty-Flash stainless steel fabric flashing
10. DP stainless steel drip plates 3” wide with FTSA foam Tite Seal with flash adhere strip. Provide inside and outside preformed corners.
11. MFL Preformed S.S. Inside & Outside Custom corner flashings
12. ST/Steel Stainless Steel Corners & End Dams per dimensions shown on drawings
13. Diedrich 202V Vana Stop Organic Masonry Cleaner

14. DOW CavityMate Ultra Extruded Polystyrene Foam Insulation (Thickness as Indicated on drawings) Using Dow Great Stuff Insulating Foam Sealant to seal gaps
15. Enviro Barrier fluid applied Air/Vapor Barrier
16. X-Barrier Peel and Stick Barrier membrane
17. Enviro-Barrier Mastic
18. Stretch-X-Seal Stretchable Detail Tape

1.17 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Foam Board Insulation. ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for thickness listed below for 1-inc deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product, moisture resistant with an integral skin.
   1. 1 1/2" thickness R-value 7.5.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

1.18 MASONRY CLEANERS

A. Proprietary Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1.19 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

   1. Do not use calcium chloride in mortar or grout.
   2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.

   1. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
   2. Limit cementitious materials in mortar for exterior masonry to portland cement, mortar cement, and lime.
   3. For masonry below grade, in contact with earth, and where indicated, use Type S.

4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

2.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

G. Masonry accessories shall be installed in accordance with manufacturer's recommendations.

2.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

2.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. Exposed concrete masonry unit bond shall be one-half running bond with vertical joint in each course centered on units in courses above and below.
2. Face brick bond shall be as indicated on the drawings.

C. Lay concealed masonry with all units in a wythe in running bond or 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 nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

2.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated. Tooling of face brick joints shall match joint tooling of existing face brick.

2.6 BONDING OF MULTIWYTHE MASONRY

A. Use bonding system indicated on Drawings.

B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.

2.7 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

B. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

2.8 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

D. Rake out joints for pointing with mortar to depth of not less than 3/4 inch before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

2.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

1. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
2. Provide either of above at Contractor's option or provide precast or formed-in-place concrete lintels complying with requirements in Division 3 Section "Cast-in-Place Concrete."

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

2.10 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install flashing as follows:

1. At multi-wythe masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through inner wythe and turn flashing up approximately 2 inches, unless otherwise indicated.
2. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form a pan.
3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
4. Extend sheet metal flashing 1/2 inch beyond face of masonry at exterior and turn flashing down to form a drip.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Use round plastic tubing to form weep holes.
2. Use wicking material to form weep holes above flashing in brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c.
4. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
5. Place cavity drainage material immediately above flashing in cavities.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

2.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

END OF SECTION 04 20 00

SECTION 04 42 00

STONE WALL

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 providing all cut stone work as indicated on the drawings and as specified herein, but is not limited to the following:
   1. Rubble Stone Walls.

B. Related Sections include the following:

   1. Section 32 31 19 – Site handrails & Railings.

1.3 SUBMITTALS

A. Stone Samples for Approval: For both site excavated stone and quarried stone, submit samples, for approval, demonstrating suitable color, grade, finish, and size as specified herein. Include samples in each set showing the full range of variations expected in these characteristics.

B. Qualification Data: For firms and persons specified in the "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.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who has a minimum of 5 years experience in stone masonry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Stone: All site excavated rock deemed suitable in size and shape, as specified herein, shall be used in the construction of the rubble stone wall. If additional stone is needed to complete the walls, obtain stone suitable in size, shape and variety, as specified herein, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties without delaying the work.
   1. All stone suitable for stone wall construction, whether excavated on site or brought in from a quarry, shall be stored and protected on site in a responsible and professional manner as specified herein.

2. All stone to be used for stone wall construction shall be uniform in quality, free of cracks, seams and starts which may impair structural integrity.
3. All stone suitable for rubble stone wall construction, whether excavated on site or brought in from a quarry, shall match the type, pattern, color, texture and finish of samples available for inspection.

C. 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.

D. Mockups: Before installing stone wall, construct a sample wall, to be reviewed and approved by architect, to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
1. Locate mockups in the locations indicated or, if not indicated, as directed by the Owner's Representative.
2. Build mockups for each type of stone masonry in sizes approximately 72 inches (1829 mm) long by 48 inches (1200 mm) high by full thickness, including face and back-up, and as follows:
   a. Include stones showing the full range of size and shape as specified herein.
   b. Include stone coping at top of mockup.
3. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. Approval of mockups does not constitute approval of deviations from Contract Documents contained in mockups, unless such deviations are specifically approved by Owner's Representative in writing.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, or other causes.

B Store cementitious materials off the ground, under cover, and in a dry location.

C. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

E. If additional stone is needed to complete construction of the rubble stone walls, deliver materials to Project site in undamaged condition.

1.6 SUITABILITY OF STONES

A. Stones whether excavated or gathered from a quarry will be deemed suitable if they conform to the quality assurances mentioned above and are roughly rectangular in shape with dimensions varying from 2"-8" thick and 6"-18" long.

B. Color of quarry supplied stone to match site excavated rock deemed suitable.

1.7 PROJECT CONDITIONS

A. Protection of Stone Masonry: During erection, cover with waterproof sheeting at the end of each day's work. Cover partially completed stone masonry when construction is not in progress.

B. Stain Prevention: Immediately remove grout, mortar, and soil to prevent them from staining the face of stone masonry.
   1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with the following requirements:
   1. Cold-Weather Construction: When ambient temperature is within limits indicated, use the following procedures:
      a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
      b. 32 to 25 deg F (0 to minus 4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry.
      c. 25 to 20 deg F (minus 4 to minus 7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Use heat on both sides of walls under construction.
      d. 20 deg F (minus 7 deg C) and below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Heat stone to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within enclosures.

   2. Cold-Weather Protection: When mean daily temperature is within limits indicated, provide the following protection:
      a. 40 to 25 deg F (4 to minus 4 deg C): Cover masonry with weather-resistant membrane for 48 hours after construction.
      b. 25 to 20 deg F (minus 4 to minus 7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Use windbreaks when wind velocity exceeds 15 mi./h (25 km/h).
      c. 20 deg F (minus 7 deg C) and below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within enclosure for 48 hours after construction.

   3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until stone masonry has dried out, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Protect stone masonry- 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 (38 deg C) and above.

PART 2 PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

A. Regional Content defined in Section 018113 “Sustainable Design Requirements”. Report Regional Content only. No minimum requirement.

2.2 STONE

A. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into this Project include, but are not limited to, the following:
   1. Excavated site stone deemed suitable.
   2. Fieldstone/Creek Stone Mix from quarry – Color, size and shape to match suitable salvaged stone on site.

   Acceptable Quarry:
   1. Finger Lakes Stone Co. Inc., Conklin, NY, (607)273-4646.
   2. Hobart Stone Dealers Inc., Binghamton, NY, (607) 723-0834.
   1. Or approved equal.

2.3 GENERAL

A. Comply with all applicable and referenced standards, in addition to the quarries performance of stone and other requirements indicated applicable to each type of material required.

B. All stone shall be free from any material producing stains after weathering. Stone shall contain no seams or defects which would impair its strength. All exposed surfaces shall be free from spots, starts, spalls, chips, stains, discolorations or other defects which would affect the appearance of the Work.

C. Stone shall be obtained from quarries or shops capable of furnishing quantity, sizes and character of the stone required. Cutting must be done by firms properly equipped to produce the finished material without causing delay in the progress of the Work. The Contractor will be held responsible for any delay in the completion of the Work due to his failure to supply satisfactory stone in ample quantities and proper sequence.

D. Unless otherwise directed by the Owner provide matched blocks from a single quarry for each type, variety, color, and quality of stone required. Extract blocks from a single bed of quarry stratum especially reserved for Project, unless stones from randomly selected blocks are acceptable to the Owner Representative for aesthetic effect.

E. Submit an affidavit to the Owner from the quarry attesting that all stone of each type required for the particular project has been quarried and obtained from one quarry and is of top grade of material specified.

F. Sufficient samples of granite shall be submitted for approval to the Owner’s Representative to show the texture, finish and anticipated range of color to be supplied.

2.3 WEEP HOLES

A. Weep Holes: Provide the following
   1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch (9.5-mm) OD thickness.

2.4 FABRICATION

A. Fabricate stonework in dimensions, sizes and shapes with all requirements, as indicated on the Contract drawings and final shop drawings.

B. Cut stones to produce pieces of thickness, size and shape indicated to comply with fabrication and construction tolerances as indicated on shop drawings or as recommended by applicable stone association or by stone source for faces, edges, beds, backs. In the case of optional tolerance specifications, comply with the most stringent tolerances unless otherwise indicated or directed by the Owner Representative.

C. Finish exposed surfaces faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.
   1. Examine substrate to verify that inserts, reinforcement, anchors, ties, dowels, and other items installed in rock or concrete and required for or extending into stone masonry are correctly installed.
   2. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prior to installation, examine surfaces to receive stonework and do not proceed until any defects detrimental to the finished work are corrected.

B. Verify all measurements and dimensions and coordinate the installation of support framing for this work. Coordinate and schedule stonework fabrications and installations with the work of other trades and contracts. Give particular attention to the location and size of cutouts required to accommodate mechanical, electrical and other work or adjoining construction.

C. Coordinate with work specified elsewhere for sealant work between stone units and between stonework and adjacent dissimilar material as indicated or otherwise required to complete installation.

D. Advise installers of other work about specific requirements for placement of reinforcement, anchors, ties, flashing, and similar items to be built into stone masonry.

3.3 INSTALLATION

A. General

1. Do not use stone units with chips, cracks, voids, stains or other defects which might be visible in the finished work. If installed, remove and replace with units meeting specification requirements and approval of the Architect.
2. Execute the work by skilled mechanics, and employ skilled stone fitters/cutters at site for necessary field cutting as stone is set. Clean stone (especially edges) before setting.
3. Set stone in accordance with Contract Documents and final approved shop drawings. Provide anchors, supports, fasteners, and other attachments shown, or necessary to secure stone in place. Shim and adjust accessories as required for proper and correct setting of stone. Completely fill holes, slots and other sinkages for anchors, dowels, fasteners and support with epoxy grout as applicable to conditions during setting of stone.
4. Erect walls facings plumb and true.
5. Top beds cut with a 1/8" per foot wash, as indicated, wash shall be in the direction as indicated on the drawings.
6. Provide control joints when meeting adjacent vertical elements, where indicated, and where required to prevent stone cracking. Joints shall extend through setting/mortar bed. Use joint filler to control joints. Sealant shall be used where indicated.
   a. Keep expansion joints free of mortar and other rigid materials.
7. Include all field cutting, drilling, and fitting of stonework not performed in the shop and required to accommodate the work of other trades or contracts. In cutting and fitting, carefully cut and grind edges to required fit. Do cutting in such manner so as not to impair strength or appearance of stone.
8. Arrange stones for good fit with joint widths within tolerances indicated, and to provide offset between vertical joints as indicated.

A. Setting Wall Units
   1. When wall units are set with mortar joints and bed, use non-staining cement/lime mortar complying with ASTM C270, Type M. Mortar shall be struck back ¼" to 3/8" from face of stone to allow for grouting.
      a. Mortar spots shall be applied over stone anchors.
      b. Joints on all sides of stone work shall be maintained by use of edges which shall be removed as stone work progresses.
      c. Joint grout shall be applied of color selected and approved by the Owner.
   2. Place weep holes and vents in joints where moisture may accumulate including base of cavity walls, above shelf angles and flashing. Locate weep holes and vents at intervals not exceeding 24 inches (600mm) or as directed by the Architect.
   3. Rake out joints for pointing with mortar to depths of not less than ½" (13mm). Rake joints to uniform depths with square bottoms and clean sides.
   4. Place weep holes and vents in joints where moisture may accumulate. Locate weep holes and vents at intervals not exceeding 24 inches (600mm) or as directed by the Owners Representative.

3.4 POINTING

A. Prepare stone joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar first in layers not greater than 3/8 inch (10 mm) until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce a smooth, flat face slightly below edges of stone.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:
   1. Broken, chipped, stained, or otherwise damaged stone.
   2. Defective joints.
   3. Stone masonry and joints not matching approved samples and mockups.

B. Replace in a manner that results in stone masonry matching approved samples and mockups.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Owner's Representative approval of sample cleaning before proceeding with cleaning of masonry.

E. Protection: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure stone masonry is without damage and deterioration at the time of Substantial Completion.

END OF SECTION 044200

SECTION 05 12 00
STRUCTURAL STEEL

1. PART I - 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 This Section includes the following:

1. Structural steel
2. Grout

B. Related Sections include the following:

1. Division 1 Section "Structural Tests and Special Inspections" for independent testing agency procedures and administrative requirements.
2. Division 5 section “Steel Decking” for field installation of shear connectors.
3. Division 5 Section "Metal Fabrications" for steel lintels, or shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.
4. Division 9 Section “Painting” for surface preparation and painting requirements except as specified herein.

1.3. DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges" that are essential to support the design loads.

B. Architecturally Exposed Structural Steel (AESS): Structural steel designated as architecturally exposed structural steel in the Contract Documents

1.4. PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD or LRFD loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction," Part 10 to Part 14.
2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer, registered in the State of New York, to design and prepare calculations for structural steel connections.

1.5. SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: Submit, for Structural Engineer's action: label samples to indicate product characteristics, and location in the Work. Samples will be reviewed for color and appearance only. Furnish sufficient samples to establish the full range of colors and textures for materials exposed in the finished work. Compliance with other requirements is the responsibility of the Contractor. Submit the following:

1. Samples of each type of weld for architecturally exposed structural steel. Sample welds shall be minimum 12 in. long and shall show shop applied finish, cleaning and shop primer if required in the finished work.

C. Painting System Description: Provide a complete written description of each type of shop coating and touch–up painting of the "Structural Steel" and "Architecturally Exposed Structural Steel" systems. Itemize the materials, methods, procedures, and sequence to be followed for painted steel components and arrange the description to correspond with the fabrication and erection schedule. Include statement verifying that the selected painting materials and systems are proper and adequate for the application shown, including compatibility of each coating product within each painting system.

1. Provide description of shop coating and touch–up painting of the "Structural Steel Framing" systems.
2. Provide description of shop coating and touch–up painting of the "Architecturally Exposed Structural Steel" system. Differentiate between shop and field applied portions of system.

D. Shop Drawings: Show fabrication of structural-steel components.

1. Include types of materials, member sizes, and weights.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment drawings.
4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
6. For structural steel connections include structural analysis data signed and sealed by the qualified professional engineer, registered in the State of New York, responsible for their preparation.
7. Shop drawings will be checked for size of material and strength of connection by the Engineer of Record (EOR), which shall not render the EOR responsible for any errors in

construction dimensions, etc. that have been made in preparation of shop drawings. The Contractor shall assume full responsibility for the correctness of dimensions and fit.

E. Welding certificates.

F. Qualification Data: For Installer, Fabricator, Professional Engineer, Testing Agency.

G. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. At Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Tension-control, high-strength bolt-nut-washer assemblies.
5. Shear stud connectors.
6. Shop primers.
7. Non-shrink grout.

H. Source quality-control test reports.

1.6. QUALITY ASSURANCE

A. Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC Certified Erector, Category [ACSE], "Advanced Certified Steel Erector."

B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC Certified Plant, Category [STD], "Standard for Steel Building Structures."

C. Regulatory Requirements:

1. Building Code: Work of this Section shall conform to all requirements of the NYC Building Code and all applicable regulations of governmental authorities having jurisdiction, including safety, health, noise, and anti-pollution regulations. Where more severe requirements than those contained in the Building Code are given in this Section, the requirements of this Section shall govern.
2. New York City Board of Standards and Appeals (BSA): Rules for Arc and Gas Welding and Oxygen Cutting and Steel Covering the Specifications for Design, Fabrication, and Inspection of Arc and Gas Welded Steel Structures and Qualification of Welders and Supervisors.

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303-05: "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC 341-05: "Seismic Provisions for Structural Steel Buildings Including Supplement No.1."
3. AISC 360-05: "Specification for Structural Steel Buildings."
4. RCSC: "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," 2004.
5. AWS D1.1/D1.1M:2011: “Structural Welding Code – Steel.”
6. AWS D1.8/D1.8M:2011: "Structural Welding Code-Seismic Supplement."
7. SSPC “Steel Structures Painting Manual.”

E. Certifications:

1. Structural steel shall conform to the material acceptance, certification, and inspection requirements of Section BC 1701 of the 2008 NYC Building Code.
2. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

F. Pre-installation Conference: Prior to start of steel fabrication work, conduct conference at the project site to comply with requirements in Division 1 Section “Project Management and Coordination.” Meeting shall include the Owner, Architect, Contractor, Owner’s Independent Testing and Inspection Agency, and other subcontractors whose work must be coordinated with the structural steel work. Discuss the project specific requirements related to construction methods, construction site safety and fire prevention during construction process; define shop drawings approval process, define the role and responsibilities of each party, and establish communication channels among the project team members.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site at such intervals as to insure uninterrupted progress of Work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8. COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

2. PART 2 – PRODUCTS

2.1. STRUCTURAL STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of 0steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
B. W-Shapes: ASTM A992, Grade 50.
C. HP-Shapes: ASTMA572, Grade 50
D. Channels, Angles, M, S-Shapes: ASTM A36.
E. Plate and Bar: ASTM A572 GR 50 (GR 42 for plate thickness larger than 4 inches).
F. Cold-Formed Hollow Structural Sections: ASTM A500, Grade C, structural tubing.
G. Steel Pipe: ASTM A53, Type E or S, Grade B.

1. Finish: Black, except where indicated to be galvanized.

H. Welding Electrodes: E7018.

2.2. BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A325 or ASTM A490, Type 1, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers. Washer requirements shall follow RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

1. Finish: Plain, except where indicated to be hot-dip zinc coated, ASTM A 153/A 153M, Class C.
2. Direct-Tension Indicators: ASTM F959, Type 325 compressible-washer type.

a. Finish: Plain, except where indicted to be mechanically deposited zinc coated, ASTM B695, Class 50

B. Shear Connectors: ASTM A108, Fu = 65 KSI, headed-stud type, cold-finished carbon steel; AWS D1.1, Chapter 7 (Section 7.2.6 and Table 7.1), Type B.
C. Headed Anchor Rods: ASTM F 1554, Grade 55.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Plain.

D. Threaded Rods: ASTM A 193.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: plain.

E. Clevises, Turnbuckles: ASTM A 108, Grade 1035, cold-finished carbon steel.

F. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.

G. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

H. Expansion/Adhesive Anchors: Anchors installed in concrete shall have current ICC-ES listing for performance in cracked concrete as per Section BC 1913 of the NYC Building Code. Design and installation provisions shall be based on current ICC-ES ESR report and ACI 318 Appendix D.

2.3. PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Galvanizing Repair Paint: ASTM A780.

C. Intumescent Fireproofing System Primer: follow manufacturer's recommendations.

2.4. GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time. Minimum 28-day compressive strength of 8,000 psi.

2.5. FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings."
1. Camber structural-steel members where indicated.
2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, " Hand Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6. SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: PT (Pretensioned).

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Remove backing bars or runoff tabs, back gouge. Grind steel smooth for architecturally exposed structural steel.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

a. Grind butt welds flush.
b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.7. SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.
6. Top flanges of structural steel members requiring stud shear connectors or supporting metal deck.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning" for interior steel members.
2. SSPC-SP3 for interior steel members exposed to view.
3. SSPC-SP6 for exterior steel exposed to weather.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.0 mils for interior steel members and 4.0 mills for exterior steel members exposed to weather. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
3. Galvanize all exterior steel supporting mechanical equipment (dunnage steel) and any other steel members indicated on Drawings.
4. Steel members to be hot-dip galvanized shall be cleaned in accordance with SSPC-SP8.

2.8. GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.

1. Fill vent holes and grind smooth after galvanizing.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9. SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports as per Special Inspection requirements of the NYC Building Code.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to the New York City Building Code.

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E165.
2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E164.
4. Radiographic Inspection: ASTM E94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

3. PART 3 - EXECUTION

3.1. EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3. ERECTION

A. Erection shall conform to Section BC 2205.6.4 of the NYC Building Code and Section 1.25 of AISC 335.

B. Temporary Bracing and Shoring: It is Contractor's responsibility to provide temporary shoring and bracing members with connections of sufficient strength to bear erection loads and guywires to maintain structure plumb and in true alignment until completion of erection. The Contractor shall engage a professional engineer, licensed in the State of New York, to design, to provide plans and details, to inspect, and to file reports of all temporary bracing and shoring to the building structure during construction operations. Remove temporary work when permanent members and bracing are in place and final connections are made.

C. Anchor Rods: Furnish to the concrete and brick masons anchor bolts and other connectors required for securing structural steel to the foundation and other in-place concrete work, together with instructions, templates, etc. necessary for setting them. Anchor bolts are to be surveyed and any approved modifications made prior to placement of columns.

D. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings."

E. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

F. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

G. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

H. Splice members only where indicated.

I. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

J. Do not use thermal cutting during erection.

K. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

L. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4. FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: PT (Pretensioned).

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs, back gouge. Grind steel smooth for architecturally exposed structural steel.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

    a. Grind butt welds flush.
    b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5. FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to the New York City Building Code.

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E165.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    c. Ultrasonic Inspection: ASTM E164.
    d. Radiographic Inspection: ASTM E94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6. REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

SECTION 05 31 00
STEEL DECKING

1. PART I - 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 This Section includes the following:

1. Composite floor deck and roof deck.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete topping.
2. Division 5 Section "Structural Steel" for field-welded shear connectors.

1.3. SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, conditions requiring closure strips, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Drawings shall include locations of temporary deck shoring, if required.

Shop drawings reviewed by the Engineer of Record for general conformity with the Drawings shall not relieve the Contractor or the metal deck supplier of responsibility for correctness of fit, quantities of materials, and adequacy of attachment details of deck and accessories to the structural steel. Deck must have UL or OTCR approval as part of the fire rated assembly. Approval of shop drawings does not absolve the Contractor of this requirement.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates: Copies of certificates for welding procedures and personnel.

E. Field quality-control test and inspection reports.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

G. Evidence of steel deck's compliance with the New York City Building Code.

H. Layout of Shear Connectors Welded Through Deck to Supporting Frame: for each beam including sizes, spacing, and coordination with metal deck ribs.

1.4. QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Installer Qualifications: An experienced installer who has completed steel deck installation work 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. Mechanical Fastener Installers: Shall be certified or licensed by the fastener and tool system manufacturer on the project site in accordance with ANSI A10.3 requirements. Certification or licensing includes all training necessary for proper tool operation, fastener selection, maintenance, and troubleshooting.

D. Welders: Shall be AWS certified and NYC licensed for welding of sheet metal in accordance with the New York City Building Code.

E. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

F. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

G. Certifications.

1. Structural metal deck and shear stud connectors shall conform to the material acceptance, certification, and inspection requirements of Section BC 1701 of the 2014 NYC Building Code.
2. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1.5. DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

C. Do not store materials on structure in a manner that might cause distortion or damage to members of supporting structure.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Deck and Accessories:

a. ASC Profiles, Inc.
b. Consolidated Systems, Inc.
c. DACS, Inc.
d. D-Mac Industries Inc.
e. Epic Metals Corporation.
f. Marlyn Steel Decks, Inc.
g. New Millennium Building Systems, LLC.
h. Nucor Corp.; Vulcraft Division.
i. United Steel Deck, Inc.
j. Valley Joist; Division of EBSCO Industries, Inc.

2. Stud Shear Connectors:

a. Nelson Stud Welding Co.
b. Hilti, Inc.

3. Mechanical Fasteners:

a. Hilti, Inc.
b. ITW Ramset

4. Sidelap Connectors:

a. Hilti, Inc.
b. Elco Textron

2.2. COMPOSITE FLOOR DECK

A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:

1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Profile Depth: As indicated on the drawings.
3. Span Condition: triple span or more and as shown on the drawings.
4. Formed with integral locking lugs and with deformations to provide bond with concrete topping.

2.3. ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

H. Recessed Sump Pans: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck, with 3-inch-wide flanges recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

I. Flat Sump Plate: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck. For drains, cut holes in the field.

J. Galvanizing Repair Paint: Per ASTM A 780 [SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight].

K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

3. PART 3 – EXECUTION

3.1. EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2. INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

J. All pour stops/bent plates forming edge of concrete slab should be surveyed prior to placement of concrete topping to assure proper placement within a tolerance of ¼” of theoretical.

3.3. FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 3/4 inch, nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 24 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Butted for composite floor deck; lapped or butted for non-composite floor deck.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

F. Shear Connectors: Weld shear connectors through deck to supporting frame according to AWS D1.1 and manufacturer's written instructions.

3.4. FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect. The following inspections shall be performed:

1. Perform 100% visual inspection of deck installation, including deck accessories.
2. Verify type of deck complies with design requirements.
3. Check size and location of weld attaching deck to supporting frame.
4. Check welding of side laps of adjacent deck units.
5. Verify installation of closures, flashings, cover plates, and other required accessories.

D. Shear connector studs shall be tested and inspected according to AWS D1.1 for stud welding as follows:

1. Shear connector stud welds will be visually inspected.
2. Bend tests will be performed if visual inspections reveal less then a full 360-degree flash, or welding repairs to any shear stud.
3. Tests will be conducted on additional shear connector studs if weld fracture occurs on the stud already tested according to AWS D1.1.

E. Remove and replace work that does not comply with specified requirements.

F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5. REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces or top surface of prime-painted deck immediately after installation and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 40 00
FORMED METAL FRAMING

1. PART I - 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 This Section includes the following:

1. Load-bearing wall framing.
2. Floor joist framing.
3. Exterior non-load bearing wall framing.
4. Roof rafter framing.
5. Ceiling joist framing.
6. Soffit framing.

B. Related requirements:

1. Section 092216 "Non-Load-Bearing Steel Framing" for interior non-load bearing, metal-stud framing, and ceiling-suspension assemblies.

1.3. PRECONSTRUCTION MEETINGS

A. Preconstruction Conference: Conduct conference at Project site.

1.4. SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings

1. Provide Shop Drawings prepared by cold-formed metal framing manufacturer.
2. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
3. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
4. Shop drawings shall be stamped by a professional engineer registered in the jurisdiction of the project.

C. Delegated-Design Submittal: For cold-formed steel framing by Specialty Structural Engineer (SSE).

1.5. INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: Code Compliance certificates for studs and tracks

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Evaluation Reports: For cold-formed steel framing

1. Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.

1.6. QUALITY ASSURANCE

A. Manufacturer Qualifications: Member in good standing of the Steel Framing Industry Association (SFIA).

1. Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.

B. Provide certification of code compliance with the “Code Compliance Certification Program” implemented by the Steel Framing Industry Association (SFIA).

C. Provide documentation on the qualifications of the contractor that will install the cold-formed steel framing. Documentation to include contractor’s recognition in the Steel Framing Industry Association’s (SFIA) “Contractor Certification Program.”

D. Product Tests: Mill certificates or data from a qualified independent testing agency [or in-house testing with calibrated test equipment,] indicating steel sheet complies with

requirements, including base-steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

F. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One- and Two-Family Dwellings."

G. Comply with the following AISI specifications and standards:

1. AISI S100 "North American Specification for the Design of Cold-Formed Steel Structural Members."
2. AISI S200 "North American Standard for Cold-Formed Steel Framing - General Provisions."
3. AISI S201 "North American Standard for Cold-Formed Steel Framing - Product Standard."
4. AISI S202 "Code of Standard Practice for Cold-Formed Steel Structural Framing."

1.7. DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling, as required in AISI's "Code of Standard Practice."

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. Provide products by Steel Framing Industry Association Members in good standing (listing found at http://www.archtest.com/certification/SFIA_SteelFraming_Intertek.aspx).

2.2. REQUIREMENTS

A. Delegated Design: Engage a qualified Specialty Structural Engineer to design cold-formed steel framing as defined in Section 014000. The design professional, individual or organization having responsibility for the design of the specialty items. This responsibility shall be in accordance with the state's statues and regulations governing the professional registration and certification of architects or engineers.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: [As indicated on Drawings] <Insert Design Loads>
2. Deflection Limits: Design framing systems to withstand [design loads] without horizontal and vertical deflections greater than the following:

a. Exterior Load-Bearing Wall Framing: Horizontal deflection of [1/240] [1/360] [1/600] of the wall height.
b. Interior Load-Bearing Wall Framing: Horizontal deflection of [1/240] [1/360] of the wall height under a horizontal load of 5 lbf/sq. ft.
c. Exterior Non-Load-Bearing Framing: Horizontal deflection of [1/240] [1/360] [1/600] [1/720] <Insert ratio> of the wall height.
d. Interior Non-Load-Bearing Framing: Horizontal deflection of [1/240] [1/360] of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).
e. Floor Joist Framing: Vertical deflection of [1/360] [1/480] for live loads and l/240 for total loads of the span.
f. Roof Rafter Framing: Vertical deflection of [1/120] [1/240] [1/360] of the horizontally projected span for live loads.
g. Ceiling Joist Framing: Vertical deflection of [1/120] [1/240] [1/360] of the pan for live loads and 1/240 for total loads of the span.

C. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

D. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

1. Upward and downward movement of [1/2 inch (13 mm)] [3/4 inch (19 mm)] [1 inch (25 mm)] [1-1/2 inches (38 mm)].

E. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

F. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

G. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and ASTM C955.
H. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3. COLD-FORMED STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with [ASTM C955] [AISI S200 and ASTM C955, Section 8] [AISI S240] f or conditions indicated.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: [ST33H (ST230H)] [ST50H (ST340H)] [As required by structural performance] [33 KSI for 18 gauge (0.0428) and lighter and 50 KSI for 16 gauge (0.0538) and heavier.].
2. Coating: [CP 60: G60 (Z180), A60 (ZF180), AZ50 (AZM150), or GF30 (ZGF90)] [CP 90: G90 (Z275), AZ50 (AZM150), or GF45 (ZGF135)] <Insert coating designation>.[Note: For IBC 2012: Per ASTM C955, Paragraph 4.4 - Members shall have a protective coating in accordance with Table 1. CP-60 minimum. Table 1 of C955 lists G60, A60, AZ50 and GF30 as allowable coatings for use for coating designator CP60; and G90, AZ50 and GF45 for coating designator CP90. The coating designators indicate that each of these coatings meet the requirements of C955.

C. Steel Sheet for [Vertical Deflection] [Drift] [Rigid] [Foundation] Clips: ASTM A1003/A1003M, ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: [33 (230)] [50 (340), Class 1] [As required by structural performance].
2. Coating: CP 90: G90 [recommended](Z275), AZ50 (AZM150), or GF45 (ZGF135).

2.4. LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, with minimum base metal thickness, flange width and section properties required to meet design requirements.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and matching properties of steel studs.

C. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths required, and with minimum base metal thickness, flange width and section properties required to meet design requirements.

D. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated.

2.5. FLOOR JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, [unpunched,] [punched,] [punched, with enlarged service holes,] with stiffened flanges, and with minimum base metal thickness, flange width and section properties required to meet design requirements.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths required, unpunched, with unstiffened flanges, and with minimum base metal thickness, flange width and section properties required to meet design requirements.

2.6. ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows: with minimum base metal thickness, flange width and section properties required to meet design requirements.

2.7. CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, [unpunched,] [punched with enlarged service holes,] [punched with standard holes,] with stiffened flanges, and with minimum base metal thickness, flange width and section properties required to meet design requirements.

2.8. SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and with minimum base metal thickness, flange width and section properties required to meet design requirements.

2.9. FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, required by design requirements.

2.10. ANCHORS, CLIPS, AND FASTENERS

A. SSE shall include the following anchors, clips and fasteners required by the design requirements:

1. Steel Shapes and Clips.
2. Anchor Bolts.
3. Expansion Anchors.
4. Power-Actuated Anchors if allowed by Structural Engineer of Record.
5. Mechanical Fasteners, head type: low-profile head beneath sheathing, manufacturer's standard elsewhere.
6. Welding Electrodes.

2.11. MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1-part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, ¼-inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.12. FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

3. PART 3 – EXECUTION

3.1. EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3. INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to ASTM C1007 and AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 07210 "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4. LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as indicated on shop drawings.
B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on shop drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumber walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically [48 inches (1220 mm)] [as indicated on Drawings] [as indicated on Shop Drawings] <Insert dimension>. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5. JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing indicated on Shop Drawings.
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as indicated on Shop Drawings.

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as indicated on Shop Drawings.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6. FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7. REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00
METAL FABRICATIONS

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 the following:

1. Loose bearing and leveling plates.
2. Loose steel lintels.
3. Shelf angles.
4. Steel framing and supports for mechanical and electrical equipment.
5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
6. Metal edgings.
7. Miscellaneous metal trim.

B. Related Sections include the following:
1. Division 6 Section "Rough Carpentry" for metal framing anchors and other rough hardware.

1.3 SUBMITTALS

A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

B. Provide samples representative of materials and finished products as may be requested by Architect.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. 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.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel, "AWS D1.2 "Structural Welding Code-Aluminum," and AWS D1.3 "Structural Welding Code-Sheet Steel."

1.5 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. 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.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

D. Gray-Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.

E. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

D. Machine Screws: ASME B18.6.3.

E. Lag Bolts: ASME B18.2.1.

F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

G. Plain Washers: Round, carbon steel, ASME B18.22.1.

H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.

I. 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 testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.5 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Shear and punch metals cleanly and accurately. Remove burrs.

C. 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 work.

D. Weld corners and seams continuously 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 welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, 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 (Range): 120 deg F, ambient; 180 deg F, material surfaces.

I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

J. Remove sharp or rough areas on exposed traffic surfaces.

K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.7 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.8 LOOSE STEEL LINTELS

A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. General: Provide steel framing and supports indicated and as necessary to complete the Work.

C. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches O.C., unless otherwise indicated.
2. Furnish inserts if units must be installed after concrete is placed.

D. Galvanize miscellaneous framing and supports where indicated.

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches O.C., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:

1. Exterior.
2. Interior, where indicated.

2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instruction and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Center nosings on tread widths with noses flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

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 welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.3 SETTING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 51 00
METAL STAIRS

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 the following:

1. Preassembled steel stairs with precast-terrazzo treads and landings.

2. Preassembled steel stairs with concrete treads & metal pan risers

B. Related Sections include the following:

1. Division 5 Section "Ornamental Railings" for ornamental metal handrails and railings fabricated from stock components.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.

1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress.
2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

1.4 SUBMITTALS

A. Product Data: For metal stairs.

B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. 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.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.

B. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 COORDINATION

A. Coordinate installation of anchorages for metal stairs. 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.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

D. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

F. Steel Bars for Gratings: ASTM A 36/A 36M.

G. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

H. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 569/A 569M; or structural quality, complying with ASTM A 570/A 570M, Grade 30, unless another grade is required by design loads.

I. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.2 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Machine Screws: ASME B18.6.3.

D. Lag Bolts: ASME B18.2.1.

E. Plain Washers: Round, carbon steel, ASME B18.22.1.

F. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.

G. 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 testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.3 PAINT

A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."

2.4 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding, unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Architectural class.

C. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.

D. 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 work.

E. Weld connections 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 welding flux immediately.
4. Weld exposed corners and seams continuously, unless otherwise indicated.
5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.5 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate stringers of structural-steel tubes, channels, or plates, or a combination, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

1. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal Risers, Subtread Pans, and Subplatforms: Form to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch.

1. Steel Sheet: Uncoated cold-rolled steel sheet, unless otherwise indicated.
2. Steel Sheet: Uncoated hot-rolled steel sheet, unless otherwise indicated.
3. Directly weld metal pans to stringers; locate welds on side of subtreads to be concealed by concrete fill. Do not weld risers to stringers.
4. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
5. Shape metal pans to include nosing integral with riser.
6. Attach extruded abrasive nosings to risers. Make nosings full width of tread, with noses flush with riser faces and level with tread surfaces.
7. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.6 STAIR HANDRAILS AND RAILINGS

A. General: Comply with applicable requirements in Division 5 Section "Ornamental Handrails and Railings" for handrails and railings, and as follows:

1. Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.
2. Fabricate newels of steel tubing and provide newel caps of pressed steel, as shown.
3. Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
4. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

2.7 FINISHES

A. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed products:

1. Interiors (SSPC Zone 1A): SSPC SP 3, "Power Tool Cleaning."

D. Apply shop primer to prepared surfaces of metal stair components, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place or existing construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

F. Field Welding: Comply with the following requirements:

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 welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Install precast treads with adhesive supplied by manufacturer.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

END OF SECTION 05 51 00

SECTION 05 73 00
ORNAMENTAL RAILINGS

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. This Section includes the following:

1. Metal railings with mesh infill.

2. Post supported metal railings with metal pickets.
3. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, wall protection, or roof areas.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Stainless Steel: 60 percent of minimum yield strength.
2. Steel: 72 percent of minimum yield strength.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Provide handrails and railings systems, including top rail, bottom rail, end posts, intermediate posts, cables, and cable hardware capable of withstanding the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections in conformance with applicable codes.
1. Top Rail of Guards: Shall withstand the following loads:
    a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction.
    b. Uniform load of 50 lbf-ft (0.07kN-m) applied horizontally and concurrently with the uniform load of 100 lbf-ft (0.14kN-m) applied vertically downward.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails not Serving As Top Rails: Shall withstand the following loads:
   a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction.
   b. Uniform load of 50 lbf-ft (0.07kN-m) applied in any direction
   c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Guard Infill Area: Shall withstand the following loads:
   a. Concentrated horizontal load of 200 lbf (0..89 kN) applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Loads need not be assumed to act concurrently with loads on top rails in determining stress on guard.

1.4 SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

B. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Welded connections.

C. Welding certificates.

D. Qualification Data: For professional engineer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.6 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for 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.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.

1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.

2.2 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 304.

B. Pipe: ASTM A 312/A 312M, Grade TP 304.

C. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.

D. Plate and Sheet: ASTM A 666, Type 304.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Castings: Either gray or malleable iron, unless otherwise indicated.

1. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2. Malleable Iron: ASTM A 47/A 47M.

E. Welded-Wire Mesh: Intermediate-crimp, square pattern, 2-inch welded-wire mesh, made from 0.192-inch nominal diameter carbon steel wire

1. Wire mesh shall be as manufactured by McNichols Company or architect's approved equal.

2.4 FASTENERS

A. General: Provide the following:

1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
2. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
3. Dissimilar Metals: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work, unless otherwise indicated.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Anchors: Provide cast-in-place or torque-controlled expansion anchors, 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.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 9 painting Sections.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

2.6 FABRICATION

A. General: Fabricate railings 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 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 reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

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.

G. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

H. Form changes in direction as follows:

1. As detailed.

I. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member

throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of hollow railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform finish indicated, free of cross scratches.

C. Finish: As selected by Architect.

2.9 STEEL AND IRON FINISHES

A. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

B. Primer Application: Spray apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

C. Baked-Powder-Coat Finish (Alternate): 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: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

   1. Do not weld, cut, or abrade surfaces of 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 variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.5 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 00

SECTION 06 10 00
ROUGH CARPENTRY

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 the following:
   1. Wood blocking, cants, and nailers.
   2. Wood furring and grounds.

B. Related Sections include the following:

   1. Division 6 Section "Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

   1. NELMA - Northeastern Lumber Manufacturers Association.
   2. NLGA - National Lumber Grades Authority.
   3. SPIB - Southern Pine Inspection Bureau.
   4. WCLIB - West Coast Lumber Inspection Bureau.
   5. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 QUALITY ASSURANCE

A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all rough carpentry, unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:
1. Blocking.
2. Cants.
3. Nailers.
4. Furring.
5. Grounds.

B. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.

2. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1..

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.

E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate 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.

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of

ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION 06 10 00

SECTION 06 20 23
INTERIOR 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. Interior trim.

B. Related Requirements:

1. Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Division 9 Section "Painting" for priming and back priming of interior finish carpentry.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.

2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

C. Samples for Verification:

1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.

B. Sample Warranty: For manufacturer's warranty.

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.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

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.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

C. Softwood Plywood: DOC PS 1.

D. Hardboard: AHA A135.4.

E. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

F. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: For applications indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction, and comply with testing requirements; testing by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.

C. For exposed items indicated to receive a stained or natural finish, use organic resin chemical formulations that do not contain colorants, and provide materials that do not have marks from spacer sticks on exposed face.

D. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
2. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

F. Application: All interior lumber and plywood.

2.3 INTERIOR TRIM

A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Maple; Clear A Finish; NHLA.
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Use for lumber trim wider than 6 inches.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

B. Hardwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.

1. Species: Maple.

2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Matching: Selected for compatible grain and color.

2.4 MISCELLANEOUS MATERIALS

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.

2.5 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim except shoe and crown molds.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

C. When required wood trim exceeds 8" it shall be made of glued up and shall be minimum 5/4”. Grain matching to be shown in shop drawings for Architect’s approval.

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.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install 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. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
2. Install trim after gypsum-board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior 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 interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

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 06 20 23

SECTION 06 41 13
INTERIOR ARCHITECTURAL WOODWORK

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 the following:

1. Wood cabinets.

B. Related Sections include the following

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories handrail brackets and finishing materials and processes.

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 details full size.

2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for items installed in architectural woodwork.

C. Samples for Initial Selection:

1. Shop-applied transparent finishes.

D. Samples for Verification:

1. Lumber with or for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
3. Veneer-faced panel products with or for transparent finish, 12 by 24 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
4. Corner pieces as follows:

   a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
   b. Miter joints for standing trim.

5. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For fabricator.

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 in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and transparent-finished wood doors that are required to be of same species as woodwork.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Wosrk if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where woodwork is 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.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section "Finish Hardware" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: White Maple, quarter sawn or cut.

C. Wood Species for Opaque Finish: Eastern white pine, sugar pine, or western white pine.

D. Wood species and Cut for Theater wood base: Eastern White Pine, quarter sawn or cut.

E. Wood species and Cut for Theater wood base at wood floor: White Oak, quarter sawn or cut

F. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
4. Softwood Plywood: DOC PS 1.
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

2.2 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. AWI Type of Cabinet Construction: As indicated.

C. Wood Species and Cut for Exposed Surfaces: Clear White Maple.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.

1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:

1. Interior Type A: Low-hygroscopic formulation.
2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
3. Kiln-dry materials before and after treatment to levels required for untreated materials.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Finish Hardware".

B. Provide cabinet hardware as indicated on the drawings.

C. Shelf Rests: BHMA A156.9, B04013; metal.

D. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. 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.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

I. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 13

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

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 the following:

1. Cold-applied, cut-back asphalt dampproofing.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of product specified, including data substantiating that materials comply with requirements for each dampproofing material specified. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.

1. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Substrate: Proceed with dampproofing only after substrate construction and penetrating work have been completed.

B. Weather Limitations: Proceed with dampproofing only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements.

C. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Cold-Applied, Asphalt Emulsion Dampproofing:

a. Euclid Chemical Co.
b. Karnak Chemical Corporation.
c. Koppers Industries, Inc.

2.2 BITUMINOUS DAMPPROOFING

A. General: Provide products recommended by manufacturer for designated application.

1. Odor Elimination: For interior and concealed-in-wall uses, provide type of bituminous dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.

B. Cold-Applied, Asphalt Emulsion Dampproofing: Asphalt-based emulsions recommended by the manufacturer for dampproofing use when applied according to the manufacturer's instructions.

1. Trowel Grade: Emulsified asphalt mastic, prepared with mineral- colloid emulsifying agents suitable for application in a relatively thick film, complying with ASTM D 1187, Type I.
2. Trowel Grade: Emulsified asphalt mastic, prepared with mineral- colloid emulsifying agents and containing fibers other than asbestos, complying with ASTM D 1227, Type III or IV.

2.3 MISCELLANEOUS MATERIALS

A. Primer: Asphalt primer complying with ASTM D 41, for asphalt-based dampproofing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer.

B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.

C. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints.

D. Install separate flashings and corner protection stripping, as recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and with manufacturer's recommendations. Pay particular attention to requirements at building expansion joints, if any.

E. Prime substrate as recommended by prime materials manufacturer.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's recommendations except where more stringent requirements are indicated and where Project conditions require extra precautions to ensure satisfactory performance of work.

B. Application: Apply dampproofing to the following surfaces.

1. Where indicated on the Drawings.

3.3 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

A. Trowel Grade: Trowel apply a coat of mastic asphalt dampproofing onto substrate at a minimum rate of 7 gal./100 sq. ft., to produce an average, dry-film thickness of 70 mils but not less than 30 mils at any point.

END OF SECTION 07 11 13

SECTION 07 21 00
THERMAL INSULATION

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 the following:

1. Concealed building insulation.

2. Exterior foundation wall insulation

3. Under slab insulation

4. Spray-on Acoustical Insulation for walls & Ceilings at Air Handler Room 115

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Firestopping" for fire safing insulation.
2. Division 9 Section “Gypsum Board Assemblies” for acoustical insulation.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of insulation product specified.

C. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: AT M E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

1. Glass-Fiber Insulation:

a. CertainTeed Corporation.
b. Knauf Fiber Glass GmbH.
c. Owens-Corning Fiberglas Corporation.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Cellular Glass Insulation: Rigid cellular glass thermal insulation with closed-cell structure complying with ASTM C 552 for type and with other requirements indicated below:

1. Type I (flat block).
2. Type IV (board) faced on both sides with manufacturer's special kraft paper sheets laminated to glass block with asphalt.
3. Unfaced insulation passes ASTM E 136 for combustion characteristics.

C. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
2. Mineral-Fiber Type: Fibers manufactured from glass.
3. Mineral-Fiber Type: Fibers manufactured from slag or rock wool.
4. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
5. Certa Spray, CertainTeed Corporation.

D. Exterior Foundation Wall Insulation: Extruded Polystyrene (XPS) Rigid Foam Insulation complying with ASTM C578 Type X, 15 psi minimum; R-5.0 per inch; thickness as shown on drawings
1. Owens Corning Foamular 150
2. Equal as approved by Architect

E. Under Slab Insulation: Extruded Polystyrene (XPS) Rigid Foam Insulation complying with ASTM C578, Compressive Strength 40 psi minimum, R-5.0 per inch; thickness as shown on drawings.
1. Owens Corning Foamular LT40
2. Equal as approved by Architect.

F. Wall & Ceiling Spray-on Acoustical Insulation at Air Handler Room 115: International Cellulose Corporation K-13 Custom Spray System; 2” thick at walls & ceilings; color to be selected from manufacturer’s standard color selection.

2.3 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches in diameter, length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

2.4 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

B. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch thick, formed under heat and pressure, of standard sizes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Commencing installation of building insulation items shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations including removing projections that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply single layer of insulation to produce R value indicated, unless multiple layers are otherwise shown or required to produce R value indicated.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

C. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

D. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.5 PROTECTION

A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 21 19

FOAMED IN PLACE INSULATION

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. This Section includes the following:

1. High density, closed celled, low VOC, water-blown polyurethane foam insulation, at the underside of roofing assembly.

1.3 REFERENCES

A. American Society for Testing and Materials International (ASTM)
   1. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
   2. ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials
   3. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials
   4. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials
   5. ASTM E 283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
   6. ASTM C 1338: Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

B. National Fire Protection Association (NFPA))

   1. NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data on materials, describing insulation properties, surface spread, smoke development, oxygen index and NY State Fire Gas Toxicity.

C. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

D. Evaluation Report: Evidence of compliance of foam-plastic insulations with International Building Code (IBC), International Residential Code (IRC), International Energy Conservation Code (IECC), International Association of Plumbing and Mechanical Officials (IAPMO).

E. Manufacturer's certificate showing the Huntsman installation certification

F. Manufacturer's installation instructions.

G. Document R-Value of insulation products.

H. Products which contain recycled content shall be certified in accordance with the Submittal Requirements of this section.

I. Sample warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Product produced in an ISO9001 registered factory.

B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.

C. Installer Qualifications:
1. Contractor performing work under this section shall be authorized by Huntsman Building Solutions in the art of applying spray polyurethane foam insulation.
2. Provide current HUNTSMAN BUILDING SOLUTIONS Authorized Contractor Certificate.

D. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.6 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three (3) years documented experience and certified by the manufacturer.

1.7 REGULATORY REQUIREMENTS

A. Conform to ASTM E84 code for flame and smoke ratings, non-combustibility, and oxygen. Index ASTM D2863 and NY State Fire Gas Toxicity.

1.8 MOCK-UP

A. Provide mock-up of polyurethane spray foam insulation.

B. Construct mock-up, three (3) feet long by three (3) feet wide, including substrate construction of typical roof condition.

C. Locate where directed by Architect.

D. Mock-up may remain as part of the Work.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Toxicity/Hazardous Materials:
   1. Outgassing/Reactivity:
      a. Formaldehyde: Products containing urea-formaldehyde will not be permitted.
      b. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted.

B. Air tightness: Meet specific standards of the 2018 International Energy Conservation Code with blower door testing such that the assemblage of materials and components complies with an air leakage not greater than 0.04 cfm/sf under a pressure differential of 0.3 inch of water gauge (75 Pa) when tested in accordance with ASTM E2357, ASTM E1677 or ASTM E283.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

B. Store materials in an area protected from freezing and overheating damage and in accordance with manufacturer’s instructions.

C. Protect materials during handling and application to prevent damage and contamination.

D. Comply with manufacturer’s written instructions for handling, storing and protection during installation.

1.11 WARRANTY

A. Manufacturer's standard limited lifetime warranty.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS / MANUFACTURERS

A. Closed Cell Polyurethane Foam Insulation:

1. HEATLOK HFO High Lift as manufactured by Huntsman Building Solutions, 3315 East Division Street, Arlington, TX 76011; Tel. 855-942-7273, www.huntsmanbuildingsolutions.com

B. Thermal Barrier Coating (15 minute):

1. DC-315 as manufactured by International Fireproof Technology, Inc., 17528 Von Karman Avenue, Irvine, CA 92614.; Telephone: 949-975-8588; www.painttoprotect.com.

2.2 MATERIALS

A. Two-part spray applied closed cell polyurethane foam insulation conforming to the following:
1. Thermal Resistance: ASTM C518; 1" = R-6.3; 3.5" = R-26.
2. Water Vapor Transmission: ASTM E96; 1.56 Perms at 1" thickness.
3. Compressive Strength: ASTM D1621; 34.8 psi (nominal).
4. Core Density: ASTM D1622; 2.0 – 2.4 lbs./ft^3 (nominal).
5. Closed Cell Content: ASTM D2856; 91%.
6. Tensile Strength: ASTM D1623; 101.3 psi (nominal).
7. Water Absorption: ASTM D2842; 0.87%.
8. Dimensional Stability (158 Degree F/97% Relative humidity): ASTM D2126 (percent change in volume); -3.7%.
9. Air Leakage Rate: ASTM E2178; less than 0.02 L s^1 m^1
10. Corrosion: No significant corrosion when in contact with steel under 85 percent relative humidity.
11. Bacterial or Fungal Growth: ASTM G-21; No growth; no material deterioration.
12. Flame Spread Index: ASTM E84; Class I, 10-15 (based on 4-inch thickness.)
13. Smoke Developed Index: ASTM E84; Class I, 350-400. (based on 4-inch thickness.)

C. Thermal Barrier Coating (15 minute): Intumescent coating designed for application as a 15-minute thermal barrier substitute over polyurethane spray foam insulation material.
1. Application Rates:
   a. Thermal barrier shall not exceed 24 wet mils (WFT) in one pass.
   b. Finish: Flat.
   c. Color: Ice gray.
   d. Volume Solids: 67%.
   e. V.O.C. Content: 47g/l.

f. Drying Time: @77 degrees F & 50% RH to touch 1-2 hours to recoat 2 to 4 hours.
g. Type of Cure: Coalesence.
h. Flash Point: None.
i. Reducer/Cleaner: Water.
j. Shelf Life: 1 year (unopened).
k. Packaging: 5 & 55-gallon containers.
l. Application: Brush, roller, conventional and airless spray.
m. Formaldehyde: None.
n. Flame Spread Index: ASTM E84; 0.
o. Smoke Developed Index: ASTM E84; less than 25.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

1. Verify existing conditions before starting work.

2. Verify that substrate is free of any foreign material that will impede application.

3.. Verify that other work on and within spaces to be insulated is complete prior to application.

4. Notify Architect of conditions that would adversely affect the application.

5. Beginning of installation means applicator accepts existing conditions.

3.2 PREPARATION

A. Comply with manufacturer's written installation instructions for preparing substrates indicated to receive insulation.

B. Mask and protect adjacent surfaces from overspray or damage.

C. Remove foreign materials, dirt, grease, oil, paint, laitance, efflorescence, and other substances that will affect application.

3.3 APPLICATION

A. Site mix liquid components manufactured by Huntsman and supplied by Independent Huntsman Licensed Dealer

B. Apply insulation in accordance with manufacturer’s written application instructions.

C. Apply insulation to a reasonably uniform monolithic density without voids.

D. Apply to minimum cured thickness as scheduled.

E. Extend insulation in thickness indicated to envelop entire area to be insulated.

F. Where building is designed to meet the specific airtightness standards of the Energy Star Program, apply insulation as recommended by the manufacturer to provide airtight construction. Apply caulking to seal joints between structural assemblies.

G. Provide 15-minute thermal barrier at all areas of spray foam insulation that is exposed.

3.4 FIELD QUALITY CONTROL

A. Inspect application for insulation thickness and density.

3.5 PROTECTION OF FINISHED WORK

A. Do not permit subsequent work to disturb applied insulation.

3.6 CONSTRUCTION WASTE MANAGEMENT

A. Plan and coordinate the insulation work to minimize the generation of offcuts and waste. Reuse insulation scraps to the maximum extent feasible.

B. Separate and recycle waste materials in accordance with the Waste Management Plan and to the extent economically feasible.

3.7 INSULATION SCHEDULE

A. Location and Average Cured Thickness of Insulation:

1. At Entire underside of all roof assemblies where shown (R-38)
(Closed Cell)

END OF SECTION

SECTION 07 27 26
FLUID-APPLIED MEMBRANE AIR BARRIERS

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 fluid-applied, vapor-retarding membrane air barriers for brick veneer cavity wall application & behind thin-set ground face CMU base assembly. See section 09 24 23 for air moisture barrier product required at stucco application.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

C. Product data for each type of product specified, including data substantiating that materials comply with requirements for each material specified. Include recommended

method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.

D. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly , 150 sq. ft., 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. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
b. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air 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.
3. 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. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 VAPOR-RETARDING MEMBRANE AIR BARRIER

A. Brick Veneer Cavity Wall Application : Fluid-Applied, Vapor-Retarding Membrane Air Barrier

1. Products: Subject to compliance with requirements, provide the following:

a. Synthetic Polymer Membrane:

1) Hohmann & Barnard Enviro-Barrier VP.
2) Equal as approved by Architect.

2. Physical and Performance Properties:

a. Air Permeance: Maximum 0.0008 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
b. Vapor Permeance: Greater tan 10 perm; ASTM E 96/E 96M.
c. Ultimate Elongation: Minimum 600 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.

D. Modified Bituminous Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

E. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

F. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

G. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

H. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

I. Modified Bituminous Transition Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

J. Elastomeric Flashing Sheet: ASTM D 2000, minimum 50- to 65-mil- thick, cured sheet neoprene with manufacturer-recommended contact adhesives and lap sealant with stainless-steel termination bars and fasteners.

K. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07920 "Joint Sealants."

L. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

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 air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. 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.

G. 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.

H. Bridge expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to 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 the 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 so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

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. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. 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.

E. Wall Openings: Prime concealed perimeter frame surfaces of windows, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counter flashings or ending in reglets with termination mastic.

I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

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 according to 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.

B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 40 mils, applied in one or more equal coats.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. 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. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Air-barrier dry film thickness.
3. Continuous structural support of air-barrier system has been 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 have been maintained.

6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish mouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers ASTM E 1186, chamber depressurization using blower door testing.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each [**600 sq. ft.**] <**Insert value**> of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to 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 according to 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 07 27 26

SECTION 07 54 19
PVC ROOFING

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. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules, and keynotes, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Clean all residual material from the roof deck.

2. Install a new fully adhered reinforced 60 mil thick polyvinyl chloride (PVC) roofing system, insulation, cover board, flashing, stripping and related accessories.

3. Install standing seam PVC ribs heat welded to the surface of the sloped PVC roofs.

4. Install 2 pipe snow guard assemblies at all sloped roof eaves, and up slope from the eave where shown on the drawings.

   a. Install sections of solid wood blocking as shown on the drawings in place of the roof insulation, to support the snow guard brackets.

5. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

B. Related Requirements

1. Masonry - Division 4

2. Carpentry - Division 6

3. Sheet Metal Flashing & Accessories - Section 07 62 00

1.3 CODE APPROVAL REQUIREMENTS

A. Install roofing and insulation system components to meet the following minimum requirements:

1. New York State Uniform Fire Prevention and Building Code, which includes by reference the New York State Energy Conservation Code.

2. Underwriters Laboratories Inc. Class A External Fire Rating for roof assemblies tested in accordance with ASTM E 108 or UL 790.

3. Underwriters Laboratories Inc. Standard 1256 for roof assemblies with foam insulation.

4. Minimum wind uplift pressure calculated using ASCE 7 and a safety factor of 2:
   a. Field Zone - 60 psf
   b. Perimeter Zones - 100 psf
   c. Corner Zone - 150 psf

B. Provide written certification from the roof material Manufacturer, before beginning work, to confirm the roofing system meets these requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with not less than 5 continuous years experience performing roofing work similar to that required for this project, employing personnel skilled in the specified work.

   a. The Installer shall directly employ the personnel performing the work of this section.

   b. The Installer shall have a full time supervisor/foreman on the roof when roofing work is in progress. The Supervisor shall have a minimum of 5 years experience in roofing work similar in nature and scope to this project, and speak fluent English.

      i. Identify the intended Supervisor, and provide his resume prior to contract award if requested.

2. The Installer shall provide a reference list of at least three projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:

   a. The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number.

   b. Provide the reference list prior to contract award if requested.

3. The Installer shall be acceptable to or licensed by the Manufacturer of the primary roofing materials, and provide written certification from the Manufacturer to confirm this prior to award if requested.

B. Material Quality: Obtain each product, including the insulation, cover board, PVC roofing and flashing, and the cements, primers and adhesives from a single Manufacturer, which has

manufactured the same products in the United States of America for not less than 5 continuous years.

1.5 PRE-CONSTRUCTION CONFERENCE:

A. Meet at the project site approximately two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How the building will be kept watertight as the work progresses.

2. How roofing will be coordinated with the installation of the new equipment curbs, barrier board, vapor barrier, insulation, cover board, flashings, roof top equipment and other items to provide a watertight installation.

3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.

4. The condition of the substrate (deck), curbs, penetrations and other preparatory work needed.

5. Incomplete submittals; note that progress payments will be not processed until all submittals are received and approved.

6. The construction schedule, forecast weather, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.

7. A schedule for Manufacturer and Architect inspections.

1.6 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work:

1. A pre-work site and building inspection report with photos to document conditions before work starts.

2. Written certification from the Manufacturer which states that the Installer is acceptable or licensed to install the specified roofing; if not previously provided.

3. Manufacturer’s technical data sheets for each component of the roofing system. Material sample submittals are not needed or wanted.

4. Samples of the Contractor’s guarantee and Manufacturer’s warranty forms.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.

1. Submittals shall be prepared and made by the firm that will perform the actual work.

2. Provide 6 copies of paper submittals, or provide electronic submittals on USB drives, in pdf format, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.7 JOB CONDITIONS (CAUTIONS & WARNINGS)

A. Do not use oil base or plastic roof cement with PVC roofing. Do not allow waste products, (petroleum grease or oil, solvents, vegetable or mineral oil, animal fat) or direct steam venting to come in contact with any roofing, insulation or flashing product. Do not expose PVC roofing and accessories to a temperature in excess of 175 degrees Fahrenheit.

B. Splice cleaner, primers, cements and bonding adhesives are flammable. Do not breathe vapors or use near fire or flame or in a confined or unventilated area. Dispense only from a UL listed or approved safety can.

C. Remove empty adhesive and solvent containers and contaminated rags from the roof daily and legally dispose of them daily.

D. Do not apply adhesives next to open ventilation system louvers, or windows. Temporarily cover the louvers and windows with 6 mil fire retardant polyethylene and prevent adhesive odors from entering the building. Remove temporary covers at the end of each days work.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, bearing labels which identify the type and names of the products and Manufacturers, with the labels intact and legible.

B. Cover all stored materials, except rolls of PVC and sealed cans of adhesives, with watertight tarpaulins installed immediately upon delivery.

C. Immediately remove any insulation which gets wet from the job site.

D. Do not overload the structure when storing materials on the roof.

E. Store and install all material within the Manufacturer’s recommended temperature range.

F. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.9 GUARANTEE AND WARRANTY

A. Provide a written Manufacturer's Full System Warranty which warrants that the roofing system, including the insulation, cover board, PVC roofing and flashings, will remain in a watertight condition for a twenty year period beginning upon Final Completion.

1. Guarantee coverage shall remain in effect for gust wind speeds up to 72 miles per hour, measured at ground level at the site.

2. Guarantee coverage shall have no dollar value limit.

B. Provide a written Contractor's Guarantee which guaranties that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: leakage, adhesive separation, delamination, lifting, loosening, splitting, cracking, and undue expansion or shrinkage.

2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as guaranteed at his own expense:

3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to affect guaranteed repairs.

4. Guarantee coverage shall remain in effect for gust wind speeds up to 72 miles per hour, measured at ground level at the site.

5. Guarantee coverage shall have no dollar value limit.

6. Provide one Contractor’s Guarantee that covers “all work performed” when a single contractor is awarded work specified in multiple Sections.

7. The Contractor’s Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor’s Guarantee.

C. The Manufacturer’s Warranty and Contractors Guarantee shall take effect no more than 30 days before the completion of all punch list work.

D. Guarantee and Warranty coverage may be cancelled, for the affected portion of the roof, if the work is damaged by winds in excess of 72 mph, by hail, lightning, insects or animals, by failure of the structural substrate, by exposure to harmful chemicals, by other trades on the roof, or by vandalism, or if the Owner fails to maintain the roof in accordance with, or makes roof alterations contrary to, the Manufacturer’s printed recommendations.

1. Guarantee and Warranty coverage shall be reinstated, for the remainder of the original period; if the Owner restores the roof to the condition it was in prior to the damage occurring.

1.10 SUBSTITUTIONS

A. PVC system components are specified as products of Sika Sarnafil Inc. to maintain the existing roof warranty. Equal products and systems from Carlisle SynTec, and Johns Manville will be accepted.

PART 2 - PRODUCTS

2.1 GENERAL

A. Primary products required for this project include:

1. Roof insulation
2. Gypsum cover board
3. PVC roofing
4. PVC Décor ribs
5. Primers and adhesives
6. Sealants
7. PVC flashing
8. Fasteners

2.2 MATERIALS:

A. Insulation:

1. Isocyanurate – Rigid cellular polyisocyanurate boards with fibrous felt/fiberglass mat facers, minimum compressive strength 20 psi, meeting ASTM C1289-01, Type II, Class 1, Grade 2, as manufactured by Sarnafil under the trade name Sarnatherm.

    a. Tapered insulation sloping 1/4 inch per foot, minimum starting thickness as indicated on the roof plan.
    b. Crickets sloping 1/2 inch per foot.
    c. 1-1/2 inch thick flat insulation to be installed on the sloped roofs.
    d. Isocyanurate tapered edge strips installed at transitions and the drain sumps.

B. Gypsum Cover Board: 1/4 and 5/8 inch thick fire resistant gypsum board decking with inorganic glass mat facers and a water resistant core, formulated in 48 x 96 inch square edge boards, UL Class A, meeting ASTM C-1177, manufactured under the trade name Dens-Deck Prime.

C. Insulation adhesive: Two component low rise elastomeric foam adhesive, installed with a mixing extruding dispenser (a Pace Cart or Heated Pleural Extruding Spray Rig) intended for application at the temperatures that will be encountered.

D. PVC: minimum .060 inches thick, fire retardant, fiberglass reinforced, PVC (polyvinyl chloride) G410 lacquer coated sheet membrane conforming to the following minimum physical properties:

Properties	ASTM Test Method	Minimum Property
Fiberglass Reinforcing Material		
Overall Thickness, min., inches	D638	0.060
Tensile Strength, min., psi	D638	1500
Elongation at Break, min. (machine x transverse)	D638	250% X 230%
Seam strength, min. (% of tensile strength)	D638	75
Properties after Heat Aging per D3045	-	-
Tensile Strength, min. % of original	D638	90
Elongation, min. % of original	D751	90

Tearing Resistance, min., lbf	D1004	10
Low Temperature Bend @ -40ºF	D136	Pass
Accelerated Weathering Test, Xenon Arc	D2565	5,000 Hrs
Cracking @ 7x magnification	-	None
Discoloration by observation	-	Negligible
Crazing @ 7 x magnification	-	None
Linear Dimensional Change, max.	D1204	0.10%
Weight Change after Immersion in Water, max.	D570	± 3.0%
Static Puncture Resistance, 33 lbf	D5602	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf	D5635	Pass

Color: as selected from the full range of Manufacturer's standard and custom colors.

E. Walkway Pads: 96 mil thick, rolled-out, polyester reinforced heat-weldable protection mat as manufactured by Sarnafil under the trade name Sarnatred, or approved equal.

F. Pipe Snow Guard Assemblies: 2 pipe snow guard assembly consisting of 1 inch diameter aluminum pipes, a 6 inch by 8 inch by 11 gauge thick Type 302 stainless steel base plate, and milled 6061-T6 aluminum snow guard block and ice flags as manufactured by Alpine Snow Guards, Model #115 with #95 Ice Flags.

2.3 RELATED MATERIALS

A. Cleaners, adhesives, sealants, caulking and fasteners furnished by the PVC system Manufacturer and as listed below. Use low VOC adhesives and cleaners as required by regulations in effect at the time of application.

1. Wall and Curb Flashing: G410 fiberglass reinforced PVC, color to match the color of the roof

2. Sealant Pocket Filler: Two component urethane sealant.

3. Corners: Prefabricated outside and inside flashing corners made of 60 mil thick unreinforced PVC, color to match the color of the roof.

4. Sealant: One component acrylic-based resin blended with solvent and inorganic adhesives.

5. PVC Adhesive: Solvent-based reactivating-type adhesive, Sarnacol 2170.

6. Insulation Plates: 3 inch square, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating.

7. Fasteners: #14 corrosion-resistant screws and toggle bolts.

8. Aluminum Tape: 2 inch wide pressure-sensitive aluminum tape.

9. Solvent Cleaner: One component liquid for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface and to clean seam areas prior to hot-air welding.

PART 3 - EXECUTION

3.1 GENERAL

A. Perform the roofing work in a watertight, workmanlike manner, meeting the guarantee requirements specified herein; in accordance with the drawings and in conformance with the Manufacturer's requirements, except as enhanced in this specification.

B. Perform work in areas with roof mounted mechanical equipment, so the work coincides with equipment shutdown periods and does not affect building occupants. Temporarily cover and protect equipment openings, and windows adjoining the work area, with 6 mil fire retardant polyethylene, so dirt, dust and odors do not enter the equipment or building. Remove covers at the end of each workday, and as soon as roof work is complete.

C. Remove debris daily and as it is generated. Do not stock-pile debris on the roof. Do not leave any debris on the roof at the end of the day. Do not overload the roof structure when moving debris.

D. Install roof system components on dry surfaces only. Do not install any items when weather conditions and outside temperatures are not suitable in accordance with the Manufacturer's recommendations.

E. Complete all work in sequence as quickly as possible so that as small an area as practicable is in the process of construction at any one time. Complete the entire area of work begun each day, the same day, and make all exposed edges watertight at the end of each day's work.

3.2 SUBSTRATE INSPECTION

A. Carefully check the deck. To be an acceptable surface for the new roofing system, it is to be dry, clean and well secured to the underlying structure and not damaged.

B. Immediately notify the Architect and Construction Manager by telephone and in writing if defects in the substrate are discovered.

3.3 INSULATION AND COVER BOARD

A. Install the insulation over the metal deck.

B. Install tapered insulation neatly cut at all miters and transitions. Do not lace corner boards.

C. Install insulation with joints offset between layers and rows a minimum of 12 inches. Cut the insulation to fit neatly at penetrations and joints. Fill any gap that is greater than 1/4 inch.

D. Fasten the bottom layer of insulation with screws and discs that penetrate through the deck a minimum of 3/4 inch and a maximum of 1-1/2 inches.

1. Install 16 screws per 4 foot x 8 foot insulation board in the field of the roof.

2. Install 28screws per 4 foot x 8 foot insulation board in 8 foot wide perimeter zones, and 32 screws per board in 8 foot by 8 foot corner zones.

3. Install screws as specified - do not use the Manufacturer's minimum fastener quantities.

4. Install subsequent layers of insulation in polyurethane foam adhesive with 1 inch diameter beads spaced 12 inches on center in the Field of the roof; space the beads 6 inches on center in 8 foot wide Perimeter Zones and 4 inches on center in 8 foot wide Corner Zones.

E. Install the gypsum cover board over the insulation with the joints staggered between rows and from joints in the insulation, in polyurethane foam adhesive.

1. Install the adhesive with 1 inch diameter beads spaced 12 inches on center in the Field of the roof, space the beads 6 inches on center in 8 foot wide perimeter zones and 4 inches on center in 8 foot wide corner zones

3.4 PVC

A. Apply adhesive to the substrate using solvent-resistant 3/4 inch nap paint rollers, in a smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only apply adhesive to those areas that will be completely covered the same day. Allow the adhesive to dry completely prior to installing the PVC.

1. Open each can of adhesive and stir it with an electric paddle mixer for at least 5 minutes before applying the adhesive. Re-stir adhesive that isn't used within two hours of initial mixing.

2. Do not punch holes in cans of adhesive and use them in a "better spreader" without mixing.

3. Replace roller covers each day; discard covers after each days use.

B. Unroll the PVC when the adhesive on the substrate is dry, overlapping adjacent sheets a minimum of 4 inches. Turn back one-half of the sheet's length and roller coat the underside of the sheet with adhesive. Roll the PVC onto the adhesive coated substrate when the adhesive has dried slightly to produce strings when touched with a dry finger. Do not allow the adhesive on the underside of the PVC to dry completely before bonding the sheet to the substrate.

C. Firmly press the sheet into the adhesive, and roll it with a water-filled, foam-covered lawn roller by frequent rolling in two directions.

D. Fold the un-bonded half of the sheet back and repeat the procedure.

E. Do not apply adhesive to seam areas.

F. Roofing installed over improperly applied adhesive, and roofing installed with blisters, ridges, mole runs and similar deficiencies shall be removed and replaced at the Contractor's expense.

G. Count and prepare a written log to show the number of pails of adhesive used in each roof area, each day, to verify to correct amount of adhesive is being applied. Provide copies of the log to the Manufacturer, and to the Architect with each Payment Requisition.

3.5 SEAMS

A. General:

1. Clean PVC surfaces prior to hot-air heat welding. Weld dry surfaces only.
2. Hot-air weld all PVC roof and flashing seams to finish 3 inches wide when automatic machine welded and 4 inches wide when hand welded.
3. Use welding equipment that is provided by or approved by the material Manufacturer.
4. Perform welding only using personnel that have successfully completed a training course provided by a Manufacturer's Technical Representative.
5. Allow hot air welding equipment to warm up for at least one minute prior to welding.

B. Hand Welding:

1. Complete hand welded seams in two stages.
2. Form a narrow but continuous weld to close the back edge of the seam, and prevent loss of hot air during the final welding.
3. Insert the nozzle into the seam at a 45 degree angle to the edge of the membrane. Heat the PVC until it begins to "flow," then press the PVC sheets together, and use a hand roller to rub the seam.
4. Use a 1-1/2 inch wide nozzle for straight seams. Use a 3/4 inch wide nozzle for corners and compound seams.

C. Machine Welding:

1. Form machine welded seams using automatic welding equipment. Follow the machine Manufacturers instructions and local codes for electric current supply, grounding and over current protection. Utilize a dedicated circuit if connected to house power, or provide a dedicated portable generator. Do not run other equipment off the generator used to power the automatic welding machine.

2. Use metal tracks laid on the membrane, under the machine welder if needed to eliminate wrinkles.

D. Quality Control of Welded Seams:

1. Visually inspect all seams as they are formed, and then check the entire length of each seam for continuity using a rounded cotter pin removal tool.

    a. Evidence that welding is proceeding correctly, is visible smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of a small amount of PVC material from the underside of the top sheet of PVC.

2. Evaluate all welded seams each day as they are formed, and at locations as directed by the Owner's or the Manufacturer's representatives.

    a. Cut and examine 1 inch wide cross section samples of welded seams at least three times a day. Correct welds that can be pulled apart before the PVC sheet separates and fails Heat weld a target patch over each test cut.

3.6 FLASHING

A. Install penetration flashings concurrently with the PVC roof as the job progresses. Do not install temporary flashings.

B. Fully adhere flashings to compatible, dry, smooth, and solvent-resistant surfaces, by applying adhesive in smooth, even coats with no gaps, globs or similar inconsistencies. Press the sheet firmly in place and thoroughly roll it with a hand roller.

C. Do not apply adhesive in seam areas that are to be welded. Overlap edges of adjoining flashing sheets a minimum of 4 inches. Hot air weld all flashing seams.

D. Install factory prefabricated corners on all inside and outside corners.

E. Mechanically fasten the top edge of all flashings 6 inches on center.

3.7 STANDING SEAM RIB

A. Install the standing seam ribs on the sloped roof in neat straight lines spaced uniformly and approximately 18 inches on center, continuously heat welded to the PVC roof.

B. Carefully layout and center the seams on each roof area before starting to install them. It is not necessary to install the ribs over the roof seams.

3.8 WALKWAY PADS

A. Install walkway pads heat welded to the roof surface to provide a 2 foot wide path where shown on the drawings, around all HVAC units and rooftop equipment.

3.9 PIPE SNOW GUARD ASSEMBLIES

A. Install snow guard assemblies over the PVC roof and over solid wood blocking installed in place of the roof insulation. Install support brackets spaced 4 feet on center, and fasten each bracket plate to the blocking and underlying metal or concrete deck with #14 flat head stainless steel screws. Set the bracket plate in sealant over a 10 inch by 12 PVC pad and cover it with a 16 inch by 18 inch PVC target patch. Join pipe sections with couplings, and install end caps onto each end of all pipes. Secure each length of pipe by drilling a 3/16 inch diameter hole in the pipe on each side of the center snow guard bracket, and inserting a 3/16 inch stainless steel cotter pin into the holes.

B. Install Ice Flags bolted to the top pipe spaced 8 inches on center, positioned 1/4 inch above the PVC roof surface.

3.10 MISCELLANEOUS

A. Provide any miscellaneous roofing, flashing, caulking, and metal work needed to leave the work complete and entirely watertight, neatly and carefully executed in a thorough and workmanlike manner.

B. Use mechanics skilled and licensed in the trades to perform mechanical and electrical work. Provide new material, couplings, transition pieces, blocking, fasteners and the like needed to complete the work.

3.11 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage, prior to performing any other work on site.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leaks and damage that weren't documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

3.12 ROOF INSPECTIONS BY MANUFACTURER

A. Arrange for the roofing Manufacturer, or his authorized representative, to make a minimum of five inspections in accordance with the following schedule and submit a written report of each inspection to the Architect.

1. First inspection during the first two days of new roof installation.
2. Second inspection when roofing is approximately one third complete.
3. Third inspection when roofing is approximately two thirds complete.
4. Fourth inspection when all roofing and flashings are installed.

5. Final inspection at the completion of all work.

B. Provide 48 hours advance written notice to the Architect, so he may have a representative attend the inspections.

C. Submit the inspection reports within one week following each inspection.

1. Payment requisitions will not be reviewed nor approved until the inspection reports are received.

END OF SECTION 07 54 19

SECTION 07 62 00
SHEET METAL FLASHINGS & SPECIALTIES

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. All plant, labor, materials, equipment, testing and services necessary to complete the work shown on the drawings, schedules and keynotes, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Sheet metal work that is compatible with the roofing systems specified, including cap flashings, hook strips, fascia, drip edges, factory fabricated roof edge systems, gutters, leaders, soffit, and miscellaneous flashings.

B. Related Requirements

1.	Masonry	- Division 4
2.	Carpentry	- Division 6
3.	PVC Roofing	- Section 07 54 19

1.3 CODE APPROVAL REQUIREMENTS

A. Fabricate and install roof perimeter flashings that comply with the NY State Uniform Fire Prevention and Building Code and with ANSI/SPRI ES-1 “Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems” requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm (Installer) with at least 5 continuous years experience performing work similar to that required for this project, employing personnel skilled in the work specified.

   a. The Installer shall directly employ the personnel performing the work of this section.

   b. The Installer shall have a full time supervisor on the roof when work is in progress. The Supervisor shall have a minimum of 5 years experience with work similar in nature and scope to this project, and speak fluent English.

2. The Installer shall provide a reference list of at least three previously completed projects of comparable size and similar design, within a fifty mile radius of this project, which may be observed by representatives of the Owner:

    a. The reference list shall include at a minimum, the completion date, a description of the work performed, the Owner's name - contact person - phone number and address and the Architect's name - contact person and phone number.

    b. The Installer shall provide the reference list prior to contract award if requested.

B. Material Quality:

1. Obtain each product from a single Manufacturer which has manufactured the same product in the United States of America for not less than 5 continuous years.

2. Obtain copper and pre-finished sheet metal items from the same mill run to maintain consistent color hue and surface finish.

C. Pre-Construction Conference: Meet at the project site between one and two weeks prior to starting work, with the Architect, Owner and other representatives concerned about the work, to discuss the following:

1. How the building will be kept watertight as work progresses.

2. How sheet metal work will be coordinated with the installation of the barrier board, vapor barrier, insulation, cover board, roofing, flashings, roof accessories and other items to provide a watertight installation.

3. Generally accepted industry practice and the Manufacturer's instructions for handling and installing his products.

4. The condition of the substrate, curbs, penetrations and other preparatory work needed.

5. Incomplete submittals; note that progress payments will not be processed until all submittals are received and approved.

6. The construction schedule, weather forecast, availability of materials, personnel, equipment and facilities needed to proceed and complete the work on schedule.

7. A schedule for Manufacturer and Architect inspections.

1.5 SUBMITTALS

A. Submit the following items far enough in advance to obtain approval prior to performing any work:

1. A pre-work site and building inspection report with photos to document conditions before work starts.

2. Shop drawings, or 2 foot long samples, for each sheet metal item, to show how it relates and fits on adjoining masonry and wood blocking assemblies, and with the roof, stripping, and flashings.

3. 6 inch square pieces of each type of sheet metal to show surface finish, texture and color.

4. Literature for each type of sheet metal, sealant and fastener.

5. A sample of the Contractor's guarantee form.

B. Simultaneously provide all technical submittals needed for this project, for all technical sections, collated by section. Incomplete submittals will not be reviewed.

1. Submittals shall be prepared and made by the firm that will perform the actual work.

2. Provide 6 copies of paper submittals, or provide electronic submittals on USB drives, in pdf format, organized in folders by Section.

C. Safety Data Sheets: Simultaneously provide all Safety Data Sheets needed for this project, for all specification sections - collated by section, in three ring binders. Provide two binders.

D. Payment requisitions will not be processed until all submittals are received and approved.

1.6 JOB MOCK-UPS

A. After the submittals are approved, prepare in actual job locations, mock-ups of cap flashings, hook strips, drip edges, fascia, factory fabricated roof edge systems, gutters, leaders, soffit panels, and all other items of sheet metal and related work, for inspection and approval by the Architect.

B. Construct each mock-up of two full lengths of metal, fastened, connected and stripped-in to the related roofing system, to show the following:

1. Type, gauge, color, cross-sectional dimensions and shape, and joint and mitering techniques.

2. Related masonry work, wood blocking, and the attachment techniques and fasteners for all wood and metal components.

3. Other sheet metal related materials and their installation techniques to fully define the detailing of each mock-up.

C. Mock-ups shall be constructed to establish the minimum standard of materials and workmanship, and to assure that completed work which matches the mock-ups will be fully functional and serve the purpose for it has been designed.

D. Approved mock-ups may be left in place and incorporated into the permanent installation. Rejected mock-ups shall be removed and replaced until an acceptable mock-up is approved.

E. Do not purchase or fabricate sheet metal items until mock-up installation, inspection and approval are completed and approval is documented in writing.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material to the site in the Manufacturer's original and unopened packaging, with intact and legible labels which identify the products and Manufacturers,

B. Cover all stored materials with watertight tarpaulins installed immediately upon delivery.

C. Do not overload the structure when storing materials on the roof.

D. Protect roof surfaces where material and equipment is placed on them, and where construction traffic occurs, with 6 mil fire retardant polyethylene, covered with 1-1/2 inch thick foam insulation, overlaid with 2 by 10 wooden planks.

1.8 GUARANTEE

A. Provide a written Contractor's Guarantee which guarantees that all work will remain free of material and workmanship defects and in a watertight condition for a five year period beginning upon Final Completion:

1. Defects include but are not limited to the following: peeling paint, leakage, adhesive separation, delamination, lifting, loosening, splitting, cracking, and undue expansion.

2. The Contractor shall make the repairs and modifications necessary to enable the work to perform as warranted at his own expense.

3. Guarantee coverage shall include removing and replacing materials installed as part of the original work, if removal is needed to affect guaranteed repairs.

4. Guarantee coverage shall have no dollar limit.

5. Guarantee coverage shall take affect no more than 30 days before the completion of all punch list work.

B. Provide one Contractor’s Guarantee that covers “all work performed” when a single contractor is awarded work specified in multiple Sections.

C. The Contractor’s Surety Company may add a rider to the Performance Bond which clarifies that Bond Coverage expires two years after Final Completion; i.e., Performance Bond Coverage does not run for the entire five year term of the Contractor’s Guarantee.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Zinc-Tin coated copper: copper sheet, coated on both sides, with a smooth uniform coating of zinc and tin, base metal weight 16 ounces per square foot, cold rolled temper, available as FreedomGray Copper by Revere.

B. Solder:
   1. Lead free / or pure tin solder for zinc-tin coated copper, Number 497 by Johnson Manufacturing.

C. Flux:
   1. Tin-bearing flux such as “Flux-N-Solder E127 with pure tin” by Johnson Manufacturing.

D. Aluminum fascias, hook strips, and miscellaneous trim: #3105-H14 alloy aluminum, minimum thickness .050 inches unless otherwise indicated, factory finished with a Fluoropolymer Kynar 500 finish, color as selected by the Architect, from the full range of custom and standard colors.

E. PVC coated metal: 25 gauge G90 galvanized steel factory coated with 20 mils of poly-vinyl chloride on the finished side, color as selected.

F. Fasteners: fabricated of stainless steel, or material that matches the sheet metal being fastened.

G. Exterior mounted gutters: 7 inch wide, .050 inch thick aluminum seamless, factory finished with Kynar 500 finish, box style gutters (manufactured by Garrety Gutters 800/628-5849) supported with concealed aluminum fascia brackets spaced 12 inches on center fastened with 1-1/2 inch long stainless steel screws.

H. Exterior mounted leaders and straps: .040 inch thick rectangular aluminum leaders factory finished with Kynar 500 finish. Fasten each leader with 1/16 inch thick by 1 inch wide straps spaced 7 feet on center. Install aluminum wire baskets at all leader outlet tubes.

I. Sealant: High performance, solvent free, formulated and moisture curing silyl-terminated polyether sealant, ASTM C-920, Type S, Grade NS, Class 25, NovaLink construction sealant by ChemLink, color as selected.

J. Aluminum soffit panels: .040 inches aluminum panels, 1 inch thick and 16 inches wide, factory finished with a Flouropolymer Kynar 500 Finish, color as selected, as manufactured by Firestone Metal Products Una-Clad under the trades name UC-500 -Flush Panel.

PART 3 - EXECUTION

3.1 GENERAL

A. Accurately reproduce the details and design shown, and form profiles, bends and intersections, sharp, true and even. Fabricate sheet metal in the shop whenever possible, and form joints, laps, splices and connections to shed water and condensation in the direction of flow.

B. Provide any miscellaneous flashing and sheet metal work not shown on the drawings but otherwise needed to leave the project complete and entirely watertight, neatly and carefully executed in a thorough and workmanlike manner.

3.2 INSPECTION

A. Examine surfaces to receive work of this section and report any defects to the Owner. Commencement of work will be construed as complete acceptance of surfaces.

3.3 INSTALLATION

A. Fabricate and install copper work in accordance with the current edition of "Copper and Common Sense" as published by the Revere Copper and Brass Company, unless otherwise indicated.

1. Form all joints, except loose locked sealant filled expansion joints, to overlap 2 inches.

2. Secure the joints with rivets spaced 1 inch on center positioned about 1/2 inch from the top edge of the joint, then sweat solder the joint.

3. Use solder only to fill and seal the joint, not for mechanical strength. Form soldered joints continuous, strong and free from defects, with well heated soldering irons. Do not use open flame torches for soldering.

4. Clean soldered joints daily, immediately after soldering, by washing them with soap and water applied with a soft bristle brush, then rinsing with clear water.

B. Securely fasten and anchor all work, and make provisions for thermal expansion. Submit details of expansion joints for approval. Install fasteners through one edge of metal only, use a hook strip on the other edge.

C. Use stainless steel pin Zamac type nail-in fasteners, or stainless steel screws and washers with neoprene inserts where fasteners will be exposed.

3.4 CAP FLASHINGS

A. Install new copper cap flashings built into masonry walls properly joined to all related materials in a watertight manner.

1. Rivet and solder all joints in the new cap flashing, except form 2 inch wide flat locked sealant filled expansion joints a maximum of 32 feet on center.

2. Form the flashing to turn up 2 inches inside the wall and finish with a hem on the bottom exposed edge.

3. Fasten the top edge of the cap flashing to the back up masonry 12 inches on center.

4. Install the new cap flashing under flexible type wall flashings where possible. Where it is not possible to lap the new cap flashing under an existing wall flashing, install a ply of

glass cloth set in and coated with asphalt cement to connect the new cap flashing to the existing wall flashing.

5. In the absence of an existing wall flashing, or at a solid masonry wall, turn up the new cap flashing 2 inches behind the first wythe of masonry.

6. Install new cap flashings where shown on the drawings, and at a height of 10 to 12 inches above the roof surface.

B. Install new aluminum cap flashings on equipment curbs.

1. Form the cap flashing to extend at least 2 inches under the equipment, 4 inches over the base flashing, and finish with a 1/2 inch hem on the bottom edge.

2. Install a 1/2 inch thick by 2 inch wide continuous foam gasket between the cap flashing and mechanical equipment. Do not set the equipment or skylight in sealant.

3. Secure the equipment to the curb with stainless steel screws spaced 12 inches on center.

3.5 DRIP EDGES

A. Fabricate drip edges to extend 1-1/2 inches past the roof edge, and turn down to ensure water cannot track back and run down the fascia. Secure the drip edge with roofing nails along the top edge, spaced 4 inches apart along the raw metal edge. Form joints in the drip edge with 6 inch wide concealed under plates which duplicate the profile of the drip edge. Set the underplates in a full bed of sealant.

3.6 HOOK STRIPS

A. Form continuous hook strips with locks that engage the superimposed trim piece a minimum of 3/4 inch, and to cover the entire underside edge of the wood blocking and neatly extend to the building wall.

B. Fasten hook strips along their bottom edge, just above the 45 degree bend, with nails spaced 4 inches on center into underlying wood blocking; Zamac type nail-in type fasteners spaced 8 inches on center into masonry surfaces, or screws spaced 8 inches on-center into sheet metal surfaces.

3.7 FASCIA

A. Fabricate new fascia to engage the hook strip 3/4 inch minimum and extend to the top of the wood fascia blocking. Secure the fascia with a continuous hook strip along the bottom edge and roofing nails along the top edge spaced 8 inches apart, positioned to be covered by the roof edge trim. Form joints in the fascia with 6 inch wide concealed under plates which duplicate the profile of the fascia. Set the underplates in a full bed of sealant.

3.8 ROOF EDGE SYSTEM

A. Install a factory fabricated roof edge system on all roof eaves.

1. Extend the roof to lap over and down the face of the fascia trim, so it stops just short of the bottom edge of the anchor bar.

2. Install the anchor bar straight, level and true, set in a full bed of sealant, and secure the bar with #9 by 2 inch long stainless steel screws spaced no more than 12 inches apart.

3. Pre-drill screw holes in the underlying metal fascia trim, where extra fasteners are needed, and at corners and special conditions.

4. Install color matching under plates at each joint in the roof edge trim; set the under plates in a full bed of sealant.

3.9 SOFFIT PANELS

A. Install 'J' mold and trim pieces in full lengths, with the ends notched to form a telescoping 3inch overlap. Face the overlaps to shed water, and where visible from the ground, away from prominent building entrance locations. Set the trim overlap into a full bed of sealant which matches the color of the trim.

B. Install panels level, and straight with seams parallel, to achieve the design appearance indicated.

C. Fasten the panels to each hat section with concealed stainless steel screws in each seam spaced 6 inches on center.

3.10 GUTTERS AND DOWNSPOUTS

A. Install seamless gutters that slope to the downspout outlet tubes, approximately 1/16 inch per foot.

1. Secure the gutters with hidden extruded aluminum fascia brackets spaced 12 inches on center. Fasten each bracket with two #10 by 1-1/2 inch long stainless steel screws.

B. Install the downspouts plumb and straight, extending from a drop tube in the gutter to the underground drain hub.

1. Secure the downspouts approximately 7 feet on center, with .050 inch thick by 1-1/4 inch wind straps - color to match the downspouts. Fasten each strap with 1/4 inch diameter Zamac nail-in anchors, with stainless steel pins.

2. Install aluminum wire basket strainers at all leader drop tube outlets.

3.11 CLEANING, PROTECTION AND WATERTIGHTNESS

A. Inspect the interior and exterior of the building and grounds, and submit a written report with photos to document any leaks or damage prior to performing any other work on site.

B. The Owner will conduct a similar inspection at the completion of the work, and the Contractor will be charged for all leakage or damage which was not documented in the Contractor's report, or repaired to the Owners satisfaction at the Contractor's expense.

C. Provide any equipment, material and labor necessary to protect the site, the building, its contents and occupants, pedestrians, and surrounding landscaped and paved areas from damage due to the construction work or from inclement weather during construction.

D. Do not perform work during inclement weather. Protect incomplete work and the building from damage by inclement weather which may occur unexpectedly. Make all work areas watertight at the end of each day's work.

E. Clean up all litter, refuse, rubbish, scrap materials and debris at least twice a day; at noon and at the end of the work day, so the roof and site presents a neat, orderly and workmanlike appearance. Place the debris in a dumpster, and remove the dumpster from the site as soon as it is full or no longer being used.

F. Carefully and thoroughly clean the entire roof to remove all residual debris when all work is complete. After cleaning the roof, thoroughly clean all drain sumps, drain lines, leader heads and leaders. Do not allow debris to enter the drainage system.

END OF SECTION 07 62 00

SECTION 07 84 13
THROUGH-PENETRATION FIRESTOP SYSTEMS

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 through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

1. Floors.
2. Roofs.
3. Walls and partitions.
4. Smoke barriers.

B. Related Sections include the following:
1. Division 7 Section “Joint Sealants” for non-fire-resistive-rated joint sealants.
2. See Drawings A-980 and A-981 for firestopping details.
3. See Drawings M-101 and M-102 for specifications.
4. See Drawings E-101 through E-103 for electrical specifications.

1.3 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

1. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated floor assemblies.
3. Fire-resistance-rated roof assemblies.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

1. Penetrations located outside wall cavities.
2. Penetrations located outside fire-resistive shaft enclosures.
3. Penetrations located in construction containing fire-protection-rated openings.
4. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: For each type of through-penetration firestop system product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.

C. 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.

D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:

    a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their “Fire Resistance Directory,” by Warnock Hersey or by another qualified testing and inspecting agency.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hilti Construction Chemicals, Inc.
2. International Protective Coatings Corp.
3. RectorSeal Corporation (The).
4. Specified Technologies Inc.
5. 3M Fire Protection Products.
6. Tremco.
7. Bio Fireshield, Inc.
8. Dow Corning, Corp.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

a. Slag-/rock-wool-fiber insulation.
b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fire-rated form board.
d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

D. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

E. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

F. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

H. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a nonslumping, gun-able sealant, unless indicated firestop system limits use to non-sag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.

B. Sealant Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

C. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure related Use NT, and joint substrate related Uses M, G, A, and (as applicable to joint substrates indicated) O.

1. Additional Movement Capability: Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated:

    a. 50 percent movement in both extension and compression for a total of 100 percent movement.
    b. 100 percent movement in extension and 50 percent movement in compression for a total of 15 0 percent movement.

2.5 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Commencing installation of firestopping shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

1. Install fill materials for firestop systems by proven techniques to produce the following results:
2. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
3. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
4. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 INSTALLING FIRE RESISTIVE JOINT SEALANTS

A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. 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 widths that allow optimum sealant movement capability and develop fire resistance rating required.

C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing: uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

D. Tool non-sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07 84 13

SECTION 07 92 00
JOINT SEALANTS

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 sealants for the following applications:

1. Exterior joints in the following surfaces:
   a. Joints between different materials.
   b. Other joints as indicated.

2. Interior joints in the following horizontal traffic surfaces:
   a. Control and expansion joints in flooring.
   b. Other joints as indicated.

B. Related Sections include the following:
1. Division 7 Section "Firestopping" for fire-resistant building joint-sealant systems.
2. Division 8 Section "Glazing" for glazing sealants.
3. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
4. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

F. 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.

G. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

H. Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.

I. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

J. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

K. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:

    a. Each type of elastomeric sealant and joint substrate indicated.
    b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
5. Test Method: Test joint sealants by hand-pull method described below:

    a. Install joint sealants in 60-inch- long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
    b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
    c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
    d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.

6. Report whether sealant in joint 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. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

D. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

A. General Warranty: 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. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules below.

2.2 MATERIALS, GENERAL

A. VOC Content of Interior Sealants and Sealant Primers: Comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: Not more than 250 g/L.
2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
3. Sealant Primers for Porous Substrates: Not more than 775 g/L.

B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

A. SINGLE-PART URETHANE SEALANT (Sealant No. 1)

1. Polyurethane Sealant: Single component, chemical during, non-staining, non-bleeding, capable of continuous water immersion, non-sagging, self-leveling type; complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, 0.

2. Products: Subject to compliance with requirements, provide the following:

a. Urethane Sealant: Dynatrol I Urethane Sealant, product of Pecora.

B. SINGLE-PART SILICONE SEALANTS (Sealant No. 2)

1. Silicone Sealant: Single component solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; complying with ASTM C 920, Type S, NS, Class 25.
2. Products: Subject to compliance with requirements, provide one of the following:

a. Silicone Sealant:
b. Silpruf Silicone Sealant, product of GE Silicones.
c. Dow 795 Silicone Sealant, product of Dow Coming.
d. Pecora 864 Silicone Sealant, product of Pecora.

C. ACRYLIC LATEX SEALANT (Sealant No. 3)

1. Sealant for interior joints, exposed or paint-finished Tremco Acrylic Latex sealant manufactured by the Tremco Manufacturing Company meeting the requirements of ASTM C834.

D. ACOUSTICAL JOINT SEALANTS

1. Acoustical Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following requirements:

    a. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90
    b. Product has flame spread and smoke developed ratings of less than 25 per ASTM E 84, non-skinning, non-staining, gun-able, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

2. Products: Subject to compliance with requirements, provide one of the following:

    a. SHEETROCK Acoustical Sealant, product of United States Gypsum Co.
    b. AC-20 FTR Acoustical and Insulation Sealant, product of Pecora Corp.

3. Acoustical Sealant for Concealed Joints:

    a. BA-98, product of Pecora Corp.
    b. Tremco Acoustical Sealant, product of Tremco, Inc.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

    1. Type O: Open-cell material.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 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, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

C. 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 all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning

operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

a. Concrete.
b. Masonry.
c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

a. Glass.
b. Porcelain enamel.
c. Glazed surfaces of ceramic tile.

D. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

E. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type 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.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to 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 provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
5. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.

a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

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 elastomeric sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants by hand-pull method described below:

a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and

meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.

b. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

4. Inspect tested joints and report on the following:

   a. Whether 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.
   b. Whether sealants filled joint cavities and are free from voids.
   c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field adhesion test log. 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.

6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

B. Evaluation of Field-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.

CLEANING

C. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.4 PROTECTION

A. Protect joint sealants during and after curing period 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 the original work.

3.5 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Unless indicated otherwise on the Drawings or in other Sections, provide the following type of joint with the sealant type indicated. For joint types not indicated below, request Architect's selection of sealant type and required procedures.

B. Interior and exterior joints

1. Joints in finish carpentry and trim: Sealant No. 3.
2. Interior joints for paint finish: Sealant No. 3.
3. Masonry, terrazzo and stone joints: Sealant No. 1.
4. Concrete joints: Sealant No. 1.
5. Glass/metal joints: Sealant No. 2.
6. Metal/metal joints: Sealant No. 2.
7. Metal/masonry joints: Sealant No. 1.
8. Metal/stone joints: Sealant No. 1.
9. Metal/wood joints: Sealant No. 3.
10. Metal/gypsum board joints: Sealant No. 3.
11. Gypsum board/plaster joints: Sealant No. 3.
12. Ceramic tile joints: Sealant No. 2.
13. Ceramic tile/porcelain fixture joints: Sealant No. 2.

END OF SECTION 07 92 00

SECTION 08 12 55
INTERIOR ALUMINUM FRAMES

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 the following:

1. Interior aluminum frames for doors.
2. Interior aluminum frames for glazing.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for carpentry for wood framing and blocking.
2. Division 7 Section "Joint Sealants" for joint sealants installed with interior aluminum frames and for sealants to the extent not specified in this Section.
3. Division 8 Section "Door Hardware" for door hardware.
4. Division 8 Section "Glazing" for glass in interior aluminum frames.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of interior aluminum frame indicated.

B. Shop Drawings: For interior aluminum frames. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: 12-inch- long framing member with factory-applied finish for each type of interior aluminum frame indicated.

D. Fabrication Sample: For each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of assembly.

E. Maintenance Data: For interior aluminum frames to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of interior aluminum frames and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1.5 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kawneer TriFab VersaGlaze 451 **non-thermal** framing system & Kawneer Series 500 Standard Entrances; 1 ¾" depth.
2. Equal as approved by Architect.

2.2 COMPONENTS

A. Aluminum Framing, General: ASTM B 221, Alloy 6063-T5 or alloy and temper required to suit structural and finish requirements, not less than 0.062 inch thick.

B. Door Frames: Reinforced for hinges and strikes.

C. Glazing Frames: For glazing thickness indicated.

D. Trim: Extruded aluminum, not less than 0.062 inch thick, with removable snap-in casing trim glazing stops and door stops without exposed fasteners.

2.3 ACCESSORIES

A. Fasteners: Aluminum, nonmagnetic stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.

B. Sound Seals: Manufacturer's standard continuous mohair, wool pile, or vinyl seals.

C. Glazing Gaskets: Manufacturer's standard extruded or molded plastic, to accommodate glazing thickness indicated.

D. Glazing: Comply with requirements in Division 8 Section "Glazing."

E. Hardware: Comply with requirements in Division 8 door hardware Sections.

2.4 FABRICATION

A. Machine jambs and prepare for hardware, with concealed reinforcement plates, drilled and tapped as required, and fastened within frame with concealed screws.

B. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted or mitered connections.

C. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.

D. Fabricate all components to allow secure installation without exposed fasteners.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Interior Framing and Doors High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
   a. Color and Gloss: Custom color match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and ceilings, with Installer present, for conditions affecting performance of work.

1. Verify that wall thickness does not exceed standard tolerances allowed by throat size indicated.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with frame manufacturer's written installation instructions.

B. Install frames plumb and square, securely anchored to substrates.

C. Install frame components in the longest possible lengths; components up to 72 inches long must be 1 piece.

1. Use concealed installation clips to produce tightly fitted and aligned splices and connections.
2. Secure clips to main structural extrusion components and not to snap-in or trim members.
3. Do not leave screws or other fasteners exposed to view when installation is complete.

3.3 CLEANING

A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended by frame manufacturer and according to AAMA 609 & 610.

B. Touch up marred frame surfaces. Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

END OF SECTION 08 12 55

SECTION 08 14 16
FLUSH WOOD DOORS

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. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory machining for hardware.

B. Related Sections:

1. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

B. Samples for Initial Selection: For factory-finished doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

    a. Provide samples for each species of veneer and solid lumber required.
    b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.

3. Frames for light openings, 6 inches long, for each material, type, and finish required.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

D. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is

operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

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. Algoma Hardwoods, Inc.
2. Eggers Industries.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Fire-Protection-Rated Doors: Provide mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

C. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.
2. Species: Maple.
3. Cut: Quarter Sawn
4. Match between Veneer Leaves: Slip match.
5. Assembly of Veneer Leaves on Door Faces: Sketch veneer as indicated on the drawings..
6. Pair and Set Match: Provide for doors hung in same opening.
7. Exposed Vertical and Top Edges: Same species as faces.
8. Core: Glued wood stave.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
10. Adhesives: Type I per WDMA TM-6.

B. Fire-Rated Doors:

1. Construction: Manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
4. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.4 LIGHT OPENINGS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
4. Where noted on the drawings proved true divided lites of wood specie to match veneer of door faces.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

C. Fully Recessed Glass Stop for Light Openings in Fire-Rated Doors: Manufacturer's standard fully recessed painted metal stop approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

A. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

B. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.

2. Finish: AWI conversion varnish system.
3. Staining: Match Architect's sample.
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 31 13
ACCESS DOORS AND FRAMES

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 the following:

1. Access doors and frames for walls and ceilings.

B. Related Sections include the following:

1. Division 8 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
2. Division 9 Section "Acoustical Panel Ceilings" for suspended acoustical panel ceilings.
3. Division 23 Section "Duct Accessories" See drawings M-101 and M-102 for Mechanical Specifications for heating and air conditioning duct access doors.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

B. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

D. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 for vertical access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

D. Field applied prime painting shall comply with the low VOC requirements called out in Section 09 91 23, Painting.

1.5 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Babcock-Davis; A Cierra Products Co.
2. Jensen Industries.
3. J. L. Industries, Inc.
4. Larsen's Manufacturing Company.
5. Milcor Inc.

B. Flush Access Doors and Trimless Frames: Fabricated from steel sheet.

1. Locations: Wall and ceiling surfaces.
2. Door: Minimum 0.060-inch- thick sheet metal, set flush with surrounding finish surfaces.
3. Frame: Minimum 0.060-inch- thick sheet metal with drywall bead flange.
4. Hinges: Spring-loaded, concealed-pin type.
5. Lock: Cylinder.

C. Recessed Access Doors and Trimless Frames: Fabricated from steel sheet.

1. Locations: Ceiling surfaces.
2. Door: Minimum 0.060-inch- thick sheet metal in the form of a pan recessed 1 inch for acoustical tile infill.
3. Frame: Minimum 0.060-inch- thick sheet metal designed for insertion into acoustical tile ceiling.
4. Lock: Cylinder.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. For trimless frames with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
2. Provide mounting holes in frames for attachment of units to metal framing.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

C. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2.

D. Frame Anchors: Same type as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. 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.

D. Aluminum Finishes:

1. Mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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 the following:

1. Exterior aluminum-framed storefronts and fixed windows.

a. Glazing is retained mechanically with gaskets on four sides.

2. Exterior and interior manual-swing aluminum doors.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
2. Division 8 Section "Door Hardware" for finish hardware.
3. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferred to building structure.

c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
d. Noise or vibration created by wind and thermal and structural movements.
e. Loosening or weakening of fasteners, attachments, and other components.
f. Sealant failure.
g. Failure of operating units to function properly.

B. Structural Loads:

1. Wind Loads: 40 lbs/sf.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and 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. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. 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; 180 deg F, material surfaces.

F. Air Infiltration:
a. Fixed Storefronts: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..
b. Swinging Doors: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.20 cfm/sq. ft. of fixed wall area

when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 59 when tested according to AAMA 1503.

I. Average Thermal Conductance:
   a. Fixed Units: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.38 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
   b. Entry Doors: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.77 Btu/sq. ft. x h x deg F when tested according to AAMA 1503

J. Maximum Solar Heat Gain Coefficient (SHGC)
   a. All north facing units maximum value of 0.36
   b. South, East and West facing units maximum value of 0.36

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
   3. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of the following:

   1. Joinery.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.

5. Flashing and drainage.

E. Welding certificates.

F. Qualification Data: For Installer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.

H. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

I. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

B. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate

construction to ensure that actual dimensions correspond to established dimensions.

1.7 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals and other materials beyond normal weathering.
d. Water leakage through fixed glazing and framing areas.
e. Failure of operating components to function properly.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Kawneer TriFab VersaGlaze 451T framing system, 2” sight line, 4 ½” frame, 1” insulated glazing, U factor max. 0.38 for fixed units; Entrance Doors shall be Kawneer 500 Standard Entrances with 1 ¾” depth and U factor max 0.77.
2. Equal as approved by the Architect.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.

C. Concrete Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

D. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

E. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As indicated on the drawings and specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Door Construction: 1 3/4 -inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: Exterior high-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior. Interior nonthermal.

2. Door Design: Wide stile; 5-inch nominal width. Refer to drawings for design.

    a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

B. Door Hardware: As specified in Division 8 Section "Finish Hardware."

2.6 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or panels.

7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Storefront Framing: Fabricate components for assembly using shear-block system.

F. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

G. Doors: Reinforce doors as required for installing hardware.

1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Exterior Framing and Doors High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

a. Color and Gloss: Custom color match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Commencing installation of aluminum entrances and storefront shall constitute acceptance of existing conditions.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 8 Section "Glazing."

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.

2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install insulation materials as specified in Division 7 Section "Building Insulation."

I. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

J. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch .
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.3 ADJUSTING

A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.

1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

3.4 PROTECTION AND CLEANING

A. Protect surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean aluminum surfaces immediately after installation. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installation. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08 41 13

SECTION 08 51 13
ALUMINUM WINDOWS

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 the following types of aluminum-framed windows:

1. Projected windows.

B. Related Sections include the following:

1. Division 8 Section “Aluminum Storefront.”
2. Division 8 Section "Glazing" for glazing requirements for aluminum windows, including those specified to be factory glazed.

1.3 DEFINITIONS

A. AW: Architectural.

B. C: Commercial.

C. HC: Heavy Commercial.

D. LC: Light Commercial.

E. R: Residential.

F. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.

G. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

H. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:

1. Minimum size required by AAMA/NWWDA 101/I.S.2.

B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1. AW: Architectural

C. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283, Air Infiltration Test.

1. Maximum Rate: 0.20 cfm/sq. ft. of area at a static test pressure differential of 6.24 lbf/sq. ft.

D. Water Resistance: No water leakage as defined in ASTM E 547 and ASTM E 331 referenced test methods at a water test pressure at a static air pressure differential of 12 PSF.

E. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F 588.

F. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 54, where windows are indicated to be "thermally improved."

G. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

H. Average Thermal Conductance:
   a. Fixed Units: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.38 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
   b. Operable Units: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.45 Btu/sq. ft. x h x deg F when tested according to AAMA 1503

I. Maximum Solar Heat Gain Coefficient (SHGC)
   a. All north facing units maximum value of 0.36
   b. South, East and West facing units maximum value of 0.36

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Thermal-break details.
7. Glazing details.
8. Window System Operators: Show locations, mounting, and details for installing operator components and controls.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For aluminum window components required, prepared on Samples of size indicated below.

1. Main Framing Member: 12-inch- long, full-size sections of extrusions with factory-applied color finish.
2. Hardware: Full-size units with factory-applied finish.
3. Weather Stripping: 12-inch- long sections.
4. Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

E. Qualification Data: For Installer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each type, grade, and size of aluminum window. Test results based on use of down-sized test units will not be accepted.

G. Maintenance Data: For operable window sash operating hardware weather stripping window system operators and finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain aluminum windows through same source as aluminum storefront assemblies; Section 08 41 13.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aluminum windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

C. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Failure to meet performance requirements.
2. Structural failures including excessive deflection.
3. Water leakage, air infiltration, or condensation.
4. Faulty operation of movable sash and hardware.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Warranty Period: Two years from date of Substantial Completion.

C. Warranty Period for Metal Finishes: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fixed Units: Kawneer Company, Inc., TriFab VersaGlaze 451T Framing System

2. Operable Units: Kawneer Company, Inc. GlassVent UT Windows, 3 1/8" System Depth, Project-Out window.
3. Equal as approved by the Architect.

2.2 MATERIALS, GENERAL

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel fasteners are not permitted.

1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel reinforcing members are not permitted.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.

1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

F. Replaceable Weather Seals: Comply with AAMA 701/702.

G. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 8 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Units shall be factory glazed with insulated glass units as specified in Division 8 Section “Glazing.”

2.4 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze.

B. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

C. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

D. Awning Windows: Provide the following operating hardware:

1. Operator: Gear-type rotary operator located on jamb at sill.
2. Hinges: Concealed four- or six-bar friction hinges located on each jamb near top rail; two per ventilator.
3. Lock: Face-mounted transom latch and keeper.

2.5 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and

fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

a. Color and Gloss: Custom color to match Architect's sample.

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; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.

1. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

A. Adjust operating sashes and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08 51 13

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware for:

    a. Swinging doors.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 06 Section “Rough Carpentry”
2. Division 06 Section "Finish Carpentry”
3. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
4. Division 08 Sections:

    a. “Access Doors and Frames”
    b. “Flush Wood Doors”
    c. “Interior Aluminum Frames”
    d. "Aluminum-Framed Entrances and Storefronts"
    e. "Entrances”

5. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.

1.02 REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
2. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:

a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

    a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

3. Door Hardware Schedule:

    a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    c. Indicate complete designations of each item required for each opening, include:
        1) Door Index: door number, heading number, and Architect's hardware set number.
        2) Quantity, type, style, function, size, and finish of each hardware item.
        3) Name and manufacturer of each item.
        4) Fastenings and other pertinent information.
        5) Location of each hardware set cross-referenced to indications on Drawings.
        6) Explanation of all abbreviations, symbols, and codes contained in schedule.
        7) Mounting locations for hardware.
        8) Door and frame sizes and materials.
        9) Degree of door swing and handing.

4. Key Schedule:

    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.

e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:

a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Factory order acknowledgement numbers (for warranty and service)
d. Name, address, and phone number of local representative for each manufacturer.
e. Parts list for each product.
f. Final approved hardware schedule edited to reflect conditions as-installed.
g. Final keying schedule
h. Copies of floor plans with keying nomenclature
i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC)

available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

a. Warehousing Facilities: In Project's vicinity.
b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
c. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:

a. For door hardware: DHI certified AHC or DHC.
b. Can provide installation and technical data to Architect and other related subcontractors.
c. Can inspect and verify components are in working order upon completion of installation.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:

a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:

a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware

a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:

a. Comply with governing accessibility regulations cited in “REFERENCES” article, herein for door hardware on doors in an accessible route.

C. Pre-Installation Meetings

1. Keying Conference

a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2) Preliminary key system schematic diagram.
3) Requirements for key control system.
4) Requirements for access control.
5) Address for delivery of keys.

2. Pre-installation Conference

a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Inspect and discuss preparatory work performed by other trades.
c. Inspect and discuss electrical roughing-in for electrified door hardware.
d. Review sequence of operation for each type of electrified door hardware.
e. Review required testing, inspecting, and certifying procedures.
f. Review questions or concerns related to proper installation and adjustment of door hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer’s original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer’s published listings.

a. Schlage
1) Key Blanks: Lifetime
2) L Series: 3 year mechanical

b. Von Duprin
1) Exit Device: 3 year mechanical

c. LCN
1) 4050 Series: 25 year mechanical

d. Ives
1) Continuous Hinges: Lifetime

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

B. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series.

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

a. Exterior: Heavy weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
b. Interior: Heavy weight, steel, 4-1/2 inches (114 mm) high

3. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
4. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
5. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

a. Steel Hinges: Steel pins
b. Non-Ferrous Hinges: Stainless steel pins
c. Out-Swinging Exterior Doors: Non-removable pins
d. Out-Swinging Interior Lockable Doors: Non-removable pins
e. Interior Non-lockable Doors: Non-rising pins

6. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.

2.04 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:

a. Scheduled Manufacturer: Ives.

2. Requirements:

a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
g. Install hinges with fasteners supplied by manufacturer.
h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.06 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

    a. Falcon T series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

    a. Lever Design: AVA

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 98/35A series.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.

9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Provide dogging indicators (CDSI/HDSI) for visible indication of dogging status.
13. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
14. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
15. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.09 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Schlage

B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide the following keyway: Match existing, verify with district

C. Construction Keying:

1. Replaceable Construction Cores.

a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
   1) 3 construction control keys
   2) 12 construction change (day) keys.

b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

C. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

    a. Master Keying system as directed by the Owner.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:

    a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    b. Patent Protection: Keys and blanks protected by one or more utility patent(s)

4. Identification:

    a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
    b. Identification stamping provisions must be approved by the Architect and Owner.
    c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5. Quantity: Furnish in the following quantities.

    a. Change (Day) Keys: 3 per cylinder/core.
    b. Permanent Control Keys: 3.
    c. Master Keys: 6.

2.11 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee.

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.

a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

a. Falcon SC70A series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 5/8-inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Provide push plates, push bars, pull plates, and pulls with diameter and length as scheduled.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)

5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Weatherstripping: Clear Anodized Aluminum
9. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer’s instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

H. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.

I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

K. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

L. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

M. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

N. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

O. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 FIELD QUALITY CONTROL

A. Engage qualified, independent, Door Hardware Institute (DHI) Certified, Fire Door Assembly Inspector (CFDAI) or Architectural Hardware Consultant (AHC) to perform inspections, prepare inspection reports, and issue inspection reports.

1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.
2. Representative will inspect fire rated doors and state in report whether installed work complies with NFPA 80.

3.04 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.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to 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.

C. Hardware items are referenced in the following hardware schedule. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Abbreviation	Name
FAL	Falcon
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

45583 OPT0186073 Version 3
HARDWARE GROUP NO. 02
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PRIVACY LOCK	T301S AVA	626	FAL
1	EA	SURFACE CLOSER	SC71 DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 03
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	T561J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	OH STOP	90S	630	GLY
3	EA	SILENCER	SR64 (OMIT WHERE SMOKE/FIRE OR SOUND SEALS ARE PROVIDED)	GRY	IVE

HARDWARE GROUP NO. 03A
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	T561J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 03B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	T561J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 06

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	DORMITORY LOCK	T571J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 06A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRY / OFFICE LOCK	T511J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 07

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	DORMITORY LOCK	T571J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 08

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64 (OMIT WHERE SMOKE/FIRE OR SOUND SEALS ARE PROVIDED)	GRY	IVE

HARDWARE GROUP NO. 09

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	T581J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 10

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL COMBO	9190EZHD NO	626	IVE
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 11

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	QM-98-L-F-2SI-QM996-07	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	RIM CYL THUMBTURN	XB11-979	626	SCH
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 HDPA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 11A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	QM-98-L-F-2SI-QM996-07	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	RIM CYL THUMBTURN	XB11-979	626	SCH
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 11B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	QM-98-L-F-2SI-QM996-07	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	RIM CYL THUMBTURN	XB11-979	626	SCH
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 12

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	REMOVABLE MULLION	KR4954	689	VON
1	EA	FIRE EXIT HARDWARE	QM-98-EO-F	626	VON
1	EA	FIRE EXIT HARDWARE	QM-98-L-F-2SI-QM996-07	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX CAM AS REQUIRED	626	SCH
1	EA	RIM CYL THUMBTURN	XB11-979	626	SCH
2	EA	FSIC CORE	23-030 CKC	626	SCH
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 14

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	FIRE EXIT HARDWARE	9847WDC-L-F-LBR-07-SNB	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	FSIC CORE	23-030 CKC	626	SCH
2	EA	SURFACE CLOSER	SC71 HDPA	689	FAL
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488FSBK PSA	BK	ZER

HARDWARE GROUP NO. 15

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	T581J IC-SC AVA	626	FAL
1	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC71 REG OR PA AS REQ	689	FAL
1	EA	RAIN DRIP	141AA MOUNT ABOVE DOOR	AA	ZER
1	SET	GASKETING	475AA-S	AA	ZER
1	EA	DOOR BOTTOM	365AA X 141A DRIP X END CAP X #8361 KEY	AA	ZER
1	EA	THRESHOLD	545A-223	A	ZER

HARDWARE GROUP NO. AL01

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	PANIC HARDWARE	CDSI-QM-35A-NL-OP-388	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX X K510-730 XQ11-948 36-083 36-082-037	626	SCH
2	EA	FSIC CORE	23-030 CKC	626	SCH
1	EA	90 DEG OFFSET PULL	8190EZHD 10" STD	630-316	IVE
1	EA	SURFACE CLOSER	SC71A SS	689	FAL
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER		
1	EA	THRESHOLD	545A-223	A	ZER

HARDWARE GROUP NO. AL02
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY	628	IVE
1	EA	REMOVABLE MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	CDSI-QM-35A-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-QM-35A-NL-OP-388	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX CAM AS REQUIRED	626	SCH
2	EA	MORTISE CYLINDER	20-061 ICX X K510-730 XQ11-948 36-083 36-082-037	626	SCH
4	EA	FSIC CORE	23-030 CKC	626	SCH
2	EA	SURFACE CLOSER	SC71A SS	689	FAL
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER		
1	EA	THRESHOLD	545A-223	A	ZER

HARDWARE GROUP NO. AL02A
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY	628	IVE
1	EA	REMOVABLE MULLION	KR4954	689	VON
2	EA	PANIC HARDWARE	LD-QM-35A-EO	626	VON
1	EA	MORTISE CYLINDER	20-061-ICX CAM AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC	626	SCH
2	EA	SURFACE CLOSER	SC71A SS	689	FAL
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER		
1	EA	THRESHOLD	545A-223	A	ZER

HARDWARE GROUP NO. AL03
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY	628	IVE
2	EA	PUSH/PULL BAR	9190HD-10"-NO	630	IVE
2	EA	SURFACE CLOSER	SC71A SS	689	FAL
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER		

HARDWARE GROUP NO. AL04

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY	628	IVE
2	EA	PANIC HARDWARE	3547A-L-LBR-07	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	FSIC CORE	23-030 CKC	626	SCH
2	EA	SURFACE CLOSER	SC71A SS	689	FAL
1	EA	PERIMETER GASKETING	BY DOOR MANUFACTURER		

END OF SECTION

SECTION 08 80 00
GLAZING

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.

B. Related Sections include the following:

1. Division 8 Section “Flush Wood Doors
2. Division 8 Section “Access Doors and Frames”.
3. Division 8 Section “Aluminum Storefront.”
4. Division Section 8 “Interior Aluminum Frames”.
5. Division 8 Section n “Aluminum Windows”.

1.3 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.

b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

1) Load Duration: 60 seconds or less.

c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

1) For monolithic-glass lites heat treated to resist wind loads.
2) For insulating glass.

d. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. 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; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- wide interspace.
3. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F.
4. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
5. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass and of 12-inch- long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

C. Samples: For the following products, in the form of 12-inch- square Samples for glass.

1. Insulating glass for each designation indicated.

D. Product Test Reports: For each of the following types of glazing products:

1. Insulating glass.

E. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

F. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass coated float glass laminated glass and insulating glass.

C. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.

D. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

E. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines”.

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:

1. Insulating Glass Certification Council.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

A. General Warranty: 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.

1. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.2 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.3 HEAT-TREATED FLOAT GLASS

A. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

B. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.4 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with Inter Active Layer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Inter active as layer manufactured by Responsive Glass
4. Interlayer Color: Clear unless otherwise indicated.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.

B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

C. Sealing System: Dual seal, with primary and secondary sealants as follows:

1. Manufacturer's standard sealants.

D. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.6 FIRE-PROTECTION-RATED GLAZING

A. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.

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. Technical Glass Products; Pyrostop. Basis of Design.
b. InterEdge; Pyrobel.
c. Pilkington North America Inc.; Pyrostop.
d. Vetrotech Saint-Gobain; Contraflam.

2.7 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of

service and application, as demonstrated by sealant manufacturer based on testing and field experience.

3. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.9 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to

maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to

lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 PROTECTION AND CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.8 INSULATING-GLASS, LOW E SCHEDULE

A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article

B. Type GL-3 Insulating Glass Units in certain storefront, exterior windows as indicated on the drawings: Where this glass is indicated, provide insulating-glass units complying with the following:

1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6 mm.
2. Interspace Content: Argon
3. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

a. Safety Glass (uncoated surfaces).

4. Outdoor Lite: Type I (transparent glass, flat) float glass, Class 1 (clear).

a. Safety Glass (uncoated surfaces).

5. Low-Emissivity Coating: Sputtered on second or third surface.

C. Type GL-3T Insulating Glass Units in certain storefront, exterior windows as indicated on the drawings: Where this glass is indicated, provide insulating-glass units complying with the following:

1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6 mm.
2. Interspace Content: Argon
3. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

a. Kind FT (Fully Tempered), Condition A (uncoated surfaces).

4. Outdoor Lite: Type I (transparent glass, flat) float glass, Class 1 (clear).

a. Kind FT (Fully Tempered), Condition A (uncoated surfaces).

5. Low-Emissivity Coating: Sputtered on second or third surface.

D. Type GL-5 Water White Glass 1 Sided Anti-Reflective, 6mm, tempered
1. Acceptable Manufacturers:
a. Water White Glass; waterwhiteglass.com, 949-789-7700
b. Equal as approved by Architect

END OF SECTION 08 80 00

SECTION 08 83 00
MIRRORED GLASS

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 the following:

1. Safety (tempered) mirrored glass.

1.3 DEFINITIONS

A. Deterioration of Silvered Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.4 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Silvered mirrored glass. Include description of materials and process used to produce mirrored glass that indicates source of glass, glass coating components, edge sealer, and quality-control provisions.
2. Mirror mastic.
3. Mirror hardware.

B. Shop Drawings: Include elevations, sections, details, and attachments to other Work.

C. Samples for Verification: For the following products, in sizes indicated below:

1. Mirrored glass, 12 inches square, including edge treatment on 2 adjoining edges.
2. Mirror trim, 12 inches long.

D. Product Certificates: Signed by manufacturers of mirrored glass and mirror mastic certifying that products furnished comply with requirements.

E. Mirror Mastic Glass Coating Compatibility Test Reports: From an organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating applied to silvered mirrored glass. Include organic coating manufacturers' interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.

F. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirrored glass installations similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each type of accessory indicated.

D. Glazing Publications: Comply with published recommendations in GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.

E. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

G. Preconstruction Mirror Mastic Glass Coating Compatibility Test: Submit mirror mastic products to organic protective coating manufacturer for testing to determine compatibility of adhesive with mirrored glass coating.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to mirrored glass manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For silvered mirrored glass, comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrored glass until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.9 WARRANTY

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. Manufacturer's Special Warranty for Silvered Mirrored Glass: Written warranty, made out to Owner and signed by mirrored glass manufacturer agreeing to replace silvered mirrored glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below:

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Mirror Company, Inc.
2. Carolina Mirror Company.
3. Gardner Glass Products.
4. Lenoir Mirror Company.
5. Stroupe Mirror Co., Inc.

6. VVP America, Inc.; Binswanger Mirror Products.

2.2 FLOAT GLASS

A. Tempered Float Glass: ASTM C 1048, Type I (transparent glass, flat), Condition A (uncoated), Kind FT (fully tempered), Quality q3 (glazing select) float glass, complying with the following requirements:

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of mirror as installed, unless otherwise indicated.
2. Clear Tempered Float Glass: Class 1 (clear).

a. Thickness: 6 mm.

2.3 MIRRORED GLASS

A. Silvered Mirrored Glass: Tempered, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.

2.4 FABRICATION

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes as indicated on the drawings.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.

1. Flat polished edge.
2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
3. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.5 MISCELLANEOUS MATERIALS

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.

B. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrored glass by spot application, certified by both mirrored glass manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrored glass will be installed.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Gunther Mirror Mastics.
b. Palmer Products Corporation.

D. Extruded-Aluminum Top and Bottom Trim: J-channels formed with a return deep enough to produce a glazing channel to accommodate mirrored glass units of thickness indicated and in lengths required to cover bottom edge of each mirrored glass unit in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.
2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.
3. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
4. Products: Subject to compliance with requirements, provide one of the following:

a. Bottom Trim:

1) CRL Standard "J" Channel; C. R. Laurence Co., Inc.
2) Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar; Sommer & Maca Industries, Inc.

b. Top Trim:

1) CRL Deep "J" Channel; C. R. Laurence Co., Inc.
2) Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar; Sommer & Maca Industries, Inc.

E. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

F. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrored glass units are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
2. Proceed with mirrored glass installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:

1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch between back of mirrored glass and mounting surface.

D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.

1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.

2. For continuous bottom supports, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long.
3. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.

3.4 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.

1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash mirrored glass by methods recommended in NAAMM publication and in writing by mirrored glass manufacturer. Use water and glass cleaners free from substances capable of damaging mirrored glass edges or coatings.

END OF SECTION 08 83 00

SECTION 08 91 19
FIXED LOUVERS

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 the following:

1. Fixed, extruded-aluminum louvers.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.
2. See Mechanical Drawings for louvers that are a part of mechanical equipment.

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.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide exterior metal louvers capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter; or permanent damage to fasteners and anchors.

1. Wind Load: Uniform pressure (velocity pressure) of 30 lbf/sq. ft., acting inward or outward.
2. Thermal Movements: Provide louvers 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, and other detrimental effects:

a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Product Data: For each type of product specified.

B. Shop Drawings: For louver units and accessories. Include plans; elevations; sections; and details showing profiles, angles, and spacing of louver blades. Show unit dimensions related to wall openings and construction; free area for each size indicated; profiles of frames at jambs, heads, and sills; and anchorage details and locations.

C. Samples for Verification: Of each type of metal finish required, prepared on Samples of same thickness and material indicated for final Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Product Certificates: Signed by manufacturers of louvers certifying that the products furnished comply with requirements and are licensed to bear the AMCA seal based on tests made according to AMCA 500 and complying with AMCA's Certified Ratings Program.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where alike in one or more respects regarding type, design, or factory-applied color finish.

B. Welding Standards: As follows:

1. Comply with AWS D1.2, "Structural Welding Code--Aluminum."

C. SMACNA Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" recommendations for fabrication, construction details, and installation procedures.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating

louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Airolite Co.
2. American Warming and Ventilating, Inc.
3. Construction Specialties, Inc.

2.2 MATERIALS

A. Aluminium Extrusions: ASTM B 221, alloy 6063-T5 or T-52.

B. Aluminum Sheet: ASTM B 209, alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.

D. Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.

1. Use types and sizes to suit unit installation conditions.
2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.

E. Anchors and Inserts: Of type, size, and material required for loading and installation indicated. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

F. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 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. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining materials' tolerances, and perimeter sealant joints.

1. Frame Type: Channel type, unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide horizontal mullions, as indicated.

F. Provide sill extensions and loose sills made of same material as louvers where indicated or required for drainage to exterior and to prevent water penetrating to interior.

G. Join frame members to one another and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view; unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Louver Construction: Provide fixed-blade louvers with extruded-aluminum frames and blades.

B. Horizontal, Drainable-Blade Louvers: As follows:

1. Louver Depth: 4 inches, unless otherwise indicated.
2. Frame Thickness: 0.125 inch.
3. Blade Thickness: 0.081 inch.

2.5 LOUVER SCREENS

A. General: Provide each exterior louver with louver screens complying with the following requirements:

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening, unless otherwise indicated.

B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate screen frames with mitered corners to louver sizes indicated and to comply with the following requirements:

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached.

a. 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 for securing screen mesh.

2.6 BLANK-OFF PANELS

A. General: Fabricate blank-off panels from materials and to sizes indicated and comply with the following requirements:

1. Finish: Same as finish applied to louvers.
2. Attach blank-off panels to back of louver frames with stainless-steel sheet-metal screws.

B. Uninsulated, Blank-off Panels: Metal sheet complying with the following requirements:

1. Aluminum sheet for aluminum louvers, as follows:

a. Thickness: 0.050 inch, unless otherwise indicated.

C. Insulated, Blank-off Panels: Laminated metal-faced panels consisting of insulating core surfaced on back and front with metal sheets.

1. Thickness: 2 inches.
2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
3. Insulating Core: Unfaced mineral-fiber or foamed-plastic rigid insulation board.
4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
5. Seal perimeter joints between panel faces and louver frames with 1/8-by-l-inch PVC compression gaskets.
6. Panel Finish: Same finish applied to louvers.
7. Attach blank-off panels to back of louver frames with stainless-steel, sheet metal screws.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish louvers after assembly.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

B. 2-coat 70% KNAR 500 / HYLAR 5000 AAMA 2605-Dry film thickness 1.2 mil. Selected from Manufacturer’s standard colors.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION

A. Locate and place louver units 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 galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.3 ADJUSTING, CLEANING, AND PROTECTING

A. Periodically 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 until final cleaning.

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. Protect louvers and vents from damage during construction. Use temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at the time of Substantial Completion.

D. 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. Clean and 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 08 91 19

SECTION 09 21 16
GYPSUM BOARD SHAFT-WALL ASSEMBLIES

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 the following:

1. Shaft enclosures.

B. Related Sections include the following:

1. Division 1, Section “Submittals.”
2. Division 9 "Gypsum Board” for applying and finishing panels in gypsum board shaft-wall assemblies.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each gypsum board shaft-wall assembly indicated.

B. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating as required by applicable building codes.

1. Include data substantiating that items that penetrate each gypsum board shaft-wall assembly do not negate fire-resistance rating.

C. Acoustical-Test-Response Reports: From a qualified independent testing agency substantiating required STC rating for each gypsum board shaft-wall assembly.

1.5 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

B. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat on leveled supports off the ground to prevent sagging.

1.7 PROJECT CONDITIONS

A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 9 Section " Gypsum Board."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum Co.
2. G-P Gypsum Corp.
3. National Gypsum Company.
4. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.

1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

B. Steel Framing: ASTM C 645.

1. Protective Coating: Manufacturer's standard corrosion-resistant zinc coating.

C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1-inch thickness and with moisture-resistant paper faces.

D. Gypsum Wallboard: ASTM C 36, core type as required by fire-resistance-rated assembly indicated.

1. Edges: Tapered.

E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section " Gypsum Board Assemblies " that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 9 Section "Gypsum Board."

G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Powder-Actuated Fasteners: Provide powder-actuated fasteners with capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 1190.

I. Acoustical Sealant: As recommended by gypsum board shaft-wall assembly manufacturer for application indicated.

J. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiber-blanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

2.3 GYPSUM BOARD SHAFT WALL

A. Deflection Limit: L/240.

B. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.

1. Depth: As indicated.
2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.

C. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least, in depth matching studs.

1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.

D. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0341 inch thick.

E. STC Rating: As indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, cast-in anchors, and structural framing. Examine 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. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:

1. ASTM C 754 for installing steel framing.
2. Division 9 Section " Gypsum Board Assemblies " for applying and finishing panels.

B. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

C. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, , and similar items.

D. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.

E. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.

END OF SECTION 09 21 16

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. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).
3. 'Z' Girt framing between rigid insulation behind thin-set ground face CMU base.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Postinstalled, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    b. Chicago Metallic Corporation; Drywall Furring System.
    c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.0312 inch.
2. Depth: As indicated on Drawings.

B. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0312 inch.
2. Depth: As indicated on Drawings.

D. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped.

E. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.

F. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

G. Z-shaped Furring at decorative CMU base or decorative stucco base: G90 galvanized finish without ventilation holes, face flange of 1 inch, wall attachment flange of 1 inch, minimum bare-metal thickness of 16 gauge (0.063”), and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

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.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. 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. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

2. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

C. 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 09 22 16

SECTION 09 24 23
PORTLAND CEMENT STUCCO

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials and installation of exterior stucco wall covering backed with continuous insulation, air/moisture barrier, and drainage mat for frame walls.

1.01.1 RELATED SECTIONS

A. Section 03 30 00 Cast-In-Place Concrete

B. Section 04 20 00 Unit Masonry

C. Section 07 92 00 Joint Sealants

D. Section 08 51 13 Aluminum WIndows

E. Section 09 29 00 Gypsum Board

1.03 REFERENCED DOCUMENTS

A. ASTM Standards:

1. A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
2. A 653 Specification for Sheet Steel Zinc coated (Galvanized) by the Hot-Dip Process, Commercial Quality
3. B 69 Specification for Rolled Zinc
4. C 144 Specification for Aggregate for Masonry Mortar
5. C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
6. C 847 Standard Specification for Metal Lath
7. C 897 Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters
8. C 926 Standard Specification for Application of Portland Cement-Based Plaster
9. C 1063 Standard Specification for Installation of Lathing and Furring for Portland Cement Plaster
10. C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
11. C 1513 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
12. D 226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
13. D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
14. D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

15. E 84 Test Method for Surface Burning Characteristics of Building Materials
16. E 96 Standard Test Methods for Water Vapor Transmission of Materials
17. E 283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
18. E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
19. E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
20. E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
21. E 2178 Standard Test Method for Air Permeance of Building Materials
22. E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
23. E 2430 Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards For Use in Exterior Insulation and Finish Systems ("EIFS")
24. G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

B. APA Engineered Wood Association

1. PS 1 Voluntary Product Standard, Structural Plywood
2. PS 2 Performance Standard for Wood-Based Structural-Use Panels
3. E 30 APA Engineered Wood Construction Guide

C. AISI (American Iron and Steel Institute)

1. AISI S200-2007 North American Standard for Cold-Formed Steel Framing-General Provisions

D. ICC (International Code Council)

1. 2012 and 2015 IBC (International Building Code)

E. ICC ES (International Code Council Evaluation Service)

1. AC 11, Acceptance Criteria for Cementitious Exterior Wall Coatings
2. AC 212, Acceptance Criteria for Water-resistive Coatings used as Water-resistive
3. Barriers over Exterior Sheathing
4. ICC ESR 1233: StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-resistive Barriers, and StoEnergy Guard
5. ICC ESR 2323: StoPowerwall and StoPowerwall NExT Stucco Systems
6. ICC ESR 2142: Styrofoam Brand Insulation Boards and Dow Fan-Fold Products

F. National Fire Protection Association (NFPA) Standards

1. NFPA 285, Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
2. NFPA 268, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source

G. South Coast Air Quality Management District (SCAQMD)
1. Rule 1113 (2007) – Architectural Coatings

H. Sto Corp. Addendum to Sto Stucco Specifications

I. US EPA (United Stated Environmental Protection Agency)
1. 40 CFR Part 59 (Code of Federal Regulations Title 40 Part 59 – National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

1.04 DESIGN REQUIREMENTS

A. Structural (wind and axial loads)

1. Design for maximum allowable deflection, normal to the plane of the wall of L/360
2. Design for wind load in conformance with code requirements
3. Metal framing: 18 gage (0.043 mil) or heavier, maximum 1-5/8 inch flange width, cold formed steel stud framing in conformance with AISI Standard S200-07
4. Maximum stud spacing: 16 inches (406 mm) on center
5. Sheathing: minimum 5/8 inch (19 mm) glass mat faced gypsum sheathing in conformance with ASTM C 1177
6. Insulation board: minimum 1 inch (25 mm), maximum 2 inch (51 mm) XPS (extruded polystyrene) insulation board in conformance with ASTM C 578 Type IV requirements
7. Drainage mat: maximum ¼ inch (6 mm) thick tangled filament nylon core with fabric facing
8. Metal Lath: minimum 2.5 lb / yd^2 (1.4 kg / m^2) self-furred galvanized steel diamond mesh metal lath in conformance with C 847
9. Lath fasteners and plates: corrosion resistant fasteners in conformance with AISI Standard S200-2007 and ASTM C 1513 with minimum three thread penetration beyond steel framing members, and minimum 1-1/4 inch (32 mm) corrosion resistant lath plates, with minimum fastener size and length of,
    - #8 x 3 inch (76 mm) for 1 inch (25 mm) insulation board thickness
    - #10 x 3-1/2 inches (89 mm) for 1-1/2 inch (38 mm) insulation board thickness
    - #10 x 4 inch (102 mm) for 2 inch (51 mm) insulation board thickness
10. Lath fastener spacing: maximum 6 inches (152 mm) vertically along studs
11. Stucco: minimum ¾ inch (19 mm) or 7/8 inch (22 mm) portland cement stucco in conformance with ASTM C 926 of uniform thickness applied in two coats, scratch and brown coat.

B. Moisture Control

1. Prevent the accumulation of water into or behind the stucco, either by condensation or leakage into the wall construction, in the design and detailing of the wall assembly:
    a. Provide corrosion resistant flashing to protect exposed elements and to direct water to the exterior, including, above window and door heads, beneath window and door sills, at floor lines, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, and at the base of the wall.
    b. Air Leakage Prevention—prevent excess air leakage in the design and detailing of the wall assembly. Provide continuity between air barrier components in the wall assembly.

c. Vapor Diffusion and Condensation -- perform a dew point analysis of the wall assembly to determine the potential for accumulation of moisture in the wall assembly as a result of water vapor diffusion and condensation. Adjust wall assembly components accordingly to minimize the risk of condensation. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.
d. Provide StoGuard Air/Moisture Barrier over sheathing.
e. At through wall expansion joints and at joints formed with back-to-back casing beads, back joints with StoGuard Transition Membrane. Refer to Sto Guide Details at www.stocorp.com.
f. Seal stucco terminations and accessory butt joints with appropriate sealant. Seal all penetrations through the stucco wall assembly with appropriate sealant, or backer rod and sealant, as dictated by joint type.

C. Grade Condition

1. Do not specify stucco for use below grade or on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 4 inch (100 mm) clearance above earth grade, minimum 2 inch (51 mm) clearance above finished grade (pavers/sidewalk). Provide increased clearance in freeze/thaw climate zones.

D. Sloped surfaces, Including Foam Trim and Projecting Architectural Features Attached to Stucco.

1. Avoid the use of stucco on build-outs or weather exposed sloped and horizontal surfaces (refer to 2 and 3 below).
2. Build out trim and projecting architectural features from the stucco wall surface with code compliant EPS foam. All foam trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All foam horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the wall plane, protect the top surface with waterproof base coat. Limit foam thickness to a maximum of 4 inches (102 mm). Periodic inspections and increased maintenance may be required to maintain surface integrity of finishes on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate maintenance and minimize maintenance burden. Refer to Sto Guide Details at www.stocorp.com
3. Do not use foam on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto Guide Details at www.stocorp.com

E. Joints and Accessories

1. Provide two piece expansion joints in the stucco system where building movement is anticipated: at joints in the substrate or supporting construction, where the system is to be installed over dissimilar construction or substrates, at changes in building height, at floor lines, at columns and cantilevered areas.
2. Provide one piece expansion joints every 144 ft^2 (13 m^2). Cut and wire tie lath to the expansion joint accessory so lath is discontinuous at or beneath the accessory. Do not exceed length to width ratio of 2-1/2:1 in expansion joint layout and do not exceed more than 18 feet (5.5 m) in any direction without an expansion joint. Where casing bead is used back-to-back as the expansion joint, back the joint with StoGuard Transition Membrane.

3. Provide one piece expansion joints at through wall penetrations, for example, above and below doors or windows.
4. Provide minimum 3/8 inch (9 mm) wide joints where the system abuts windows, doors and other through wall penetrations.
5. Provide appropriate accessories at stucco terminations and joints.
6. Avoid the use of channel reveal accessories which can interfere with proper drainage and proper stress relief.
7. Provide appropriate sealant at stucco terminations and at stucco accessory butt joints.
8. Indicate location of joints, accessories and accessory type on architectural drawings.

F. Fire Protection

1. Provide 15 minute thermal barrier, typically minimum ½ inch thick interior gypsum wall board, to separate foam plastic insulation from interior.
2. Noncombustible Type Construction: provide full width firestops at floor lines, typically 4 pcf (64 kg/m^3) semi-rigid mineral wool, where metal framing runs continuously past floor lin and provide minimum ¾ inch (19 mm) stucco thickness.
3. Fire Resistance Rated Non-load Bearing Wall Assembly: provide ¾ or 7/8 inch (19 or 22 mm) uniform stucco thickness. Refer to Sto Guide Details for one hour non-load bearing fire-resistive rated wall assembly.

G. Stucco Thickness *(does not include primer or textured finish coat)*

1. Application to Metal Plaster Bases: stucco thickness shall be uniforrm ¾ inch or 7/8 inch (19 or 22 mm). Stucco thickness shall not exceed 7/8 inch (22 mm).
2. Stucco shall be applied in 2 coats, scratch and brown coat, to achieve the prescribed thickness.
3. Thickness shall be uniform throughout the wall area.

1.03 PERFORMANCE REQUIREMENTS

A. Continuous Insulation

1. Compliant with ASTM C 578 Type IV requirements

B. Waterproof Air Barrier

1. Compliant with ICC ES Acceptance Criteria AC 212 (ICC ESR 1233)
2. Material Air Leakage Resistance, ASTM E 2178: less than 0.02 L/s·m^2 (0.004 cfm/ft^2 at 1.57 psf)
3. Assembly Air Leakage Resistance, ASTM E 2357: less than 0.2 L/s·m^2 (0.04 cfm/ft^2 at 1.57 psf)
4. Water Vapor Permeance, ASTM E 96, Method B: greater than 10 perms [573 ng/(Pa·s·m^2)]
5. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed, less than 450, Class A Building Material
6. Tensile Adhesion, ASTM C 297:
   Gypsum Sheathing, exceeds strength of substrate
   Plywood, > 85 psi (590 kPa)
   OSB, > 30 psi (206 kPa)
7. VOC, calculation:
   a. Less than 100 g/L
   b. Compliant with US EPA 40 CFR 59 for waterproofing/sealer
   c. Compliant with South Coast AQMD Rule 1113 for waterproofing/sealer

B. Drainage Mat

1. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A Building Material
2. Flame Propagation, NFPA 285: meets requirements for use on noncombustible (Types I,II,III, and IV) construction.

C. Stucco Base *(select one)*

1. Stucco scratch and brown coat material in compliance with ASTM C 926 and manufactured or listed by Sto Corp. (see Addendum)
2. One coat stucco material in compliance with ICC AC 11, listed by ICC ES, and manufactured or listed by Sto Corp. (see Addendum)

D. Primers

.

1. Alkaline Resistant Primer for freshly placed (minimum 4 day old) stucco surfaces:
   a. Resistant to alkaline surfaces with pH of 13 or less
   b. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A building material
   c. VOC: less than 50 g/L, compliant with South Coast AQMD Rule 1113 for architectural coatings

E. Finishes

1. Lotus-Effect Technology Finish (Stolit Lotusan)
   a. Super-hydrophobic textured finish with Lotus-Effect Technology
   b. Accelerated Weathering, ASTM G 154: 2500 hours, no blistering, checking cracking, crazing, or other deleterious effects
   c. Water Vapor Permeability, ASTM E 96, Method B: > 30 perms [(1172 ng/(Pa·s·m^2)]
   d. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A building material
   e. VOC: less than 50 g/L, compliant with South Coast AQMD Rule 1113 for architectural coatings

1.06 SUBMITTALS

A. Manufacturer's specifications, details, installation instructions and product data.

B. Manufacturer’s code compliance report and UL Listing for continuous insulation

C. Manufacturer’s code compliance report for air barrier and water-resistive barrier

D. Manufacturer’s NFPA 285 assembly report or ICC ESR indicating compliance of stucco assembly, including continuous insulation, air/moisture barrier, and drainage mat, with requirements of NFPA 285 for use on Types I, II, III, and IV construction

E. Manufacturer’s code compliance report for stucco where ICC listed one coat stucco is used

F. Manufacturer's standard warranty

G. Samples for approval as directed by architect or owner

H. Fastener manufacturer's pull-out or withdrawal capacity testing for frame construction

I. Prepare and submit project-specific details (when required by contract documents)

1.07 QUALITY ASSURANCE

A. Manufacturer requirements

1. Stucco and air barrier products manufacturer for a minimum of twenty (20) years.
2. Stucco finish products and air/moisture barrier products manufactured under ISO 9001:2008 Quality System and 14001:2004 Environmental Management System.

B. Contractor requirements

1. Licensed, insured and engaged in application of portland cement stucco for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of Sto materials.
3. Employ skilled mechanics who are experienced and knowledgeable in portland cement stucco application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.

C. Insulation board manufacturer requirements

1. Listed by an approved agency. Label insulation board with information required by Sto, the approved listing agency, and the applicable building code. 2" (R-10) Type IV XPS Insulation Board. Provide manufacturer's approved spray foam and or tape to seal gaps between boards. Follow manufacturer's installation requirements and use manufacturer's approved fasteners and spacing.

D. Testing

1. Construct full-scale mock-up of typical stucco/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, E 331 and E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
2. Conduct air barrier adhesion testing in accordance with ASTM D 4541.
3. Conduct air barrier assembly testing in accordance with ASTM E 783.
4. Verify adequacy of pull-out or withdrawal capacity of fasteners used for frame construction with manufacturer in relation to negative design wind pressures.
5. Conduct pH testing to check stucco surface alkalinity before application of primer or finish materials. Where alkaline resistant primer is used pH testing may be waived.
6. Conduct wet sealant adhesion testing in accordance with sealant manufacturer's field quality control test procedure.
7. Notify design professional minimum 7 days prior to testing.

E. Inspections

1. Provide independent third party inspection where required by code or contract documents.
2. Conduct inspections in accordance with code requirements and contract documents.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect insulation materials from prolonged UV exposure, keep away from sources of heat, sparks, flame, flammable or volatile materials. Store on a clean, flat surface, off the ground in a dry area.

C. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

D. Protect portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

E. Handle all products as directed on labeling.

1.09 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after set of stucco, and application of waterproof air barrier and finish materials.

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that material temperatures are maintained as in 1.09A. Prevent concentration of heat on uncured stucco and vent fumes and other products of combustion to the outside to prevent contact with stucco.

C. Prevent uneven or excessive evaporation of moisture from stucco during hot, dry or windy weather. For installation under any of these conditions provide special measures to properly moist cure the stucco. Do not install stucco if ambient temperatures are expected to rise above 100ºF (38ºC) within a 24 hour period.

D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.10 COORDINATION/SCHEDULING

A. Protect continuous insulation from prolonged UV exposure. Protect with wall covering within 60 days of installation.

B. Protect sheathing from climatic conditions to prevent weather damage until the installation of the waterproof air barrier.

C. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

D. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier and continuous

moisture protection. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall and provide sill flashing. Coordinate installation of air/moisture barrier components with window and door installation to provide weather proofing of the structure and to prevent moisture infiltration and excess air infiltration.

E. Install window and door head flashing immediately after windows and doors are installed.

F. Protect air/moisture barrier with stucco cladding within 180 days of installation.

G. Protect drainage mat with stucco cladding within 30 days of installation.

H. Commence the stucco installation after completion of all floor, roof construction and other construction that imposes dead loads on the walls to prevent excessive deflection (and potential cracking) of the stucco.

I. Sequence interior work such as drywall installation prior to stucco installation to prevent stud distortion (and potential cracking) of the stucco.

J. Provide site grading such that the stucco terminates above earth grade minimum 4 inches (100 mm) and above finished grade (pavers/sidewalk) minimum 2 inches (51 mm). Provide increased clearance in freeze/thaw climate zones.

K. Install copings and sealant immediately after installation of the stucco and when finish coatings are dry.

L. Attach penetrations through stucco to structural support and provide air tight and water tight seals at penetrations.

1.11 WARRANTY

A. Provide manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Air/Moisture Barrier, Drainage Mat, Portland Cement Stucco, Stucco Primers, and Stucco Finishes

1. Sto Corp., 3800 Camp Creek Parkway, Building 1400, Suite 120. Atlanta, GA 30331

2.02 AIR/MOISTURE BARRIER

A. StoGuard-- fluid applied waterproof air barrier for sheathing, concrete, and concrete masonry substrates consisting of multiple compatible components:

1. Sto Gold Fill -- ready mixed acrylic based flexible joint treatment for rough opening protection, joint treatment of wall sheathing, CMU crack repair, and detail component for shiplap connections with flashing, weep screed, and similar ship lap details.
2. Sto EmeraldCoat -- ready mixed flexible waterproof coating for wall sheathing, concrete and CMU wall surfaces

3. Sto AirSeal™ -- ready mixed medium-high build coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar shingle lap details
4. StoGuard Mesh-- nominal 4.2 oz/yd^2 (142 g/m^2), self-adhesive, flexible, symmetrical, interlaced glass fiber mesh, with alkaline resistant coating for compatibility with Sto materials, used with Sto Gold Fill to reinforce rough openings, inside and outside corners, sheathing joints, and shiplap connections with flashing, weep screed, and similar shingle lap details
5. StoGuard Fabric - nonwoven cloth reinforcement used with Sto EmeraldCoat for rough opening protection, joint treatment of wall sheathing, and detail component for shiplap connections with flashing, weep screed, and similar shingle lap details
6. StoGuard RediCorner - a preformed fabric piece used in the corners of rough openings in tandem with StoGuard Fabric for quicker installation
7. StoGuard Tape – self adhering rubberized asphalt tape for rough opening protection in wood or metal frame construction
8. StoGuard Primer – primer for use with StoGuard Tape
9. StoGuard Transition Membrane - flexible air barrier membrane for continuity at static transitions: sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions. Also used for dynamic joints: floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
10. Sto RapidGuard™ - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap over flashing, wall to balcony floor slab or ceiling, and through wall penetrations – pipes, electrical boxes, and scupper penetrations
11. StoGuard RapidSeal – one component quick drying waterproof air barrier material for rough opening protection, sheathing joints (with StoGuard Mesh), CMU crack repair, and for sealing fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials
12. StoGuard RapidFill - one component rapid drying gun-applied joint treatment for sheathing. Also used at static transition joints or seams in construction and to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials. Also used as a detail component for shiplap connections to flashing, weep screed, and similar ship lap details

2.03 CONTINUOUS INSULATION

A. Owens Corning Type IV XPS rigid insulation board in compliance with ASTM C 578.

B. Dow Type IV XPS rigid insulation board in compliance with ASTM C 578.

2.04 SPRAY FOAM ADHESIVE, CI SEAM AND GAP FILLER

A. Sto TurboStick – single component polyurethane spray foam adhesive for attaching foam insulation and filling seams and gaps in insulation board surface.

2.05 WATER-RESISTIVE BARRIER

A. Minimum No. 15 asphalt saturated felt complying with ASTM D 226, Type 1, or

one layer of Grade D kraft building paper, or paper-backed stucco lath conforming to 2.07.

2.06 DRAINAGE MAT

A. Sto DrainScreen 6mm – nominal ¼" (6 mm) tangled filament nylon core drainage mat with fabric facing.

2.07 LATH

A. Minimum 2.5 lb./yd^2 (1.4 kg/m^2) self-furred galvanized steel diamond mesh metal lath in compliance with ASTM C 847

2.08 MECHANICAL FASTENERS FOR METAL LATH

A. Non-corroding fasteners in compliance with AISI S200 – 2007 and ASTM C 1513:

1. Wood Framing--minimum #10 Type S wafer head fully threaded corrosion resistant screws with minimum 1 inch (25 mm) penetration into studs.
2. Steel Framing— corrosion resistant fasteners and plates with minimum three thread penetration beyond steel framing members, and with minimum fastener size and length of,
    - #8 x 3 inch (76 mm) for 1 inch (25 mm) insulation board thickness
    - #10 x 3-1/2 inches (89 mm) for 1-1/2 inch (38 mm) insulation board thickness
    - #10 x 4 inch (102 mm) for 2 inch (51 mm) insulation board thickness

B. Tie Wire—18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A 641 with Class I coating.

2.09 ACCESSORIES

A. Weep screed, casing bead, corner bead, corner lath, expansion and control joint accessories. All accessories shall meet the requirements of ASTM C 1063 and its referenced documents

1. Zinc in compliance with ASTM B 69, 99% pure zinc.

B. All accessories shall have perforated or expanded flanges and shall be designed with grounds for the specified thickness of stucco.

2.10 JOB MIXED INGREDIENTS

A. Water: clean and potable.

B. Sand: in compliance with ASTM C 897 or C 144, for use with one coat and C 926 stucco concentrates

2.11 STUCCO

A. 102 StoPowerwall Stucco Pre-Blended: fiber reinforced one coat portland cement stucco pre-blended with graded sand, and in compliance with ICC AC 11. See ICC ESR 2323.

B. 103 StoPowerwall Stucco: fiber reinforced one coat portland cement stucco concentrate in compliance with ICC AC 11. See ICC ESR 2323.

C. 108 StoPowerwall Scratch & Brown: portland cement-based stucco concentrate in compliance with ASTM C 926.

D. Other code compliant portland cement stucco as listed by Sto Corp. (refer to Addendum)

ci

2.12 FOAM TRIM AMD BUILD-OUTS

A. Adhesive and Base Coat *(select one)*

1. Sto BTS Xtra - light weight one component polymer modified cement-based extra high build base coat material
2. Sto BTS Plus - one component polymer modified cement-based high build base coat material
3. Sto Primer/Adhesive-B - one component polymer modified cement-based base coat material
4. Sto Primer/Adhesive – two component acrylic based base coat material field mixed with portland cement
5. Sto RFP – ready mixed non-cementitious fiber reinforced base coat material
6. Sto Flexyl – two component fiber reinforced acrylic based waterproof base coat material field mixed with portland cement (for use as a waterproof base coat to waterproof foundations, parapets, splash areas, trim and other projecting architectural features).

B. Foam Insulation Board for Trim

1. Sto EPS Insulation Board--nominal 1.0 lb/ft^3 (16 kg/m^3) Expanded Polystyrene (EPS) Insulation Board in compliance with ASTM C 578 Type I requirements, and ASTM E 2430,

C. Reinforcing Mesh

1. Sto Mesh--nominal 4.5 oz./yd^2 (153 g/m^2), symmetrical, interlaced open-weave glass fiber mesh treated with alkaline resistant coating for compatibility with Sto materials

2. Sto Detail Mesh--nominal 4.2 oz/yd^2 (143 g/m^2), flexible, symmetrical, interlaced open-weave glass fiber fabric treated with alkaline resistant coating for compatibility with Sto materials

3.

2.13 CRACK DEFENSE

A. Base Coat
1. Sto BTS Plus - one component polymer modified cement-based high build base coat material

B. Reinforcing Mesh

1. Sto Mesh - nominal 4.5 oz./yd^2 (153 g/m^2), symmetrical, interlaced open-weave glass fiber mesh made with alkaline resistant coating for compatibility with Sto materials.

2.14 PRIMER

A. StoPrime Hot—acrylic based primer/sealer for freshly placed (minimum 4 day old) and high pH stucco surfaces.

2.15 FINISH COAT

A. Stolit Lotusan Finish - integrally colored, factory blended textured Lotus-Effect Technology wall finish with graded marble aggregate

B. StoSignature Finishes – Stolit acrylic based textured wall finish applied over Sto Crack Defense with specialized techniques to achieve unique textures, impressions or effects. Refer to www.stocorp.com for StoSignature Finishes Brochure and Installation Guides.

2.16 MIXING

A. StoGuard

1. Sto Gold Fill - mix with a clean, rust-free electric drill and paddle to a uniform consistency. Do not thin, or dilute with water.
2. Sto AirSeal – mix with a clean, rust-free electric drill and paddle to a uniform consistency. Do not thin, or dilute with water.
3. Sto EmeraldCoat - mix with a clean, rust-free electric drill and paddle to a uniform consistency. Do not thin, or dilute with water.

B. StoPowerwall Stucco

1. Refer to mix instructions on packaging. USE ONLY THE AMOUNT OF WATER NECESSARY FOR A WORKABLE MIX. Use of excess water is detrimental to performance.

C. Adhesive and Base Coats for Sto Crack Defense and Foam Build-outs:

1. Refer to applicable Sto Product Bulletin for selected adhesive/base coat material(s).

D. Primer--mix with a clean, rust-free high speed mixer to a uniform consistency.

E. Finish--mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water (up to 12 ounces [0.4 L]) may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.

F. Mix only as much material as can readily be used.

G. Do not add lime, anti-freeze compounds, or other additives to any of the materials.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. Pre-qualify under Quality Assurance requirements of this specification (section 1.07.B).

3.02 EXAMINATION

A. Inspect sheathing surfaces for:

1. Damage and deterioration.
2. Moisture damage—record any areas of moisture damage.

B. Inspect sheathing application for compliance with applicable requirement:

1. Glass Mat Faced Gypsum Sheathing in compliance with ASTM C 1177—refer to manufacturer's instructions and/or ICC evaluation report
2. Exterior Grade and Exposure 1 wood based sheathing—APA Engineered Wood Association E 30.

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the waterproof air barrier, CI, or stucco installation to the General Contractor. Do not proceed with air barrier, CI, or stucco installation until deviations are corrected.

3.03 SURFACE PREPARATION.

C. Sheathing
1. Remove surface contaminants and replace damaged sheathing.
2. All sheathing must be handled and installed in compliance with applicable building code and/or manufacturer requirements. Installed sheathing must be clean, dry and free from damage, frost, and all bond-inhibiting materials. Abut gypsum sheathing joints. Gap wood sheathing 1/8 inch (3 mm) at joints. Should gaps exceed ⅛ inch (3 mm) up to 1/2 inch (13 mm) wide, use Sto RapidGuard or StoGuard RapidFill to fill joints, or apply low expanding urethane foam into joints and rasp or shave flush with sheathing surface in preparation for installation of StoGuard joint treatment.
3. Spot surface defects in sheathing with joint treatment (Sto Gold Fill, Sto RapidGuard, StoGuard RapidSeal, StoGuard RapidFill, or Sto EmeraldCoat).

3. 04 AIR/MOISTURE BARRIER INSTALLATION

A. The following instructions are applicable to:

1. Exterior or Exposure I Plywood in compliance with PS-1
2. OSB (Oriented Strand Board) in compliance with PS-1 or PS-2
3. Glass Mat Faced Gypsum Sheathing in compliance with ASTM C 1177

B. Transition Detailing
1. Detail transition areas with Sto RapidGuard (static joints and seams) or StoGuard Transition Membrane (dynamic joints and seams) to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocop.com)

C. Rough Opening Protection Sto Gold Fill with StoGuard Mesh: apply 9 inch (229 mm) wide StoGuard Mesh at rough openings. Immediately apply Sto Gold Fill by spray or trowel over the mesh and spread smooth with a trowel to completely cover the mesh (refer to Sto Detail 20.20M).

D. Sheathing Joint Treatment
1. Sto Gold Fill with StoGuard Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered

and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread smooth with a trowel to completely cover the mesh.

E. Air/Moisture Barrier Coating Installation

1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform thickness of 10 wet mils in one coat (Sto EmeraldCoat) or 50 wet mils in one coat (Sto AirSeal). Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
2. OSB Sheathing: apply waterproof coating by spray or with a ¾ inch (19 mm) nap roller to sheathing surface to a uniform thickness of 10 wet mils (Sto EmeraldCoat) or 50 wet mils in one coat (Sto AirSeal). Protect rough openings, joints, and parapets (Paragraph 3.04D), then apply a second coat of waterproof coating.

F. Air /Moisture Barrier Connections and Shingle Laps

1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

NOTE: DO NOT ALLOW WATERPROOF AIR BARRIER INSTALLATION TO REMAIN EXPOSED MORE THAN 180 DAYS. PROTECT WITH STUCCO WALL COVERING PROMPTLY AFTER INSTALLATION.

3.05 CONTINUOUS INSULATION INSTALLATION

A. Attach insulation boards to framing with corrosion resistant bugle head metal screws and 1-1/4 inch metal lath locks or other corrosion resistant cap fastener. Use only enough fasteners (typically 3 per board mid-span) to temporarily hold the board in place. Sto TurboStick can also be applied on the back of the insulation board (minimum 4 – 8 vertical ribbons per board) to temporarily hold the insulation in place. (lath attachment is intended to permanently hold it in place).

B. Attach in courses with vertical joint staggered.

C. Cut insulation board in an “L” shape around openings. Tightly abut insulation board joints and interlock inside and outside corners. Trim or rasp board flush for square corners.

D. Seal gaps or open joints with Sto TurboStick spray foam and rasp or shave flush with surface.

E. Do not allow insulation board to be exposed to weather from more than 60 days.

3.06 SHEET WATER-RESISTIVE BARRIER INSTALLATION

A. Install in compliance with the applicable building code requirements for building paper. Lap paper over foundation weep screed attachment flange, floor line flashing, and window/door head flashings. Refer to Sto Gide Details at www.stocorp.com

.

(

3.07 DRAINAGE MAT INSTALLATION

A. Place drainage mat against the wall surface and unroll horizontally with the fabric facing out. Hammer-tack or staple into continuous insulation with corrosion-resistant fasteners. Use as few fasteners as needed to hold the mat in place, starting from the bottom of the wall at base flashing or weep screed and working up. Do not fasten through flashing. Shingle lap fabric at horizontal courses. Shingle lap drainage mat over weep screeds, flashing at floor lines, decks, roof lines, window heads, and other areas where flashing is required, to direct water to the exterior. Butt ends of rolls and vertical seams. Trim around windows, doors, vents, or other penetrations through the wall. Do not install behind window nail flanges. Immediately follow installation of drainage mat with stucco lath installation. Where stucco lath installation will not immediately follow installation of drainage mat, use corrosion-resistant cap nails, cap staples, or cap screws every 16 inches (406 mm) on center along framing for more secure attachment. Cover drainage mat with stucco within 30 days of installation.

3.08 STUCCO INSTALLATION

Apply the stucco in discrete panels without interruption to avoid cold joints and differences in appearance. Abut wet stucco to set stucco at natural or architectural breaks in the wall such as expansion joints, pilasters, terminations, or changes in plane. Hot or dry conditions accelerate drying and moisture loss from stucco which can diminish strength and resistance to cracking. Under these conditions adjustments in the application, scheduling and curing of stucco to prevent rapid loss of moisture are necessary to achieve a satisfactory stucco installation. Cold temperatures retard drying and strength gain and adjustments may have to be made in the application, scheduling and curing of stucco to prevent damage from frost and other trades. Do not install stucco during extremely hot, dry and/or windy conditions. Do not install stucco during freezing conditions or on frozen substrates. Do not install stucco onto grounds of accessories. Completely embed lath and flanges of accessories and completely cover fastener attachments with stucco. Moist cure stucco minimum 48 hours for optimum strength gain and resistance to cracking. Allow final stucco application to completely dry (28 days) before applying primer or finish or until pH of stucco surface is less than 10 (except in the case of StoPrime Hot which can be applied 48 hours after completing moist cure of stucco). The finished installation must be true, plumb and square. Should stucco get into control or expansion joints, remove the stucco from within the joint before the stucco sets.

After satisfactory inspection of surfaces and correction of any deviations from specification requirements commence the stucco installation as described below:

A. Installation over StoGuard/Sto DrainScreen

1. Weep Screed Installation
   a. Install foundation weep screed at the base of the wall securely to solid substrate or framing with the appropriate fastener. Locate foundation weep screed so that it overlaps the joint between the foundation and framing by a minimum of 1 inch (25 mm). Locate the foundation weep screed nosing minimum 4 inches (100 mm) above earth grade, 2 inches (51 mm) above finished grade (paved surfaces, for example). Lap

waterproof air barrier, sheet water-resistive barrier, and drainage mat over the weep screed attachment flange.

2. Casing Bead and Two Piece Expansion Joint Installation
   a. Install casing beads at stucco terminations—doors, windows and other through wall penetrations. Install two piece expansion joints (or back-to-back casing beads) at building expansion joints, thru-wall joints in concrete or CMU, where the stucco is to be installed over dissimilar construction or substrates, at changes in building height, at floor lines, columns, and cantilevered areas. Install full accessory pieces where possible and avoid small pieces. Seal adjoining pieces by embedding ends in sealant. Abut horizontal into vertical joint accessories (except where horizontal movement joints exist that prevent continuous vertical runs of accessories). Attach at no more than 7 inches (178 mm) into solid substrate/framing with appropriate fasteners.

3. Lath Installation
   a. Diamond Mesh Metal Lath – conform to ASTM C 1063
      i. General--install metal lath with the long dimension at right angles to structural framing (horizontally on solid substrates). Terminate lath at expansion joints. Do not install continuously at joints.
      ii. Seams/Overlaps--overlap side seams minimum 1/2 inch (13 mm) and end seams minimum 1 inch (25 mm). Stagger end seams. Overlap casing beads and expansion joints minimum 1 inch (25 mm) over narrow wing accessories, minimum 2 inches (51 mm) over expanded flange accessories. Do not install lath continuously beneath expansion joints.
      iii. Attachment--fasten securely through sheathing into structural framing at 6 inches (152 mm) on center maximum vertically and 16 inches (406 mm) on center horizontally*. Wire tie at no more than 9 inches (225 mm) on center at: side laps, accessory overlaps, and where end laps occur between supports.
   b. Paper-backed lath—follow installation as for diamond mesh metal lath. Lap lath over lath, not paper to lath overlap. For horizontal overlaps the paper backing must lap shingle style behind the lath to lath overlap.

4. One Piece Expansion Joint Installation
   a. Install one piece expansion joints at through wall penetrations, for example, above and below doors and windows. Install one piece expansion joints at every 144 ft^2 (13 m^2). Wire tie one piece expansion joints to lath at no more than 7 inches (178 mm) on center. Seal adjoining pieces by embedding ends in sealant. Make certain lath is DISCONTINUOUS at or beneath joints.
5. Inside and Outside Corners
   a. Install corner lath at inside corners and corner bead at outside corners over lath. Attach through lath into solid substrate or framing at no more than 7 inches (178 mm) on center with appropriate fasteners.
6. Stucco Installation
   a. Scratch Coat: apply stucco with sufficient pressure to key into and embed the metal lath. Apply sufficient material, 3/8 or ½ inch (9 or 12 mm), to cover the metal lath and to permit scoring the surface. Score the stucco upon completion of each panel in preparation for a second coat. Score horizontally.
   b. Brown Coat: as soon as the first coat is firm enough to receive the second coat without damage, apply the second coat. Alternatively, moist cure the first coat up to 48 hours and dampen the scratched surface with water

immediately before applying the second coat. Apply the second coat with sufficient pressure to ensure intimate contact with the first coat and as needed to bring the stucco to a uniform thickness that matches the grounds of the accessories. Use a rod or straight edge to bring the surface to a true, even plane. Fill depressions in plane with stucco. Final thickness of stucco shall be uniform throughout the wall area and shall be either 3/4 inch or 7/8 inch (19 or 22 mm), and shall not exceed 7/8 inch (22 mm).

c. After the stucco has become slightly firm float the surface lightly with a darby or wood float to densify the surface and to provide a smooth, even surface. The proper time to float is when the wood float no longer sticks to the surface of the stucco.

d. Moist cure after the stucco has set by lightly fogging for at least 48 hours. Fog as frequently as required during the 48 hour period to prevent loss of moisture from the stucco. Avoid eroding the stucco surface with excess moisture. If relative humidity exceeds 75% the frequency of moist curing can be diminished.

B. Foam Trim and Build-Outs

1. Where foam build-outs terminate at a dissimilar material such as a window, door or other non-stucco surface, backwrap the foam build-out by installing detail mesh onto the terminating edge of the stucco. Embed the mesh in the foam trim adhesive. Allow the mesh to dangle until the backwrapping procedure is completed (B4).
2. Install foam build-outs directly over hardened stucco with foam trim adhesive. Apply adhesive with the appropriate size notched trowel to the back of the insulation board and immediately place build-out in the proper location on the wall. Press firmly into place and trim or tool excess adhesive from ends and edges of foam trim for a smooth void-free connection to the stucco substrate.
3. After the adhesive has cured sufficiently to hold the build-out firmly in place, rasp the entire foam surface smooth.
4. Complete the backwrapping procedure by applying the foam trim base coat to the exposed edges of the foam build-out and minimum 2-1/2 inches (64 mm) onto the face. Pull the backwrap mesh around the foam build-out and fully embed it into the base coat. Use a corner trowel for neat straight corners.
5. Apply the base coat to the foam build-out and approximately 3 inches (76 mm) onto the adjacent stucco surfaces to an approximate thickness of 1/8 inch (3 mm). Immediately embed the reinforcing mesh in the wet base coat. Trowel from the center to the edges of the mesh to avoid wrinkles and remove excess base coat. Overlap mesh seams minimum 2-1/2 inches (64 mm). Overlap mesh onto adjacent stucco wall surfaces minimum 2-1/2 inches (64 mm) at terminations of the foam build-out and feather onto the stucco wall surface. Alternatively, If Crack Defense is used apply Crack Defense with its reinforcing mesh continuously from the stucco wall surface over foam build-outs (refer to 3.08 C).

C. Crack Defense

1. Apply base coat over the moist cured stucco (and foam build-outs if not already reinforced with mesh) with appropriate spray equipment or a stainless steel trowel to a uniform thickness of approximately ⅛ inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-½ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Avoid wrinkles in

the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible. Do not install base coat or mesh over joints or accessories in the stucco wall assembly.

D. Primer Installation

1. StoPrime Hot—Moist cure stucco for a minimum of 48 hours. Allow stucco to dry an additional 48 hours, then apply primer evenly with brush, roller or proper spray equipment over the clean, dry stucco and foam build-outs, and allow to dry. Final age of primed stucco application must be minimum 7 days before application of finish.
2. StoPrime Sand—Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or pH must be below 10.
3. StoPrime— Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or the pH must be below 10.

D. Finish Installation

1. Apply finish to minimum 28 day old stucco or primed stucco and foam build-outs, or
when pH of stucco surface is less than 10. If StoPrime Hot is used as the primer the primed stucco/foam build-out surfaces need only be minimum 7 days old. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
   a. Avoid application in direct sunlight.
   b. Apply finish in a continuous application, and work a wet edge towards the unfinished wall area. Work to an architectural break in the wall before stopping to avoid cold joints.
   c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
   d. Float “R” (rilled or swirl texture) finishes with a plastic float to achieve their rilled texture
   e. Do not install separate batches of finish side-by-side.
   f. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
   g. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.
   h. Do not install finish over high pH ($\geq$ 10) stucco surfaces or surfaces that have not been fully cured.

3.09 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them.

B. Provide protection of installed stucco from dust, dirt, precipitation, and freezing.

C. Provide protection of installed primer and finish from dust, dirt, precipitation, freezing and continuous high humidity until fully dry.

D. Provide sealant and backer material at stucco terminations and at fixture penetrations through the stucco to protect against air, water and insect infiltration. Provide weeps at floor lines, window and door heads, and other areas to conduct water to the exterior.

3.10 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the stucco finish for a fresh appearance and to prevent water entry into and behind the stucco. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.

C. Refer to Sto reStore Repair and Maintenance Guide (reStore Program) for detailed information on stucco restoration - cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

SECTION 09 29 00
GYPSUM BOARD

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 the following:

1. Interior gypsum board.
2. Tile backing panels.
3. Exterior Sheathing

B. Related Sections include the following:

1. Division 7 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
2. Division 7 Section “Foamed in Place Insulation” for insulation installed in assemblies that incorporate gypsum sheathing
3. Division 9 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.

1.3 SUBMITTALS

A. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.
b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wall coverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are 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.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated

B. Type: All gypsum board shall be Type 'X'.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Continental Building Products

b. G-P Gypsum
c. National Gypsum Company
d. USG Corporation.

B. Type X:

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture and Mold-Resistant Type: With moisture and mold-resistant core and surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.

D. Acoustically Enhanced Gypsum Board: ASTM C1396/C1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.
1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.

E. Impact-Resistant Gypsum Board: complying with ASTM C1629. Constructed of high-density, mold and moisture resistant, Type X core covered front and back in heavyweight paper facers or tough fiberglass mats.
1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.

2.3 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board:

1. Complying with ASTM C 1178/C 1178M.

a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum.

2. Complying with ASTM C1177/C 1177M.

a. Product: Subject to compliance with requirements, provide "DensArmor Plus Interior Guard" by G-P Gypsum.

2.4 EXTERIOR SHEATHING

A. Paperless sheathing panel made of a treated, water resistant core, surface with glass mat facings:

1. Complying with ASTM C1177, ASTM E119.

a. Product: Subject to compliance with requirements, provide “DensGlassGold” by G-P Gypsum.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, 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.

a. 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 drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

F. Thermal Insulation: As specified in Division 7 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, 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. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for

locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces, unless otherwise indicated.
2. Moisture- and Mold-Resistant Type: 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 vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. 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.

C. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. Curved-Edge Cornerbead: Use at curved openings.

3.6 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, beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

    a. Primer and its application to surfaces are specified in other Division 9 Sections.

E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. 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 09 29 00

SECTION 09 30 00
CERAMIC TILE

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, but is not limited to, the following:

1. Ceramic floor tile.
2. Glazed wall tile.
3. Quarry Tile
4. Waterproof membranes for tile installations.
5. Stone thresholds installed as part of the tile installation.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

2. Division 9 Section “Gypsum Board” for tile backing panels.

1.3 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

B. Load-Bearing Performance: For ceramic tile installed on walkway surfaces, provide installations rated for the following load-bearing performance level based on testing assemblies according to ASTM C 627 that are representative of those indicated for this Project:

1. Heavy: Passes cycles 1 through 12.

1.5 SUBMITTALS

A. Product Data: For each type of tile, mortar, grout, and other products specified.

B. Shop Drawings: For the following:

1. Tile patterns and locations.
2. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification: Of each item listed below, prepared on Samples of size and construction indicated. Where products involve normal color and texture variations, include Sample sets showing the full range of variations expected.

1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on braced cementitious backer units, and with grouted joints using product complying with specified requirements and approved for completed work in color or colors selected by Architect.
2. Full-size units of each type of trim and accessory for each color required.
3. Stone thresholds in 6-inch lengths.
4. Metal edge strips in 6-inch lengths.

D. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

E. Product Certificates: Signed by manufacturers certifying that the products furnished comply with requirements.

F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.

G. Tile Test Reports: Indicate and interpret test results for compliance of special-purpose tile with specified requirements.

H. Setting Material Test Reports: Indicate and interpret test results for compliance of tile-setting and -grouting products with specified requirements.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each product:

1. Stone thresholds.
2. Joint sealants.

E. Mockups: Before installing tile, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.

1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before proceeding with final unit of Work.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

a. When directed, demolish and remove mockups from Project site.
b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

1. Tile Products:

a. As noted on the drawings
b. Equal as approved by the Architect.

2. Tile-Setting and -Grouting Materials:

a. American Olean Tile Company.
b. Dal-Tile Corporation.
c. DAP, Inc.
d. Laticrete International, Inc.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.

C. Sizes, Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As indicated on the drawings.
2. Provide tile trim and accessories that match color and finish of adjoining flat tile.

2.3 TILE PRODUCTS

A. Ceramic Tile: Provide factory-mounted flat tile complying with the following requirements:

1. Module Size: as indicated on the drawings.
2. Nominal Thickness: 1/4 inch.
3. Face: Plain with cushion edges.
4. Styles, colors and patterns: As indicated on the drawings

B. Glazed Wall Tile: Provide flat tile complying with the following requirements:

1. Module Sizes: as indicated on the drawings.
2. Thickness: 5/16 inch.
3. Face: Plain with modified square edges or cushion edges.
4. Styles colors and patterns: As indicated on the drawings.

C. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:

1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
2. Shapes: As follows, selected from manufacturer's standard shapes:

a. Base for Portland Cement Mortar Installations: Coved.
b. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose.
c. External Corners for Thin-Set Mortar Installations: Surface bullnose.

D. QUARRY FLOOR TILE AND BASE

1. Tile selections shall be as shown on the Drawings.

2.4 WATERPROOFING MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10.

B. Typical Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement.

1. LATICRETE International Inc.; Laticrete 9237 Waterproof Membrane.

C. Polyethylene Waterproofing Uncoupling Membrane with grid structure of square cavities and an anchoring fleece laminated to the underside.
1. Schluter Systems “DITRA” Uncoupling membrane

2.5 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

B. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Match Architect's sample.

2.6 SETTING MATERIALS

A. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:

1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.

a. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

B. Water-Cleanable, Tile-Setting Epoxy Mortar: ANSI A118.3.

1. Pro-Spec B-7000 Epoxy Mortar.

2.7 GROUTING MATERIALS

A. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:

1. Factory-Prepared, Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:

a. Unsanded grout mixture for joints 1/8 inch and narrower.
b. Sanded grout mixture for joints 1/8 inch and wider.

B. Epoxy Grout

1. Pro-Spec B-7000 Epoxy Grout.

2.8 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part, Mildew-Resistant Silicone Sealants:

a. Dow Corning 786; Dow Corning Corporation.
b. Sanitary 1700; GE Silicones.
c. Pecora 898 Sanitary Silicone Sealant; Pecora Corp.
d. Tremsil 600 White; Tremco, Inc.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.

1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

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 installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Commencing installation of ceramic tile items shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

B. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.

1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in 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.

D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:

1. Petroleum paraffin wax or grout release.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. 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.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."

H. Grout tile to comply with the requirements of the following tile installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate. FLOOR TILE INSTALLATION

B. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.

C. Joint Widths: Install tile on floors with the following joint widths:

1. Ceramic Floor Tile: 1/16 inch.
2. Quarry Tile: 1/4 inch

D. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

1. Tile floors composed of rib-backed tiles.

E. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

3.5 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:

1. Wall Tile: 1/16 inch.

C. Back Buttering: Obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, remove any protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09 30 00

SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

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 ceilings consisting of acoustical panels and exposed suspension systems.

1.3 SUBMITTALS

A. Product Data: For each type of product specified.

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension system members.
2. Method of attaching suspension system hangers to building structure.
3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
4. Minimum Drawing Scale: 1/4 inch = 1 foot.

C. Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

1. Full-size samples of each acoustical panel type, pattern, and color.
2. Set of 12-inch-long samples of exposed suspension system members, including moldings, for each color and system type required.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated below.

2.2 ACOUSTICAL PANELS

A. Refer to drawings for acoustical panel selections.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Refer to drawings for suspension system selections.

B. General: Direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

F. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

G. Ceiling Isolation Hangers: Kinetics Noise Control model ICC-100 Isolation Hanger.

H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
3. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.2 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.
9. Install ceiling isolation hangers a maximum of 48” on center.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated or required.

3.3 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 64 66

WOOD SPORTS-FLOORING ASSEMBLIES

PART 1 - GENERAL

1.1 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 the following:
1. Oak, strip flooring on floating, double-layer, plywood subfloor.

B. Related Sections include the following:
1. Division 6 Section "Finish Carpentry" for wood bases.

C. Product Data: For each type of product indicated.

D. Shop Drawings: Show installation details including location and layout of each type of wood, athletic-flooring assembly and accessory. Include the following:
1. Expansion provisions and trim details.
2. Layout, colors, widths, and dimensions of game lines and markers.
3. Locations of athletic equipment floor anchors installed in wood flooring.

E. Samples for Initial Selection: Manufacturer's color charts showing colors and glosses available for the following:
1. Floor finish.
2. Game-line and marker paint.

F. Samples for Verification: For each type of wood flooring, game-line and marker paint, finish, and accessory required; approximately 12 inches long and of same thickness and material indicated for the Work. Include sample sets showing the full range of normal color and texture variations expected.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed wood, athletic flooring similar in material, design, and extent to that indicated for this Project and whose work has resulted in wood, athletic-flooring installations with a record of successful in-service performance.

1. Installer's Responsibilities: Installation of flooring assembly, including the following:
   a. Floating Floor System.
   b. Subfloor.
   c. Wood finish flooring.
   d. Game lines and markers.
   e. Accessories.

B. Oak Flooring: Comply with NWFA grading rules for grade and cut.
   1. Certification: Provide flooring that carries NWFA Certification Mark on each piece.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood-flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood-flooring materials in a dry, warm, well-ventilated, weathertight location as recommended by wood flooring assembly manufacturer.

D. Move wood flooring materials into spaces where it will be installed at least seven days before installation.

1.5 PROJECT CONDITIONS

A. Conditioning: Maintain relative humidity conditions planned for building occupants, but not greater or less than the relative humidity range recommended by NWFA, and an ambient temperature between 55 and 75 deg F in spaces to receive wood flooring for at least seven days before installation, during installation, and for at least seven days after installation. After postinstallation period, maintain relative humidity conditions and ambient temperature planned for building occupants.
   1. Open sealed packages to allow wood flooring to acclimatize.
   2. Do not install flooring until it adjusts to the relative humidity of and is at the same temperature as the space where it is to be installed.
   3. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by flooring and finish manufacturer, but not less than 10 days.

PART 2 - PRODUCTS

1.6 2.1 MANUFACTURERS

A. A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Wood, Athletic-Flooring Assemblies:
      a. Action Floor Systems, Inc.

2. Finishing Materials:
   a. Basic Coatings.
   b. BonaKemi USA, Inc.
   c. Crawford Laboratories.
   d. Hillyard Inc.
   e. Huntington Laboratories, Inc.
   f. National Coatings Co.
   g. Flooring-assembly manufacturer.

2.2 OAK FLOORING

A. Strip Flooring: White Oak, kiln dried.
   1. Grade: #1 Common Unfinished Solid
   2. Cut: Edge grain.
   3. Lengths: Nominal 15 to 96 inches complying with NWFA grading rules, unless otherwise required for patterns indicated.
   4. Matching: Tongue and groove, and end matched.
   5. Backs: Channeled (kerfed) for stress relief.
   6. Thickness: 25/32 inch.
   7. Face Width: 2-1/4 inches.

B. Preservative Treatment: Clear, penetrating, water-repellent wood preservative that protects against mold, mildew, staining, and decay fungi; complying with NWFA's written recommendations and applied by immersion.

2.3 FLOATING RESILIENT FLOOR SYSTEM

A. The floating resilient floor system shall be Action Thrust I as manufacturered by Action Floors and shall be installed at the First Floor Stage

B. Subfloor
   1. Vapor barrier shall be 6-mil polyethylene.
   2. Performance Pads shall be Action ¾" Conical natural rubber performance pads.
   3. Plywood subfloor panels shall be 15/32, Exposure 1, rated sheathing, minimum APA Span Rating of 32/16
   4. Room Base shall be 3" x 4" Vented Rubber Base.

C. Fasteners
   1. Flooring fasteners shall be 2" flooring fasteners.

2.4 FINISHING MATERIALS

A. Floor-Finish System: NWFA-listed system of compatible components recommended by flooring and finish manufacturers for application indicated.
   1. Type: Group 3, Gymnasium Type (Surface) Finishes; urethane-oil type.
   2. Finish Coats: Formulated for gloss finish and multicoat application.

2.5 ACCESSORY MATERIALS

A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6 mils thick.

B. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by NWFA for application indicated.

PART 3 - EXECUTION

2.6 3.1 EXAMINATION

A. A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of wood-flooring assembly. Proceed with installation only after unsatisfactory conditions have been corrected.

B. B. Concrete Slabs: Verify that concrete slabs comply with requirements specified in Division 3 Section "Cast-in-Place Concrete."
1. Grind high spots and fill low spots to provide a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
2. Verify that slabs are dry according to test methods recommended in writing by flooring manufacturer.

3.2 INSTALLATION

A. General: Comply with flooring-assembly manufacturer's written instructions, but not less than recommendations of NWFA applicable to flooring type indicated.

B. Pattern: Lay flooring parallel with the long dimension of the space to be floored, unless otherwise indicated.

C. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and NWFA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.
1. Cover expansion spaces with base molding, trim, and saddles, as indicated.

D. Vapor Retarder: Install with joints lapped a minimum of 6 inches and sealed.

E. Installation Tolerances: 1/8 inch in 10 feet variance from level.

3.3 FLOATING RESILIENT FLOOR SYSTEM

A. Cover concrete slab with polyethylene lapping edges 6” and seal with adhesive or 2” duct tape.

B. Place flexible foam over polyethylene and seal joints with duct tape.

C. Place the first layer of plywood diagonal or perpendicular to the intended direction of the finish flooring. Allow 1/4" gap between panels at sides and edges and a 2" expansion void at walls and vertical obstructions.

D. Fasten the second layer of plywood without pads at a 45-degree angle or at right angles to the first layer. The plywood sheets must be nailed or stapled together with 1” fasteners starting from the center of the sheet working outward. No joint in the second layer of plywood shall coincide with a joint in the first layer. Allow 1/4" between panels at sides and edges and a 2" expansion void at walls and vertical obstructions.

E. Machine nail strip flooring into the plywood subfloor, parallel to the long dimension of the area nail approximately 12” on-center. Provide adequate expansion at regular intervals across the floor during installation as dictated by the average humidity conditions of the area according to the recommendations of the local Action Floor Systems, LLC flooring contractor. Provide 2" expansion voids at perimeters and all vertical obstructions. Install vent cove base over perimeter voids and metal thresholds at doorways.

3.4 SANDING AND FINISHING

A. Allow installed flooring to acclimate to ambient conditions for at least 10 days before sanding.

B. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.

C. Finish: Apply seal and finish coats of finish system according to manufacturer's written instructions. Provide not less than four coats total and not less than two finish coats.
   1. Lines and Markers: Apply game-line and marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions. Mask flooring to provide sharp edges. Where game lines cross, break minor game line at intersection; do not overlap lines.

D. Install base molding and other cover trim indicated for expansion spaces at edges and interruptions of flooring.

3.5 PROTECTION

A. Protect wood flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.

END OF SECTION 09 64 66

SECTION 09 65 19
RESILIENT FLOORING

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 the following:

1. Solid Vinyl floor tile.
2. Resilient wall base and accessories.
3. Vinyl composition tile

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post installation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install tiles and accessories after other finishing operations, including painting, have been completed.

E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 SOLID VINYL RESILIENT TILE

A. Solid Vinyl Tile shall be as selected from manufacturer’s premium color and pattern. Selections shall be as shown on drawings.

B. Vinyl Composition Tile shall be as selected from manufacturer’s premium color and pattern. Selections shall be as shown on drawings.

2.2 RESILIENT ACCESSORIES

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I. Selections shall be as shown on drawings

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

D. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

D. Commencing installation of resilient flooring shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.

E. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.

1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, non-staining marking device.

G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Hand roll tiles according to tile manufacturer's written instructions.

3.4 RESILIENT ACCESSORY INSTALLATION

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
5. Install pre-molded outside and inside corners before installing straight pieces.

C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.5 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.

1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

    a. Use commercially available product acceptable to flooring manufacturer.

2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.

3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations.

END OF SECTION 09 65 19

SECTION 09 68 16
SHEET CARPET

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 the following:

1. Carpet.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
2. Carpet type, color, and dye lot.
3. Locations where dye lot changes occur.
4. Seam locations, types, and methods.
5. Type of installation.
6. Pattern type, repeat size, location, direction, and starting point.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.
11. Type of cushion.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch- square Sample of each carpet selection.
2. Exposed Edge Stripping and Accessory: 12-inch- long Samples.
3. Carpet Seam: 6-inch Sample.

4. Mitered Carpet Border Seam: 12-inch- square Sample. Show carpet pattern alignment.

D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

E. Maintenance Data: For carpet to include in maintenance manuals specified in Division 1. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

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. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET

A. Carpet selections shall be as indicated in the finish schedule.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:

1. Carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the following:

1. Carpet manufacturer.

C. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

E. Carpet edge guard, non-metallic – Extruded or molded heavy duty vinyl or rubber carpet edge guard, transition molding, and reducers of size and profile indicated, with minimum two inch wide anchorage flange; colors selected by architect among standard colors available within the industry.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the following:

1. Carpet manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FLOOR PREPARATION:

A. Inspect all rooms and areas to be carpeted. Before installation, test concrete floors for moisture content and hydrostatic pressure and take corrective measure if necessary. Excessive moisture is defined as no more than 2.5 pounds per sq. ft. Concrete should be tested for acidity/alkalinity and should test in to 6.0 to 8.0 range.

B. Remove all excess concrete or debris adhering to the floor. Grind raised areas or ridges smooth and to a level surface. Floor shall be free of any wax, dirt, grease, paint or old adhesives (especially cut-back or emulsion). Previous residue of asphalt adhesive (cut-back or emulsion) must be removed by grinding with a concrete or terrazzo grinding machine and moist sand. Never use solvents. Apply latex sealer over remaining cut back at carpet areas only.

C. Repair holes, cracks, depressions, or rough areas using materials recommended by carpet or adhesive manufacturer. Underlayments mixed with water are unacceptable.

D. After patching and grinding, floor shall be swept or vacuumed clean to remove all grit. Oil based sweeping compounds should not be used.

3.4 INSTALLATION

A. Comply with CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for the following:

1. Direct Glue-Down Installation: Comply with CRI 104, Section 9, "Double Glue-Down Installation."

B. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

1. Level adjoining border edges.

C. Do not bridge building expansion joints with carpet.

D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 68 16

SECTION 09 91 23
PAINTING

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 surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Related Sections include the following:

1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
2. Division 9 Section "Gypsum Board" for surface preparation for gypsum board.
3. See Mechanical and Electrical Drawings for: Painting of mechanical and electrical work.

C. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Factory finished millwork.
b. Finished mechanical and electrical equipment.
c. Light fixtures.

d. Distribution cabinets.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Pipe spaces.
e. Duct shafts.

3. Finished metal surfaces include the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper.
e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
3. Submit Samples on the following substrates for the Architect's review of color and texture only:

a. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.
b. Stained or Natural Wood: Provide two 4-by-8-inchsamples of natural- or stained-wood finish on actual wood surfaces.
c. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch- long samples of solid metal for each color and finish.

D. Qualification Data: For firms and persons specified in the "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.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.

    a. Wall Surfaces: Provide samples on at least 100 sq. ft.
    b. Small Areas and Items: Architect will designate items or areas required.

2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
3. Repaint individual areas which are not accepted by the Architect with up to three additional color samples.

    a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.

4. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Devoe & Raynolds Co. (Devoe).
2. Fuller-O'Brien Paints (Fuller).
3. Glidden Co. (The) (Glidden).
4. Benjamin Moore & Co. (Moore).
5. PPG Industries, Inc. (PPG).
6. Pratt & Lambert, Inc. (P & L).
7. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

B. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

C. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete masonry units, cement plaster, and surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
c. When transparent finish is required, backprime with spar varnish.
d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

F. Coordinate installation of all paints with the ventilation and sequencing criteria defined in Specification section 01501 Construction IAQ Management Plan

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.

3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Piping, pipe hangers, and supports.
2. Heat exchangers.
3. Tanks.
4. Ductwork.
5. Insulation.
6. Motors and mechanical equipment.
7. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.
3. Panelboards.

H. Block Fillers: Apply block fillers to concrete masonry units at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

1. The Construction Manager may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Concrete, Stucco, and Masonry (Other than Concrete Masonry Units): Provide the following finish systems over exterior concrete, stucco, and brick masonry surfaces:

1. Low-Luster Acrylic Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

1) Devoe: 1502 Wonder-Shield Exterior Acrylic Latex House Paint Primer.
2) Fuller: 220-17 Pigmented Concrete and Masonry Primer Sealer.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint thinned with one-half pint of water per 1 gal..
4) Moore: Moore's Latex Exterior Primer #102.
5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
6) P & L: Z/F 1001 Suprime "1" Multi-Purpose 100 Percent Acrylic Primer.

b. First and Second Coats: Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.3 mils.

1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 1800 Series Aqua-Shell Exterior Latex Eggshell Paint.

2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, exterior, acrylic-latex primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

1) Devoe: 1502 Wonder-Shield Exterior Latex House Paint Primer.
2) Fuller: 220-17 Acrylic Concrete and Masonry Primer Sealer.
3) Glidden: Primer not required over this substrate.
4) Moore: Moore's Latex Exterior Primer #102.

5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
6) P & L: Z/F 1001 Suprime "1" Multi-Purpose 100 Percent Acrylic Primer.

b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

3. Low-Luster Acrylic Finish: 2 finish coats over a primer.

a. Primer: Exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Devoe: 1102 All-Weather Exterior Alkyd House Paint Primer.
2) Fuller: 220-08 Exterior Latex Wood Primer.
3) Glidden: UH 450 Ultra-Hide Oil/Alkyd Exterior Primer.
4) Moore: Moorwhite Primer #100.
5) PPG: 1-70 or 1-870 Sun-Proof Exterior Wood Primer.
6) P & L: S/D 1002 Suprime "2" Exterior Latex Wood Primer.

b. First and Second Coats: Low-sheen (eggshell or satin), exterior, latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.3 mils.

1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 1800 Series Aqua-Shell Exterior Latex Eggshell Paint.

4. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Devoe: 1102 All-Weather Exterior Alkyd House Paint Primer.
2) Fuller: 220-08 Exterior Latex Wood Primer.
3) Glidden: UH 450 Ultra-Hide Oil/Alkyd Exterior Primer.
4) Moore: Moorwhite Primer #100.
5) PPG: 72-1 Sun-Proof Exterior House & Trim Wood Primer Flat--Latex.
6) P & L: S/D 1002 Suprime "2" Exterior Latex Wood Primer.

b. First and Second Coats: Semigloss, waterborne, exterior, acrylic enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

5. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a primer.

a. Primer: Exterior, alkyd primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Moore: Moorwhite Deep Color Base #100-04.

b. First and Second Coats: exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.2 mils.

1) Devoe: 155 All-Weather Exterior Alkyd Gloss House and Trim Paint.
2) Fuller: 660-XX Weather King Alkyd House & Trim Paint.
3) Glidden: 1901 Series Spred House Dura-Gloss Oil House & Trim Paint.
4) Moore: Moore's House Paint #110.
5) PPG: 1 Line Sun-Proof Exterior Gloss-Oil House & Trim Paints.
6) P & L: S/D 4900 Series Permalize Alkyd Gloss House and Trim Finish.
7) S-W: SWP Exterior Gloss Finish A-2 Series.

B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a rust-inhibitive primer.

a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S 4551 Tech-Gard High Performance Rust-Inhibitor Primer.
7) S-W: Kem Kromik Metal Primer B50N2/B50W1.

b. First and Second Coats: Full-gloss, exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.0 mils.

1) Devoe: 70XX Mirrolac Interior/Exterior Alkyd-Urethane Gloss Enamel.
2) Fuller: 312-XX Heavy-Duty Industrial Maintenance Enamel.
3) Glidden: 4500 Series Glid-Guard Alkyd Industrial Enamel.
4) Moore: Impervo Enamel #133.
5) PPG: 6-282 Speedhide Interior/Exterior Gloss-Oil Enamel.
6) P & L: S 4500 Series Tech-Gard Maintenance Gloss Enamel.
7) S-W: Industrial Enamel B-54 Series.

C. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

1. Low-Luster Finish: 2 finish coats over a galvanized metal primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 8502/8520 Mirrolac Interior/Exterior Waterborne Flat DTM Primer and Finish.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coat: Low-luster (eggshell of satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.

1) Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
2) Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
3) Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
4) Moore: MoorGard Latex House Paint #103.
5) PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
6) P & L: Z/F 4200 Series Accolade Exterior Eggshell.

3.7 INTERIOR PAINT SCHEDULE

A. Face Brick Alternate
1. PermaTint, LTD, 1020 Silazur.

B. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:

1. Semigloss, Alkyd-Enamel Finish: 2 finish coats over an undercoat and a filled surface.

a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils.

1) Devoe: 52902 Bloxfil 200 Interior/Exterior Latex Block Filler.
2) Fuller: 280-00 Interior/Exterior Latex Block Filler.
3) Glidden: 5317 Ultra-Hide Block Filler, Latex Interior-Exterior.
4) Moore: Moorcraft Interior & Exterior Block Filler #173.
5) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
6) P & L: Z 98 Pro-Hide Plus Latex Block Filler.
7) S-W: Heavy-Duty Block Filler B42W46.

b. Undercoat: Interior, alkyd- or latex-based, enamel undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
3) Glidden: UH 400 Ultra-Hide Alkyd Interior Enamel Undercoater.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-855 Speedhide Interior Latex Enamel Undercoater.

6) P & L: S/D 1012 Suprime "12" Interior Alkyd Wall Primer.
7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 206-XX Interior Alkyd Semi-Gloss Enamel.
3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
4) Moore: Satin Impervo #235.
5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
6) P & L: S/D 5700 Series Cellu-Tone Alkyd Satin Enamel.
7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

C. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 50801 Wonder-Tones Interior Vinyl Latex Primer-Sealer.
2) Fuller: 220-20 Pro-Tech Interior Latex Wall Primer and Sealer.
3) Glidden: 5111 Spred Ultra Latex Primer-Sealer.
4) Moore: Regal First Coat Interior Latex Primer & Underbody #216.
5) PPG: 17-10 Quick-Drying Interior Latex Primer-Sealer.
6) P & L: Z/F 1004 Suprime "4" Interior Latex Wall Primer.

b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.

1) Devoe: 34XX Wonder-Tones Interior Latex Eggshell Enamel.
2) Fuller: 212-XX AA Enamel Acrylic Latex Eggshell Enamel.
3) Glidden: 4100 Series Spred Ultra Eggshell Latex Wall & Trim Paint.
4) Moore: Moore's Regal AquaVelvet #319.
5) PPG: 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.
6) P & L: Z/F 4000 Series Accolade Interior Velvet.

D. Woodwork and Hardboard: Provide the following paint finish systems over new, interior wood surfaces:

1. Semigloss, Alkyd-Enamel Finish: 2 finish coats over a primer.

    a. Primer: Alkyd or latex-based, interior enamel undercoater applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

        1) Devoe: 51701 Wonder-Prime All-Purpose Latex Primer Sealer & Vapor Barrier.
        2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
        3) Glidden: UH 400 Ultra-Hide Alkyd Interior Enamel Undercoater.
        4) Moore: Moore's Alkyd Enamel Underbody #217.
        5) PPG: 17-255 Quick-Drying Enamel Undercoater.
        6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
        7) S-W: ProMar 200 Alkyd Enamel Undercoater B49W200.

    b. First and Second Coats: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.4 mils.

        1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
        2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
        3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
        4) Moore: Satin Impervo #235.
        5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
        6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
        7) S-W: Classic 99 Interior Alkyd Semi-Gloss Enamel A-40 Series.

E. Stained Wood: Provide the following stained finishes over interior wood. Match Architect's sample:

    1. Alkyd-Based, Satin-Varnish Finish: 2 finish coats of an alkyd-based, clear-satin varnish over a sealer coat and an alkyd-based, interior wood stain. Wipe wood filler before applying stain.

        a. Filler Coat: Paste-wood filler applied at spreading rate recommended by the manufacturer.

            1) Devoe: None required.
            2) Fuller: 680-00 Pen-Chrome Paste Wood Filler.
            3) Glidden: Glidden Paste Wood Filler.
            4) Moore: Benwood Paste Wood Filler #238.
            5) PPG: None required.
            6) P & L: None required.
            7) S-W: Sher-Wood Fast-Dry Filler.

        b. Stain Coat: Alkyd-based, interior wood stain applied at spreading rate recommended by the manufacturer.

1) Devoe: 96XX WoodWorks Alkyd Interior Stain.
2) Fuller: 640-XX Pen-Chrome Interior Oil Base Wood Stain.
3) Glidden: 1600 Series Woodmaster Oil Wood Stain.
4) Moore: Benwood Penetrating Stain #234.
5) PPG: 77-302 Rez Interior Semi-Transparent Stain.
6) P & L: S-Series Tonetic Wood Stain.
7) S-W: Oil Stain A-48 Series.

c. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by the manufacturer.

1) Devoe: 4900 WoodWorks Quick-Dry Clear Sealer.
2) Fuller: None recommended.
3) Glidden: 5035 Ultra-Hide Quick-Dry Sanding Sealer, Clear.
4) Moore: Moore's Interior Wood Finishes Quick-Dry Sanding Sealer #413.
5) PPG: 77-30 Rez Interior Quick-Drying Sealer and Finish.
6) P & L: H-40 Sanding Sealer.
7) S-W: ProMar Varnish Sanding Sealer B26V3.

d. First and Second Finish Coats: Alkyd-based or polyurethane varnish, as recommended by the manufacturer, applied at spreading rate recommended by the manufacturer.

1) Devoe: 4600 WoodWorks Alkyd Satin Varnish.
2) Fuller: 653-01 EPA Compliant Clear Polyurethane Satin Finish.
3) Glidden: 82 Satin Sheen Woodmaster Polyurethane Clear Finishes Varnish.
4) Moore: Benwood Satin Finish Varnish #404.
5) PPG: 77-7 Rez Varnish, Interior Satin Oil Clear.
6) P & L: H24 38 Clear Finish Gloss.
7) S-W: Oil Base Varnish, Gloss A66V91.

F. Natural-Finish Woodwork: Provide the following natural finishes over new, interior woodwork:

1. Alkyd-Based, Satin-Varnish Finish: 2 finish coats of an alkyd-based, clear-satin varnish over a sanding sealer. Provide wood filler on open-grain wood before applying first varnish coat.

a. Filler Coat: Paste-wood filler applied at spreading rate recommended by the manufacturer.

1) Devoe: None required.
2) Fuller: 680-00 Pen-Chrome Paste Wood Filler.
3) Glidden: Glidden Paste Wood Filler.
4) Moore: Benwood Paste Wood Filler #238.
5) PPG: None required.
6) P & L: None required.
7) S-W: Sher-Wood Fast-Dry Filler.

b. Sealer Coat: Clear sanding sealer applied at spreading rate recommended by the manufacturer.

1) Devoe: 4900 WoodWorks Quick-Dry Clear Sealer.
2) Fuller: None recommended.
3) Glidden: 5035 Ultra-Hide Quick-Dry Sanding Sealer, Clear.
4) Moore: Moore's Interior Wood Finishes Quick-Dry Sanding Sealer #413.
5) PPG: 77-30 Rez Interior Quick-Drying Sealer and Finish.
6) P & L: H-40 Sanding Sealer.
7) S-W: ProMar Varnish Sanding Sealer B26V3.

c. First and Second Finish Coats: Alkyd-based or polyurethane varnish, as recommended by the manufacturer, applied at spreading rate recommended by the manufacturer.

1) Devoe: 4600 WoodWorks Alkyd Satin Varnish.
2) Fuller: 653-01 EPA Compliant Clear Polyurethane Satin Finish.
3) Glidden: 82 Satin Sheen Woodmaster Polyurethane Clear Finishes Varnish.
4) Moore: Benwood Satin Finish Varnish #404.
5) PPG: 77-7 Rez Varnish, Interior Satin Oil Clear.
6) P & L: H24 38 Clear Finish Gloss.
7) S-W: Oil Base Varnish, Gloss A66V91.

G. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Alkyd-Enamel Finish: One finish coat over an enamel undercoater and a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S 4551 Tech-Gard High Performance Rust Inhibitor Primer.
7) S-W: Kem Kromik Metal Primer B50N2/B50W1.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, interior, alkyd-enamel finish coat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
7) S-W: ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200.

c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
4) Moore: Satin Impervo #235.
5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
7) S-W: Classic 99 Interior/Exterior Semi-Gloss Alkyd Enamel A-40 Series.

H. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Alkyd-Enamel Finish: One finish coat over an undercoat and a primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 13201 Mirrolac Galvanized Metal Primer.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.
7) S-W: Galvite Paint B50W3.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, interior, alkyd-enamel finish coat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.

3) Glidden: UH 8400 Series Spred Ultra Traditional Alkyd Semi-Gloss Enamel.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
6) P & L: S/D 1011 Suprime "11" Interior Alkyd Wood Primer.
7) S-W: ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200.

c. Finish Coat: Odorless, semigloss, alkyd, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

1) Devoe: 26XX Velour Interior Alkyd Semi-Gloss Enamel.
2) Fuller: 110-XX Fullerglo Alkyd Semi-Gloss Enamel.
3) Glidden: UH 8400 Ultra Traditional Alkyd Semi-Gloss Enamel.
4) Moore: Satin Impervo #235.
5) PPG: 27 Line Wallhide Low Odor Interior Enamel Wall and Trim Semi-Gloss Oil.
6) P & L: S/D 5700 Cellu-Tone Alkyd Satin Enamel.
7) S-W: Classic 99 Interior Alkyd Semi-Gloss Enamel A-40 Series.

I. Special Coating (Semigloss Finish): One finish coat over an intermediate coat and a primer.

a. Primer: Acrylic or epoxy primer, as recommended by manufacturer for this substrate, applied at spreading rate recommended by manufacturer.

1) Moore: M04 Acrylic Metal Primer.
2) PPG: 90-7XX Series Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel.
3) S-W: Kem Kromik Universal Metal Primer B50Z Series.
4) Tnemec: Series 18 Enviroprime.

b. Intermediate Coat: Acrylic enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.0 to 4.0 mils.

1) Moore: M29 D.T.M. Acrylic Semi-Gloss Finish.
2) PPG: 90-4XX Series Pitt-Tech One Pack Interior/Exterior High Performance Waterborne Satin DTM Industrial Enamel.
3) S-W: DTM Acrylic Semi-Gloss Coating B66W200 Series.
4) Tnemec: Series 29 Tuf-Cryl Water Based Acrylic Emulsion.

c. Topcoat: Semigloss acrylic enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.0 to 4.0 mils.

1) Moore: M29 D.T.M. Acrylic Semi-Gloss Finish.

2) PPG: 90-4XX Series Pitt-Tech One Pack Interior/Exterior High Performance Waterborne Satin DTM Industrial Enamel.
3) S-W: DTM Acrylic Semi-Gloss Coating B66W200 Series.
4) Tnemec: Series 29 Tuf-Cryl Water Based Acrylic Emulsion.

END OF SECTION 09 91 23

SECTION 10 11 00
VISUAL DISPLAY SURFACES

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 the following:

1. Markerboards.
2. Tackboards.

B. Related Sections include the following:

1. Division 6 Section "Finish Carpentry" for custom wood trim and chalktrays for visual display surfaces.

1.3 DEFINITIONS

A. Tackboard: Framed or unframed tackable surface.

B. Visual Display Boards: Markerboards, and tackboards.

1.4 SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Show location of panel joints.

B. Samples for Verification: For each type of visual display surface indicated and as follows:

1. Visual Display Surface: Not less than 8-1/2 by 11 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
2. Accessories: Full-size Sample of each type of accessory.

C. Qualification Data: For Installer.

D. Maintenance Data: For visual display surfaces to include in maintenance manuals.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of visual display surface through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display surfaces and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

B. Store visual display units vertically with packing materials between each unit.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating visual display surfaces without field measurements. Coordinate wall construction to ensure that actual dimensions correspond to established dimensions.

2. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.8 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Surfaces lose original writing and erasing qualities.
b. Surfaces become slick or shiny.
c. Surfaces exhibit crazing, cracking, or flaking.

2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Product: Subject to compliance with requirements, provide product specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 MATERIALS, GENERAL

A. Porcelain-Enamel Face Sheet: Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.0236-inch uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F.

1. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.

a. Product: Claridge Products & Equipment, Inc.; Vitracite Chalkboard.

B. Fiberboard: ANSI A208.2, Grade MD.

C. Natural Cork Sheet: Seamless, single layer, compressed fine-grain cork sheet, bulletin board quality; face sanded for natural finish.

2.3 MARKERBOARD ASSEMBLIES

A. Porcelain-Enamel Markerboard Assembly: Balanced, high-pressure, factory-laminated markerboard assembly of 3-ply construction consisting of backing sheet, core material, and porcelain-enamel face sheet with low-gloss finish.

1. Manufacturers:

a. Claridge Products & Equipment, Inc.

2. Particleboard Core: 3/8 inch thick; with 0.015-inch- thick, aluminum sheet backing.
3. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.

B. Markerboard Sheet Assembly: Fabricated from 0.0209-inch- thick, porcelain-enamel face sheets for direct application to wall surface.

2.4 TACK ASSEMBLIES

A. Manufacturers:

1. Claridge Products & Equipment, Inc.

B. Natural-Cork Tack Assembly: 1/4-inch- thick, natural cork sheet factory laminated to 1/4-inch- thick particleboard backing.

2.5 MARKERBOARD AND TACKBOARD ACCESSORIES

A. Field-Applied Wood Trim and chalk tray: Comply with requirements specified in Division 6 Section "Finish Carpentry."

2.6 FABRICATION

A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine walls and partitions for proper backing for visual display surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove dirt, scaling paint, projections, and depressions that will affect smooth, finished surfaces of visual display boards.

B. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, and substances that will impair bond between visual display boards and surfaces.

3.3 INSTALLATION, GENERAL

A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. Field-Assembled Visual Display Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.

1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints.

3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY UNITS

A. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.

1. Field-Applied Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.

a. Attach chalk trays to boards with fasteners at not more than 12 inches o.c.

2. Field-Applied Wood Trim: Install trim according to requirements in Division 6 Section " Finish Carpentry."

3.5 CLEANING AND PROTECTION

A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.

B. Touch up factory-applied finishes to restore damaged or soiled areas.

C. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION 10 11 00

SECTION 10 21 13
SOLID PLASTIC TOILET COMPARTMENTS

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 toilet compartments as follows:

1. Type: Solid-plastic, polymer resin.
2. Compartment Style: Overhead Braced.
3. Screen Style: Floor anchored.

B. Related Sections include the following:

1. Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- square Samples of same thickness and material indicated for Work.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASI,Global Partitions, Basis of Design.
2. Santana Products, Inc.
3. Comtec Industries.
4. Knickerbocker Partition Corporation.

2.2 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch thick with seamless construction and eased edges in color and pattern as follows:

1. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range of colors and patterns.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch thick and 3 inches high, finished to match hardware.

1. For solid-plastic, polymer-resin pilasters, in lieu of stainless-steel pilaster shoes and sleeves, manufacturer's standard plastic pilaster shoes and sleeves may be provided.

D. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:

1. Material: Stainless steel.

E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

1. Material: Stainless steel.

F. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

G. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.

H. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

C. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

D. Floor-Anchored Screens: Provide pilasters and panels of same construction and finish as toilet compartments. Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

E. Doors: Unless otherwise indicated, provide 24-inch- wide in-swinging doors for standard toilet compartments and 36-inch- wide out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be handicapped accessible.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch between pilasters and panels and not more than 1 inch between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.2 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10 21 13

SECTION 10 28 00
TOILET ACCESSORIES

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 the following:

1. Toilet accessories.

B. Related Sections include the following:

1. Division 10 Section "Toilet Compartments" for compartments and screens.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Samples: For each accessory item to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

D. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet Accessory Schedule and room designations indicated on Drawings in product schedule.

E. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.4 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet Accessory Schedule.

1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.
2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet Accessories:

a. A & J Washroom Accessories, Inc.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. McKinney/Parker Washroom Accessories Corp.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.

C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

E. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

F. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

G. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

A. Refer to drawings for Toilet Accessory Schedule.

END OF SECTION 10 28 00

SECTION 10 90 00
MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. All work under this Section is subject to the Contract Document, Contract Drawings, and the General Conditions governing the Contract, all of which form a part of this Section as if written in full herein.

1.02 SCOPE OF WORK

A. Provide all labor and material, equipment, and services required for the proper performance of the work of this Section.

B. Work includes all items shown on Drawings, listed in the Notes on the Drawings, or reasonably inferred from Specifications or the Drawings as being a Contract requirement of this Section.

C. In general, the work shall include but not necessarily be limited to:

1. Furnish and install insulation system for P trap and angle valve assemblies at handicapped accessible bathrooms.
2. Glass marker Boards
3. Link Seal Modular Seal
4. Control Room Sliding Glass Window Track Assembly

D. Related Sections:

1. See Plumbing Drawings.

1.03 QUALITY ASSURANCE

A. Location of Miscellaneous Specialties. Coordinate location with other work to avoid interference and to assure proper operation and servicing of other units.

1.04 SUBMITTALS

A. Product Data: Submit Manufacturer's technical data and installation instructions for each specialty.

B. Setting Drawings: Provide setting drawings and direction for installation and cut out requirements in other work.

PART 2 - PRODUCTS

2.01 INSULATION FOR LAVATORY TRAP

A. Provide fully molded lavatory P-Trap and angle valve assemblies as manufactured by TRUEBRO or equivalent at the following locations:

1. At all Handicapped Accessible Bathrooms.

B. Material: Molded closed cell vinyl.

C. Fasteners: Nylon.

D. Color: To be selected by Architect.

E. Burning Characteristics: Self extinguished 5 sec (ATB) 10 mm (AEB).

F. Thermal Conductivity: K Value = 1.17.

G. Model 102 or 105, as required.

2.02 GLASS MARKER BOARDS

A. Glass Marker Boards shall be Vision Products SysScribe Writable Magnetic Glass System. System shall be complete with all necessary options for a fully functioning installation.

2.03 LINK SEAL MODULAR SEAL

A. Link Seal modular seals shall be by “GPT Industries” (gptindustries.com) and shall be coordinated with specified pipe sizing requirements per Plumbing Drawings and coordinated with wall construction per Architectural and Structural Drawings.

B. Sizing of Link Seal shall be per manufacturer’s recommendation.

2.10 CONTROL ROOM SLIDING GLASS WINDOW TRACK ASSEMBLY

A. CRL D2300 Deluxe Track Assembly with D609 upper track and nylon wheels in brushed nickel finish. Custom Size to fit within hollow metal frame. C.R. Laurence of Canada: www.crlaurence.ca

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before starting any work examine existing conditions and thoroughly check Drawings, Specifications, adjoining or underlying conditions in which the work of this Section is

to be performed, including all dimensions.

B. Failure to notify the Architect in writing of unsatisfactory conditions will be construed as an acceptance of all conditions. The starting of the work by the Contractor shall mean that he is satisfied that surfaces are in the required condition, as he will be held responsible for failure to secure the results required.

3.02 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions. Install units plumb, level and firmly anchored in locations indicated.

B. Touch-up marred finishes; replace units that cannot be restored to an acceptable appearance. Use materials and procedures recommended by manufacturers.

END OF SECTION 10 90 00

SECTION 10 90 10
EXTERIOR CLOCKS

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. Section Includes:

1. Tower Clock Components and Remote Control System.

B. Related Sections:

1. See Electrical Drawings for electrical service, wiring devices and connections.

2. All raceways, junction boxes, and conduit wire to be provided by Electrical Contractor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, manufacturer’s detailed installation instructions and finishes for tower clocks.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: Manufacturer’s original wiring diagrams for timepieces and controls.

C. Samples for Verification: For each type of exposed finish required the following products, in manufacturer's standard sizes:

1. Each exposed surface: 6” x 6”.

D. Qualification Data: For qualified Installer.

E. Operation and Maintenance Data: For timepieces to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations for timepieces : Obtain all components from single source.

C. Electrical Components, : All electrical components and clock movements for tower clock shall follow acceptable guidelines by Underwriters Laboratories (UL) and shall comply with applicable NEMA standards. including lighting fixtures for illuminated clock.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Tower clock shall be delivered to the project location with all components and accessories clearly identified for installation.

B. Products shall be stored as necessary at the project site under cover in a coal dry location.

1.6 PROJECT CONDITIONS

A. Substrate Conditions: Verify that supporting and surrounding construction provided by others, including electrical service, is suitable and acceptable for installation of tower clock.

B. Field Measurements: Verify actual dimensions of openings construction contiguous with by field measurements before fabrication.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of Tower Clocks that fail(s) in materials or workmanship within specified warranty period. Two on-site service calls per year during the warranty period shall be provided by factory trained technicians.

1. Warranty Period: 3 years from date of Substantial Completion.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial warranty service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
About Time Clock Restoration, 128 Thayer Road, Higganum, CT, Telephone: 860-345-7655; email contact@AboutTimeCT.com

2.2 MATERIALS

A. Furnish complete clock system consisting of (1) tower clock and (1) remote control system.

B. Tower Clock Components

1. Finishes: Dial markings and clock hands to be made of aluminum and to have a satin aluminum polyurethane painted finish. Center plate to be made of aluminum and to have a satin aluminum polyurethane painted finish.

2. Hands: "CS" design.

3. Dial Markings: to be brick masonry.

4. Movement: Style MI Design. 24VAC drive motor and electronics. 8 second maximum run time. Alternating hall effect switched closed loop minute impulse operation. Composite lubrication free bearings. Style C1G1-MI front access movement, mounted in a WB22 front access wall box with 20" dia. center plate.

5. Style: WP-P-1072-MI Design. (72" o.d. of the dial markings)

C. Provide Type 99B-MI automatic reset control;

1. IP65 Enclosure – Indoor & Outdoor Use
2. Automatically resets clock after power failures.
3. Automatically resets clocks for daylight savings time
4. Precision Quartz Time base 4 minutes per year maximum drift.
5. Optional GPS – no drift.
6. Built in 100 year daylight savings time calendar.
7. 2 Line 16 character backlighted LCD display.
8. ETL listed to UL 863.
9. Power Failure Event logging.
10. Standard MI output – 4 clocks maximum standard
11. Standard 24VDC RP output -20 clocks maximum
12. Sweep Second hand output
13. Hour Strike Capability.
14. RS-232 and RS-485 output ports
15. 24 VAC hour strike output – configurable pulse output

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 the Work. Inspect substrates, supporting items and related conditions, to ensure that they are ready to receive each item, prior to commencement of installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install Tower Clock in accordance with manufacturer’s instructions

B. Install each item at locations indicated on drawings, as detailed, and in accordance with manufacturers’ instructions. .

3.3 ADJUSTING

A. Adjust Tower Clock to function smoothly, and lubricate as recommended by manufacturer.

3.4 CLEANING AND PROTECTION

A. Completion of the installation, clean soiled clock surfaces in accordance with the manufacturer's instructions. Protect units from damage until substantial completion.

END OF SECTION 10 90 10

SECTION 12 36 61
SIMULATED STONE COUNTERTOPS

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. Section Includes:

1. Quartz agglomerate countertops.

1.3 SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edges and, methods of joining, and cutouts for plumbing fixtures.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. One full-size quartz agglomerate countertop, with front edge, 8 by 10 inches, of construction and in configuration specified.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.5 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: As indicated on the drawings.
2. Backsplash: None.
3. Endsplash: None.

B. Countertops: 5/4-inch- thick, quartz agglomerate.

C. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

2.2 COUNTERTOP MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

B. Adhesives: Use adhesives that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

C. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. CaesarStone U.S.A., Inc.

2. Colors and Patterns: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 12 36 61

SECTION 12 61 00

FIXED AUDITORIUM SEATING
(For Reference Only)

PART 1: GENERAL SPECIFICATIONS

1.01 SCOPE: Deliver and install fixed auditorium chairs with upholstered seats and backs, aisle and center standards, all as specified, floor mounted, with self-lifting seat which raises automatically to a uniform 3/4 fold position. Refer to Architectural Drawings for Theater Seating Plan and for the specific requirements.

1.02 ADA: Comply with ADA (Americans with Disabilities Act Rules and Regulations).

1.03 SIZES: Varying lateral sizes of backs shall be used in accordance with approved seating plans, with standards in each row spaced laterally so that the end standards shall be in alignment from first to last row whether aisles are of constant of converging width.

1.04 SHOP DRAWINGS: Submit a complete seating plan developed from the contract drawings, showing all chairs, sizes, and aisle widths. Assume complete responsibility for the accuracy of all chair measurements shown on the seating plan.

1.05 EXAMINATION & ACCEPTANCE OF WORK IN PLACE: Examine work in place on which seating work is dependent. Defects which may influence satisfactory completion and performance of seating work shall be corrected in accordance with the requirements of the applicable section of work prior to commencement of seating work.

1.06 FIELD MEASUREMENTS: Take field measurements to verify or supplement dimensions indicated. Be responsible for accurate fit of work.

1.07 MATERIALS AND WORKMANSHIP:

a. Provide new materials of types specified.

b. Turn over all work to the owner in undamaged condition.

c. Provide workmanship of the best quality by craftsmen skilled in their respective trades.

1.08 FIRE PERFORMANCE CHARACTERISTICS OF UPHOLSTERED SEATING: Chairs provided shall have been tested and certified as complying with BIFMA Voluntary Upholstered Furniture Flammability Standard F-1-1978 (rev. 1980) sponsored by the Business and Institutional Furniture Manufacturer's Association.

1.09 QUALITY ASSURANCE: To assure high and satisfactory quality, design, color and operation of products, reference has been made to brand names; however, it is not

intended to limit competition and items of brands that are equal will be given full consideration.

Basis of Design:

SPECIFIED FIXED CHAIR #91 MILLENIUM Irwin Seating Company

1.10 RESPONSIBILITY OF BIDDER: The bidder must provide the following with his bid:

a. Bidder shall submit a list of five (5) seating projects of similar size which have been in service for 5 years or longer. Projects submitted shall incorporate chairs with seats, backs and standards consistent with those offered on this project.

1.11 DELIVERY: Deliver the seating at a proper time for installation that will not interfere with other trades operating in the building.

1.3 Quality Assurance:

A. Source Limitations:

1. Obtain each type of fixed seating required, including accessories and mounting components, from a single manufacturer.

2. Obtain fabric of a single dye lot for each color and pattern of fabric required except when yardage requirement exceeds maximum dye lot. Multiple dye lots shall be color matched for quality assurance.

B. Fire Performance Characteristics of Upholstered Seating:

1. Fabric shall be Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.

2. Padding shall comply with California Technical Bulletin 117.

C. Build sample chairs for each model required to demonstrate aesthetic effects and set quality standards for fabrication.

1.4 Project Conditions:

A. Environmental Limitations:
Do not deliver or install seating until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements:
Take field measurements to verify or supplement dimensions indicated on contract drawings prior to manufacturing.

1.5 Project Coordination:

A. Do not deliver or install seating until space is free of lifts and/or scaffolding used by other trades which may interfere with installation and/or damage seating.

B. Coordinate layout and installation of electrical wiring and devices with electrical contractor to ensure that floor junction boxes for electrical devices are accurately located for final connection to the building's power supply by the electrical contractor.

C. Coordinate layout and installation of seating with HVAC contractor to ensure that vents are located in a manner that will not interfere with seating installation.

D. Coordinate concrete requirements needed for proper installation.

1.6 Warranty:

A. Provide a manufacturer's warranty covering the material and workmanship for the specified warranty period from date of final acceptance.

B. Warranty Periods:

1. Structural Components: five years.
2. Operating Mechanisms: five years.
3. Plastic, Wood and Painted Components: five years.
4. Upholstery Fabric: one year.
5. Electrical Components: one year.

C. Repair or replace any part which becomes defective during the warranty period.

PART 2: MATERIAL SPECIFICATIONS

A. Steel shall meet requirements for ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.

B. Cast Iron shall meet requirements for ASTM A 48/A 48M, Class 25, gray iron castings free of blow holes and hot checks with parting lines ground smooth.

C. Cast Aluminum shall meet requirements for ASTM B 85 aluminum-alloy die castings.

D. All exposed metal parts shall be powder coated with a hybrid thermosetting powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 2 - 5 mils, and shall provide a durable coating having a 2H Pencil hardness. Prior to powder coating, metal parts shall be treated with a three-stage non-acidic, bonderizing process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth, durable finish. Manufacturer's standard color range shall be used.

E. Medium-density fiberboard shall meet requirements for ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

F. Concealed plywood shall meet requirements for HPVA HP-1 hardwood plywood.

G. Exposed plywood shall meet requirements for HPVA HP-1, Face Grade A, hardwood veneer core with color-matched hardwood-veneer faces, made with adhesive containing no urea formaldehyde.

H. Hardwood lumber and veneer faces shall be selected and disclosed by Architect. Selected wood to be free of visible defects. Exposed wood shall be sanded smooth and stained to color selected with low-VOC water-based stain and top coat to provide with a high quality finish. Color to be chosen from manufacturer's standard offering.

I. Upholstery fabric shall be 100% recycled polyester Skyline pattern by Guilford of Maine. Fabric shall have a weight of 10 oz. per lineal yard (± .5 oz.). Fabric shall meet specifications AATCC 16 Option 3, AATCC 107 and AATCC 8 for color fastness and withstand 100,000 double rubs per ASTM D-4157. Fabric shall meet flammability resistance outlined in California Technical Bulletin 117; NFPA 260-1989, Class 1; UFAC, class 1.

J. Upholstery padding shall be molded or slab polyurethane foam.

K. Molded Plastics:

1. Structural components shall be mar and dent resistant high density glass-filled polypropylene with UV stabilizers.

2. Decorative components shall be mar and dent resistant high density polyethylene (HDPE) with UV stabilizers.

3. Plastic components shall be chosen from manufacturer's standard offering.

2.01 STEEL: Steel shall be the primary structural material for all chair components, including seat support mechanisms, aisle and center standards, and back component attachment. Steel structural components shall be die-formed according to modern manufacturing methods, and assembled by means of state-of-the-art MIG welding processes. All steel shall have smooth surfaces and be of sufficient gauge thickness and designed to withstand strains of normal use and abuse.

2.02 WOOD: Plywood, exposed or concealed, shall be hardwood. All plywood shall be hot press laminated using high frequency process. Interior plys shall be Class 3 or better. Exposed exterior plys shall be Class 1, continuous, and selected as to color. Solid hardwood shall be clear and shall be selected as to color. All exposed hardwood, solid or veneer to be selected and disclosed by architect. Particle core shall be 55 pound density.

2.03 PLASTIC COMPONENTS:

a. Injection molded structural plastic shall be one-piece, high impact resistant, 25% glass-filled polypropylene with built-in ultra-violet light inhibitors to retard fading.

b. Plastic laminate shall be minimum 0.030 inch thickness, composed of a core of kraft papers impregnated with phenolic resins, a decorative surface sheet, and overlay

sheet containing melamine. Layers are fused together under pressures in excess of 1000 PSI, and temperatures over 275 degrees. Plastic laminate shall meet or exceed performance standards as established by N.E.M.A.

c. Plastic shall have a maximum burn rate of 1" per minute when tested in accordance with ASTM D635, or Department of Transportation Motor Vehicle Safety Standard No. 302.
Thickness: Horizontal Surfaces .050"
Vertical Surfaces .030”

2.04 PADDING MATERIAL: Seat and back padding material shall be of new (prime manufacture) polyurethane foam. Padding material shall comply with the flammability requirements outlined in the California Technical Information Bulletin #117, Resilient Cellular Materials, Section A & D, dated February 1975, when tested in accordance with Federal Test Method Standard 191, Method 5903.2.

2.05 FABRIC: Upholstery fabric shall be C.O.M. Maharam Steady Crypton 465946 Force Field; Class A; 45% Polyester, 45% Post-Industrial Recycled Polyester, 10% Post – Consumer Recycled Polyester. Fabric shall be selected from a choice of five patterns, each with a choice of colors. Fabrics shall meet Class1 flammability requirements of the U.S. Dept. of Commerce Commercial Standard 191-53 per Bulletin #117 (California Code). Manufacturer’s standard color range shall be utilized.

2.06 FINISH:

a. Metal Parts: All exposed metal parts shall be powder coated with an epoxy powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 2-3 mils, and shall provide a durable coating having a 4H Pencil hardness. Prior to powder coating, metal parts shall be treated with a five-stage bonderization process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth, durable finish. Manufacturer's standard color range shall be used.
b. Wood Parts: All exposed surfaces shall be stained to color selected and coated with lacquer of sufficient film depth to afford wear resistance of institutional quality and oven baked.
c. Plastic Parts: Color of plastic shall be selected from manufacturer's standard color range.
d. Hardware: All assembly hardware shall be rust resistant, black plated.

2.2 Fixed Audience Seating:

A. Permanent arrangement of fixed audience seating as shown on seating layout drawings.

1. Approved manufacturers subject to compliance with requirements outlined herein.

2. Basis-of-design for fixed audience seating is Irwin Seating Company model 91.12.10.4 Millenium or comparable product to be reviewed and approved by architect.

B. Chair support columns shall be a formed 14 gauge (.0747") steel tube with an integral back wing plate. Column shall exhibit a 10° rearward incline to help conceal back attachment hardware. Brackets for seat attachment shall be 7-gauge (.1875") steel for superior strength, formed with an integral support buttress. Floor attachment foot shall be formed from 12 gauge (.105) steel to 7-1/2" x 2-5/8" in size. All steel components shall be robotic welded for precise assembly and exceptional integrity. Foot-to-column welds are to be concealed on the inside of the foot for a clean appearance. The standard shall be fabricated to be compatible with the floor incline, and to maintain proper seat and back height and angle.

C. Aisle end panels shall be rectangular-shaped with a rounded bottom edge, constructed of medium density fiberboard (MDF) and surfaced with wood veneer stained with a clear lacquer finish. Panels shall be provided with a seat bracket recess for precise location and support of the panel. Panel is secured to a 14 gauge formed steel bracket bolted to the top of the support column and directly to the support column with the use of a spacer. Panel bracket assembly is concealed behind a steel shroud attached with a tamper resistant screw.

D. Backs shall be round profile, padded and upholstered on their face, with a one-piece injection molded polymer rear panel. The foundation of the back component shall be provided by a 7/16" thick, 5-ply hardwood inner panel that shall also serve as the upholstery substrate. The face of the back shall be upholstered over a 2" thick polyurethane foam pad. The polyfoam pad shall be securely cemented to the plywood inner panel and upholstered with a 1-piece cover securely fastened to the hardwood inner panel by means of upholstery staples to facilitate ease of re-upholstering. The rear designer panel shall be injection molded HDPE plastic, high impact-resistant, with textured outer surface, formed to enclose the edges of the inner upholstery panel at the top and both sides of the back, and shall be not less than 25" in length, extending down to the rear of the seat. There shall be no exposed screws above the armrests. Wings used for the attachment of the complete back assembly to the standards shall be not less than 14 gauge (.0747") steel. Wings shall be firmly secured to the inner panel through the use of threaded t-nuts fastened to the inner panel. Assembled chair shall have a nominal back height of 34". The back assembly shall be certified through routine ISO testing to withstand a 250 lb. static load test applied approximately 16" above the seat assembly and a 100,000 cycle 40 lb. swing impact test.

E. Seats shall be padded and upholstered on their top surface with a structural, injection molded polypropylene seat foundation. Seats shall self-rise to a uniform position when unoccupied. The mechanism shall be certified through routine ISO testing to exceed 300,000 cycles during ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanism. In addition, the seat shall withstand as a 600 lb. static load test applied approximately 3" from the front edge of the seat assembly and a 50,000 cycles 125 lb. vertical drop impact test.

1. Seat foundation shall be engineered glass-filled, injection molded polypropylene, strengthened by deep internal ribs and gussets, completely enclosing the self-rising hinge mechanism. Bottom surface of the foundation shall be textured and feature an attractive molded recess. Bolted attachment of the seat assembly to the chair standard

shall be concealed by an integral color-coordinated plastic cap to present a finished, refined appearance.

2. When unoccupied, the seat shall rise automatically to a 3/4 safety fold position, and upon a slight rearward pressure, shall achieve full-fold, allowing the patron additional passing room. The seat shall rotate on two, molded acetal shafts supported by nylon bearings with integral down-stops for exceptional strength. Seat-lift shall be accomplished by compression springs and self-lubricating plastic cams.

3. The base structure for the cushion assembly shall be an ergonomic contoured, rigid thermoplastic resin panel covered with a 3" thick molded polyurethane foam pad. Cushion assembly is upholstered with a carefully tailored fabric cover secured around the perimeter of the thermoplastic resin panel by means of a drawstring and staples and securely locked to the seat foundation, preventing unauthorized removal; but facilitating convenient access by trained maintenance personnel.

F. Chair width to be fixed. Chair installation to match seating layout.

G. Back height and pitch shall be fixed as shown on seating layout drawings.

H. Center standards shall be provided with a glass-filled polypropylene armrest support structure capable of surpassing a 200 lb. vertical static load test applied 3" from the front edge of the armrest. Armrest support shall be attached to the support column with an integral ribbed post that binds into the steel support column and locked in place with a concealed security screw. Support structure is capped with a curved solid wood armrest attached with concealed hardware. Aisle end armrests are to be attached to the 14-gauge aisle panel bracket with concealed hardware.

I. Row-lettering and chair-numbering shall be provided for identification of all chairs as shown on approved seating layout drawings. Number plates shall be 5/8" x 1-5/8" aluminum with a bronze finish and black sans serif numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and attached by two (2) pop rivets. Letter plates shall be 5/8" x 1-5/8" with a bronze finish and black sans serif numerals attached in recess of aisle standard armrest by two (2) escutcheon pins. Attaching hardware shall have a finish compatible to plates.

J. Armrests shall be solid hardwood. Armrests shall be attached without exposed fasteners through the use of two (2) keyhole slots in the bottom which lock securely to dovetail lugs provided on aisle and center standards. Further, one (1) security screw shall be utilized. Armrests to be curved wood armrests – centers and aisle ends.

K. Accessible Seating:

1. Shall be designated on the seating layout drawings and designed to allow an individual to transfer from a wheelchair to the theatre chair. The aisle standard shall be equipped

with an armrest capable of lifting to a position parallel with the support column, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the handicapped access standards.

2. Chairs located as shown in the contract drawings shall be mounted upon moveable steel bases. The steel bases shall be available for sections of one (1), two (2), or three (3) chairs. The bases shall be fabricated from 3/16" x 3-1/2" x 15-1/2" steel, with cross members securely fastened to the horizontal base members via Tec screws. Holes shall be provided for the attachment of the chair standards. Moveable bases are secured to the floor when the seating is in use with reverse anchors.

L. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish complete seat and back assemblies equal to 5% of amount installed for each type and size of chair seat and back along with required hardware for proper installation.

2. Furnish seat and back fabric covers equal to 5% of amount installed for each type and size of cushion.

3. Furnish armrests equal to 5% of amount installed for each type of armrest along with required hardware for proper installation.

PART 3: CONSTRUCTION

3.01 UPHOLSTERED CHAIR BACKS:

a. Backs shall be upholstered and padded on their face with an exposed hardwood veneer rear "Designer" panel. The top perimeter shall be shaped to be gently curved at the center and more rounded at the sides to blend with the vertical edges of the back. Backs shall be fabricated with the upholstery and rear panels enclosing a 5/16 inch diameter continuous welt of matching fabric and shall be fabricated to an approximate 24" radius. Attachment of the rear panel shall be by unobtrusive, countersunk, tamper-proof screws. There shall be no exposed fasteners or hardware of any sort visible at the rear of the back.

b. Upholstery panel: The upholstery panel shall be 7/16" thick, 5-ply Maple hardwood plywood and shall be padded with a 2" thick polyurethane foam pad and covered over its full face with the fabric selected. The poly foam pad shall be securely cemented to the plywood inner panel and the upholstery fabric shall be securely fastened to the hardwood inner panel by means of upholstery staples to facilitate ease of reupholstering. The wings for the attachment of the complete back to the standards shall be not less than 14 gauge (.0747") steel, firmly secured to the back by concealed threaded washers. Back wings shall have provision for 16 degree and 20 degree pitch.

c. The exposed rear "Designer" panel shall be 7-ply, 5/8" hardwood veneer, providing an attractive, measured, even appearance of the exposed edges. Special care shall be

exercised regarding consistent color of exposed edges. Special care shall be exercised regarding consistent color of exposed edges of interior piles. Decorative rear panels shall be formed on the formed the same radius as the upholstery panel. The rear panel shall be long enough to protect the chair seat from the rear. The rear of the back shall be surfaced with vertical-grain wood veneer of the species selected, and finished to the stain color selected. The rear panel shall be attached to the upholstery panel by internal, concealed fasteners.

3.02 UPHOLSTERED SELF-LIFTING SEAT:

Seats shall be upholstered on their face with a solid, sturdy, steel-based foundation and wood veneer decorative bottom surface. Seats shall be quietly and automatically self-lifting to a full, vertical fold when unoccupied, and shall be certified to pass seat cycle oscillation testing, ASTM Designation F851-87, Test Method for Self-Rising Seat Mechanism, as well as 600 lb. static load to front of seat testing.

a. The seat cushion shall have a base structure of a 5/8" thick, 7-ply hardwood plywood panel acting in concert with steel seat-lift arms. Seats shall be padded with 2-1/4" to 3" variable thickness, high density, molded polyurethane foam cushions. A carefully tailored cover of the specified fabric shall be upholstered over the polyurethane foam pads and securely attached, utilizing staples, to the bottom of the structural wood panel.

b. Hinge and Seat-Lift Structure: Support structure for the seats shall be initiated by heavy, 8 gauge (0.165") flanged steel support arms securely attached to the plywood upholstery panel, providing rigidity, stability, and superior strength for the seat component. The seat structure shall rotate on two, independent, 5/8" diameter, high strength, solid steel hinge rods securely locked to unobtrusive mounting sockets fixed to the chair standards, and shall allow for radius installation to a minimum of 25 ft. radius. Seat hinge location shall be carefully engineered so that the seat is properly balanced to provide stable support for a seated adult individual. Seat-lift shall be accomplished by a contoured cast iron counterweight recessed in the rear of the seat component. Seat operation shall be dampened at both hinges by neoprene cushioned upstops and downstops.

c. The bottom surface of the seats shall be 8-ply, 5/8" thick hardwood plywood to provide an attractive wood decorative bottom, and to enhance chair acoustics. The decorative bottom shall be molded to conform to the shape of the inner structural panel, and attachment, via concealed fasteners, shall eliminate voids within the assembled component.

3.03 STANDARDS:

a. Aisle Standards: Aisle standards shall be of modern pedestal design with rectangular

decorator panels having a full-round bottom, surfaced with wood veneer of the selected species. The decorator panels shall be rectangular-shape, full-round bottom, approximately 11-1/2" wide, high-density particle board construction. Structure of the aisle standards shall be provided by 1" x 3" rectangular columns of 14 gauge (.0747) steel. A formed panel of 16 gauge (.0598) steel shall be welded to the column to accept a decorator panel. The top of the column shall be provided with two formed steel dovetail lugs for secure attachment of the armrests. Brackets for seat attachment shall be 7 gauge (.1875") buttressed steel welded on the inside of the standard.

b. Center Standards: Center standards shall be of welded steel, modern pedestal design, fabricated of 14 gauge (.0747") steel to a 1" x 3" rectangular column. Brackets for seat support shall be 7 gauge (.1875") steel for superior strength, formed with an integral support buttress, and wing plates for mounting backs shall be 14 ga. (.0747") steel; both MIG-welded to the pedestal column to form a coherent unit. The top of the column shall be provided with two formed steel dovetails for secure attachment of the armrests.

c. A 14 gauge (.0747) steel formed foot shall be welded to the bottom of the rectangular column. This weldment shall be at all critical stress areas 360 degrees around the column, and concealed on the inside so as not to detract from the clean appearance. The foot dimension shall be 8" x 2-3/4" to provide maximum bearing surface to the floor to withstand severe tightening and shock without fracture. The standard shall be fabricated to be compatible with the floor incline, and to maintain proper seat and back height and angle. All weldments shall be gas shielded, arc weld.

3.04 ARMRESTS: Armrests shall be solid hardwood with rounded edges. Armrests shall have two keyhole slots in the bottom to securely lock on to steel lugs at the top of the standard. Further, one security screw shall be utilized.

3.05 NUMBER AND LETTER PLATES: A numbering system shall be provided for identification of all chairs. Number and letter plates shall be furnished as shown on the approved seating layout, and shall be 5/8" x 1-5/8" with a bronze finish and black Helvetica Medium letters and numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and the plates shall be attached by two (2) pop rivets. Letter plates shall be attached in a recess in the aisle standard armrest by two (2) escutcheon pins. Attaching hardware shall have a bronze finish compatible to plates.

3.06 HANDICAPPED ACCESS AISLE STANDARDS: Aisle standards designated on the contract drawings shall be arranged for easy access by handicapped individuals and shall be designed to allow the individual to transfer easily from a wheelchair to the theatre chair. The aisle standard support column shall be inclined to the rear at the top by 16 degrees, and shall be equipped with an armrest capable of lifting to a position parallel with the chair back, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the Handicapped Access Standards.

3.1 EXAMINATION

A. Prior to layout and installation examine floors, risers, and other adjacent work and

conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the work including, but not limited to, plumb of riser faces and concrete conditions.

B. Examine locations of electrical connections.

C. Examine locations of HVAC supply ducts.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.

B. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed 600-lb static load applied 3” from front edge of the seat without failure or other conditions that might impair the chair's usefulness.

C. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width and spacing to optimize sightlines.

D. Install riser-mounted attachments to maintain uniform chair heights above floor.

E. Install chairs in curved rows at a smooth radius.

F. Install seating so moving components operate smoothly and quietly.

G. Install wiring conductors and cables concealed in components of seating and accessible for servicing.

3.3 Field Quality Control

A. Perform tests and inspections.

B. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust chair backs so that they are properly aligned with each other.

B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.

C. Verify that all components and devices are operating properly.

D. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

E. Replace upholstery fabric damaged during installation.

PART 4: EXECUTION

4.01 SCOPE OF WORK: The installation is to be performed by the successful bidder, under the direction of a capable installation superintendent, in a manner satisfactory to the Architect, and the job turned over to the owner with all chairs complete and ready to use.

4.02 METHOD OF INSTALLATION: The seating plan is to be reproduced on the floor, all dimensions checked against the plan and necessary adjustments made in the layout for all discrepancies.

Chairs to be attached by means of an approved type of lead shield expansion bolts. Floor mount chairs shall be attached with 1/4" expansion bolts by not less than 2 " long. There shall be 2 bolts per standard.

4.03 CLEANING: Remove all debris caused by this work from the premises.

END OF SECTION 12 61 00

SECTION 14 21 00
ELECTRIC TRACTION ELEVATORS

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 gearless electric traction service elevators.

1. Seismic switches required by ASME A17.1 are included.

B. Related Sections include the following:
1. Section 01 81 19 - Construction Indoor Air Quality Management.
2. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
3. Division 4 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry.
4. Division 5 Section "Structural Steel" for the following:

a. Machine beams.
b. Divider beams.
c. Hoist beams.

5. Division 5 Section "Metal Fabrications" for the following:

a. Attachment plates and angle brackets for supporting guide-rail brackets.
b. Structural-steel shapes for subsills and entrance frames.
c. Pit ladders.

6. Division 7 “Waterproofing”
7. Division 23 “Heating, Ventilating, and Air conditioning”
8. Division 26 “Electrical”, “Electric Power Generating” and “Storing equipment”
9. Division 27 “Voice Communications”
10. Division 28 “Fire Detection and Alarm”
11. Division 31 “Earthwork”

C. Industry and government standards:

1. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities

2. ADAAG - Accessibility Guidelines for Buildings and Facilities

3. ANSI/NFPA 70, National Electrical Code

4. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows

5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.

1.3 DEFINITIONS

A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- square samples of sheet materials; and 4-inch lengths of running trim members.

D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

E. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.

F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."

1. Seismic Risk Zone: Project is located in Zone 2.

C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

1.6 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of other work relating to electric traction elevator including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.7 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Include 24-hour-per-day, 7-day-per-week emergency callback service.

a. Response Time: One hour or less.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

A. Composite Wood, medium density fiberboard, plywood, Engineered Wood, Agrifiber Products: no added urea-formaldehyde resins (NAUF).

B. Laminating adhesives: no added urea-formaldehyde (NAUF).

C. Solid wood and veneers and other Wood Products with FSC Wood Content.

D. VOC content limitations defined in Section 01 8123 “Volatile Organic Compound Limits

2.2 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering electric traction elevator that may be incorporated into the Work include, but are not limited to, the following:

1. KONE Inc., EcoSpace.
2. Otis, Gen 2
3. or Equal as approved by the Architect.

2.3 MATERIALS AND COMPONENTS

A. General: Provide custom engineered elevator systems to be installed within the existing elevator shafts. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.

B. Elevator Machines: Provide variable-voltage, variable-frequency ac-type hoisting machines. Provide solid-state power converters.

1. Provide non-regenerative system.
2. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

D. Roller Guides: Provide roller guides at top and bottom of car and counterweight frames.

E. Car Frame and Platform: Welded steel units.

F. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:

1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 6, nondirectional satin finish.
2. Nickel Silver Extrusions: ASTM B 151, alloy UNS No. C74500.
3. Enameled-Steel Sheet: Cold-rolled steel sheet complying with ASTM A 366/A 366M, matte finish, stretcher-leveled standard of flatness; hot-rolled

steel sheet complying with ASTM A 569/A 569M may be used for door frames. Provide with factory-applied enamel finish; colors as selected by Architect.

4. Prime-Painted Steel Sheet: Cold-rolled steel sheet, ASTM A 366/A 366M, or hot-rolled steel sheet, ASTM A 569/A 569M, with factory-applied rust-inhibitive primer.

2.4 OPERATION SYSTEMS

A. Elevator: Provide manufacturer's standard microprocessor operation system for each elevator as required to provide type of operation system indicated.

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevator where indicated:

1. Loaded-Car Bypass: When car load exceeds a predetermined weight, car will respond only to car calls, not to hall calls. Predetermined weight can be adjusted.
2. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.

C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

1. Keyswitch Feature: Car and hall push buttons are activated and deactivated by security keyswitches. Key is removable only in deactivated position.

2.5 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, nonyellowing translucent plastic.

B. Swing-Return Car Control Stations: Provide car control stations fully recessed in hinged return panel adjacent to car door.

1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."

C. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevator where indicated:

1. Loaded-Car Bypass: When car load exceeds a predetermined weight, car will respond only to car calls, not to hall calls. Predetermined weight can be adjusted.
2. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.

3. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.

D. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

E. Fire Department Communication System: Provide flush-mounted cabinet in each car and required conductors in traveling cable for fire department communication system specified in Division 26 Sections.

F. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

G. Hall Push-Button Stations: Provide one hall push-button station at each landing for each elevator.

1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.

H. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.

1. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches above finished floor.

2. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

I. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.

1. Integrate ground-floor hall lanterns with hall position indicators.

J. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

1. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.

1. Floor finish is specified in another Section.
2. Front Walls (Return Panels): Polished stainless steel, No. 8 finish.
3. Side and rear panels: Plastic Laminate panels.
4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Door Faces (Interior): Polished stainless steel, No. 8 finish.
7. Sills: Extruded metal, with grooved surface, 1/4 inch thick. Provide polished finish on nickel silver.
8. Ceiling: Aurora standard translucent panels suspended ceiling consisting of white translucent polycarbonate panels with fluorescent lighting fixtures.
9. Handrails: 1-1/2 inches round mirror-brushed stainless steel, No. 4 finish, at rear of car.

2.8 HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:

1. Enameled-Steel Frames: Formed steel sheet.
2. Enameled-Steel Doors: Flush, hollow-metal construction.
3. Sills: Extruded metal, with grooved surface, 1/4 inch thick. Provide polished finish on nickel silver.
4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.9 ELEVATOR

A. Elevator – Kone Ecospace Gearless Traction

1. Type: Gearless traction, counterweight at rear of hoistway.
2. Machine Location: Inside the hoistway mounted on car guide rail no machine room required.
3. Rated Load: 3500 lbs
4. Rated Speed: 150 fpm.
5. Operation System: Group Automatic.
6. Integral Control Closet; equipment control KCM831
7. Openings: (2) front and (1) back
8. Landings: total of 3
9. Main Power Supply: 120/208 Volts +5% (Three Phase)
10. Emergency Battery Device.
11. Auxiliary Operations:

    a. Independent service.
    b. Loaded-car bypass.
    c. Automatic dispatching of loaded car.
    d. Nuisance call cancel.
    e. Earthquake Emergency Operation: Comply with requirements in ASME A17.1.

12. Car Enclosures: As follows:

    a. Inside Width: 6’-8”
    b. Inside Depth: 5’-6”
    c. Inside Height: 7’-7”
    d. Door Width: 3’-6” ADA compliant
    e. Door Sills: Nickel silver.

13. Hoistway:

    a. Width: 8’-8”
    b. Depth: 7’-6”
    c. Height Clerance: 13’-2”
    d. Type: single-speed side sliding.
    e. Frames: Formed steel sheet.
    f. Doors: Flush, hollow-metal construction.
    g. Sills: Nickel silver.

14. Hall Fixtures: Satin stainless steel.
15. Additional Requirements: As follows:

    a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
    b. Provide traveling cables for security and telephone lines.
    c. Provide protective blanket hooks and two complete sets of full-height blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

B. Commencing installation of passenger elevator shall constitute acceptance of existing conditions.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and direction of travel.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevator, perform acceptance tests as required and recommended by ASME A17.1 and governing regulations and agencies.

B. Operating Test: Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machines during 30-minute test period. Record failure of elevator to perform as required.

1. Perform operating test specified above on one elevator of each type, capacity, speed, and travel distance.

C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevator.

3.4 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operation, and daily maintenance of elevator. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

PROTECTION

C. Temporary Use: Do not use elevator for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.

1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevator used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.
2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevator. If, despite such protection, elevator become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

END OF SECTION 14 21 00

SECTION 31 00 00

SITE WORK

PART 1 - GENERAL

1.00 QUALITY ASSURANCE

A. Comply with all applicable local, state and federal requirements regarding materials, methods of work and disposal of excess and waste materials.

B. Obtain and pay for all required inspections, permits and fees. Provide notices required by governmental authorities.

1.01 DEMOLITION, REMOVAL, CUTTING AND PATCHING

A. Provide materials, labor, equipment and services necessary to perform work as shown on the drawings, as specified herein or as required by job conditions; scheduling work as required by Contract Documents.

1.02 PROJECT CONDITIONS

A. Locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means for protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense.

B. Arrange for disconnection, disconnect and seal or cap all utilities and services designated to be removed before start of site work operations. Perform all work in accordance with the requirements of the applicable utility company or agency involved.

C. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company immediately to obtain procedure directions. Cooperate with the applicable utility company in maintaining active services in operation.

D. Locate, protect and maintain bench marks, monuments, control points and project engineering reference points. Re-establish disturbed or destroyed items at Contractor's expense.

E. Perform site work operations and the removal of debris and waste materials to assure minimum interference with streets, walks and other adjacent facilities.

F. Obtain governing authorities written permission when required to close off obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways when required by governing authorities.

G. Control dust caused by the work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

H. Protect existing buildings, paving and other services or facilities on site and adjacent to the site from damage caused by site work operation. Cost of repair and restoration of damaged items at Contractor's expense.

I. Protect and maintain street lights, utility poles and services, traffic signal control boxes, curb boxes, valves and other services, except items designated for removal. Remove or coordinate the removal of traffic signs, parking meters and postal mail boxes with the applicable governmental agency. Provide for temporary relocation when required to maintain facilities and services in operation during construction work. Provide for temporary street lighting during construction, as necessary.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment: As selected by Contractor, except as indicated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine the areas and conditions under which site work is performed. Do not proceed with the work until unsatisfactory conditions are corrected.

B. Consult the records and drawings of adjacent work and of existing services and utilities which may affect site work operations.

END OF SECTION

SECTION 31 10 00

SITE DEMOLITION, CLEARING AND PREPARATION

PART 1 - GENERAL

1.00 DESCRIPTION

A. Work under this Section shall consist of providing all labor, plant material and equipment for preparing the site for construction in accordance with the Contract Documents.

B. Work shall include, but not be limited

1. Removal of site structures, obstructions and utilities.

2. Disconnecting, capping, or sealing and removing or abandoning utilities.

3. Protection of Existing structures and utilities to remain.

4. Protection of existing trees, landscaping and natural features to remain.

5. Maintenance and protection of traffic.

6. Clean-up and restoration.

7. Removing designated site improvements.

8. Reusing designated site improvements.

1.02 RELATED DOCUMENTS

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

1.03 SUBMITTALS

A. Provide submittals as listed and/or enumerated in division 1 of these specifications.

1.04 QUALITY ASSURANCE

A. Comply with Section 31 00 00 requirements.

1.05 PROJECT CONDITIONS

A. General:

1. Locations shown on Drawings not Guaranteed:

The structures, obstruction, utilities, trees and shrubs shown on the drawings are those known to exist, but their location is not guaranteed to be exact, nor is it guaranteed that all structures, obstructions, utilities, trees and shrubs are shown. The contractor shall, however, be responsible for the protection of all structures, obstructions, utilities, trees and shrubs, whether shown on the drawings or not.

2. Safeguards and Protections:
   The Contractor shall provide all necessary safeguards including the installation of protective fencing and barriers, etc., as may be required to prevent damage to adjacent property or injury to persons. All work shall be done in accordance with the requirements of the local building codes and the rules, regulations and ordinances of all other governing bodies having jurisdiction. The Contractor will be held responsible for any claim arising from his failure to provide proper safeguards or for his failure to conduct his operation in a manner consistent with the rules, regulations and ordinances of those governing bodies having jurisdiction.

3. Replacement of Disturbed Ground Surfaces:
   The Contractor shall at his own expense, repair or replace all ground surfaces which are to remain, and which may become disturbed or damaged due to his operations. Said repair or replacement shall be satisfactory to the Architect and in accordance with the requirements of the governing body having jurisdiction.

4. Damage:
   The contractor, at his own expense, shall make good, repair and/or replace all damage occurring as a direct or indirect result of his operations.

5. Notification of Utility Owners:
   Under Industrial Code Rule 53, the Contractor will be required to notify all operators of utilities prior to the start of his work and to call the Underground Call Center so that all the various underground utility operators will be able to locate and mark the locations of their own utilities. Notification of operators of utilities must be made at least forty-eight (48) hours prior to the start of any construction. No work by the Contractor shall commence until the operators have notified the Contractor that their utilities have been located.

   The Contractor will be held responsible for any claims arising from his failure to make such notification, or for his failure to do the work in accordance with the rules and regulations of the governing authorities and owners of the utilities involved.

6. Locate and identify existing underground and overhead services and utilities within contract limit work areas. Provide adequate means of protection of utilities and services designated to remain. Repair utilities damaged during site work operations at Contractor's expense.

7. When uncharted or incorrectly charted underground piping or other utilities and services are encountered during site work operations, notify the applicable utility company immediately to obtain procedure directions. Cooperate with the applicable utility company in maintaining active services in operation.

8. Locate, protect and maintain bench marks, monuments, control points and project engineering reference points.

9. Control dust caused by work. Dampen surfaces as required, comply with pollution control regulations of governing authorities.

1.06 REMOVAL OF STRUCTURE, UTILITIES AND OBSTRUCTIONS

A. General Requirements:
The contractor shall remove and dispose of those existing structures, utilities and obstructions which interfere with the proposed construction as shown on the drawings, and as determined in the field by the Owner's Field Representative or Architect. This shall include, but not necessarily be limited to: retaining walls, poles, pole bases, catch basins, inlets, manholes, vaults, tanks, conduit, pipes and appurtenances, pavements, sidewalks, curbs, signs and sign supporting structures.

The Contractor shall remove only those items and structures that he has been authorized to remove, either by specific directions given on the drawings or by written instructions given before or during the progress of the work by the Owner's Field Representative or Architect.

The Contractor will be held responsible for any claim arising from his removal of any existing item or structure without the required authorization specified herein.

B. Discontinuance of Utilities:
Before any structure or building with utilities thereon is disposed of, the utilities shall be disconnected and removed. The Contractor shall perform the work of discontinuing the utilities in accordance with the requirements and directions of the authorities having jurisdiction over the utilities involved.

C. Removal Within Proposed Building Areas:
In the proposed building areas as shown on the Drawings, existing foundations, floor slabs, pipe, utility structures and other obstructions shall be removed completely. Backfilling required by the removal of these obstructions shall be performed in accordance with the appropriate Section of these specifications.

D. Portions of Pavements, Curbs, Etc., to Remain:
In removing portions of pavements, curbs, sidewalks, driveways and similar items where the balance of such items is to remain, removal shall be to an existing joint. Where this is not practical, as determined by the Owner's Field Representative or Architect, removal shall be to a reasonably true line with vertical face, which shall be cut with a power-driven concrete saw or by other approved mechanical line cutting methods.

E. Existing Services to be Maintained:
In removing storm drain structures or sanitary sewer structures, all existing live storm drains or sanitary sewers connected to the structures shall be rebuilt and properly reconnected, and service shall be maintained during such construction operations.

F. Disposal of Material:
All waste material obtained from the removal of structures and obstructions, including, but not limited to, concrete matted together by reinforcing, pipe, plaster, wood, paper, asphalt shingles, tanks, metal and miscellaneous debris, shall be properly disposed of off-site. Broken concrete (but not including broken concrete matted together by reinforcing), broken pavements, brick and concrete block not exceeding a maximum dimension of twelve (12) inches, may be deposited in the deep on-site fill areas outside of the building areas, where and as directed by the Owner's Field Representative or Architect and/or Soils

Engineer. Location of on-site deposit areas and method of handling and placing such material shall be in strict accordance with the directions of the Owner's Field Representative or Architect and/or Soils Engineer.

1.07 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. General Requirements:

1. The Contractor shall be responsible throughout the course of work for protecting from injury or damage all existing structures and utilities which are to remain.

2. All existing gas and water lines, telephone and electric poles, wires, conduits, sewers, drains, culverts, fire hydrants and other utilities which are to remain shall be carefully supported, maintained in operation and protected from injury or damage by the Contractor.

3. The Contractor shall sling, support, shore up and secure in place all pipe or conduits, without damage thereto. The Contractor shall provide for and maintain, by means of suitable temporary channels or pipe, the flow of drainage and watercourses, whether on the surface or under-ground which may be interrupted during and by progress of the work. All works of drainage intercepted or disconnected shall be restored and made good or taken down and rebuilt to the extent made necessary by the new work, and all temporary material required for such construction shall immediately be removed from there when no longer required.

B. Dead-End Pipe and/or Conduit to be Sealed:
When pipe, conduits, sewers or drains are removed from trenches, leaving dead-end in the ground, the Contractor shall carefully plug or bulkhead such ends in a manner satisfactory to the Owner's Field Representative or Architect and the utility owner.

1.08 PROTECTION OF EXISTING TREES, LANDSCAPE AND NATURAL FEATURES

A. General Requirements:
The Contractor shall protect, throughout the course of construction, all such trees as are shown on the drawings or marked by the Architect as "to remain". The Contractor shall also protect throughout the course of construction all landscaping, vegetation and natural features on public and private property. The contractor shall use every precaution to prevent injury, damage, pollution, erosion or destruction of existing landscaping, vegetation and natural features including swamps, woods and field.

B. Protective Fencing Around Trees:
The Contractor shall install and maintain a four (4) foot high snow fence properly supported around each such tree or grouping of trees that is to be saved. Minimum clearance shall be ten (10) feet around each tree depending on tree size or as required by the Architect. All protective fencing shall be subject to the approval of the Architect.

C. Grading and/or Filling Around Trees:
Grading and/or filling operations within the protective fencing shall be carried on with extreme care only under the direct supervision of the Architect. If the soil over the root area of the trees has been compacted, it shall be restored by proper cultivation to permit entrance of water and proper aeration of roots.

D. Cutting of Tree Roots and Limbs:
Roots and limbs of trees are not to be cut unless authorized by the Architect. Should it become necessary to do so, the Contractor shall treat the remaining exposed portion of roots and/or limbs to prevent damage, loss or injury to the tree. This treatment shall be done in accordance with accepted horticulture practice and by personnel experienced in that field of work.

1.09 MAINTENANCE AND PROTECTION OF TRAFFIC

A. General Requirements:
The Contractor shall maintain traffic as required during the course of construction in such a manner satisfactory to the Architect and authorities having jurisdiction. The contractor shall comply with all rules and regulations of those governing bodies having jurisdiction on the adjacent roadways, and shall obtain required permits and pay all fees, deposits and charges in connection with same.

B. Conduct of Work:
The Contractor shall furnish, install and maintain construction signs, barricades, lights, steel plates, and/or all other protective devices necessary and required to adequately maintain vehicular traffic during construction. He shall provide all personnel necessary for properly directing and controlling traffic. Traffic entering and exiting the site shall be regulated and maintained so as not to disrupt the normal flow of traffic. Emergency personnel and equipment shall have safe and adequate access at all times to the site.

1.10 CONSTRUCTION AND MAINTENANCE OF ACCESS ROAD

A. General Requirements:
The Contractor shall construct and maintain a suitable gravel or hard surfaced access road from the existing highway pavement at the proposed driveway to the site to the building and staging areas. This road shall be constructed when and where directed by the Owner's Field Representative or Architect and shall be kept in such condition that the vehicles of all other contractors, subcontractors and suppliers can traverse it at all times without difficulty.

B. Stabilized Construction Entrance as per civil drawings.

C. Maintenance:
The Contractor shall be responsible for the installation and maintenance of temporary facilities such as steel plates, ramps, etc., to insure safe, adequate and uninterrupted means of traffic flow over this access road. Work shall also include dust control and snow removal.

PART 2 - MATERIALS

2.01 8' HIGH CONSTRUCTION FENCE

A. Furnished by Owner.

2.02 MATERIALS FOR PIPE ABANDONMENT

A. A cement-based grout shall be used to fill the void of the existing pipe. The grouting material must have a minimum strength of 100 PSI and shall have flow characteristics appropriate for filling an existing pipe. The grout mix design and method of installation shall be approved by the Engineer prior to the start of operations.
Non-shrink mortar grout shall conform to the requirements of ASTM C 1107 and shall a cement-based, flowable, non-shrink grout that develops extremely high compressive strength in a short period of time.

PART 3 - EXECUTION

3.01 TREE PROTECTION

A. Protect existing trees scheduled to remain against injury or damage, including cutting, breaking, or skinning of roots, trunks or branches; smothering by stockpiled construction materials, excavated materials or vehicular traffic within branch spread.

1. Protect designated trees with temporary wood snow fence enclosure. Provide a minimum 8'-0" radius from center of tree trunk. Increase enclosure size as directed for large trees.

2. Erect temporary fencing before commencing site preparation work. Maintain fencing during full construction period. Remove temporary fencing when no longer needed or when acceptable to Landscape Architect.

3. Contractor to employ the services of a licensed arborist to “air spade” and perform root pruning around outer edge of designated tree protection zones
4. Interfering branches of trees scheduled to remain may be removed when acceptable to the Landscape Architect.
5. Repair trees scheduled to remain and damaged by construction operations in a manner acceptable to the Landscape Architect.
Repair damaged trees promptly to prevent progressive deterioration caused by damage.
6. Replace trees scheduled to remain and damaged beyond repair by construction operations, as determined by the Landscape Architect, with trees of similar size and species. Cost for tree replacement shall be determined in accordance with the Tree Evaluation Formula as described in "A Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs, and Evergreens", published by the International Society of Arboriculture.
7. Repair and replacement of trees scheduled to remain and damaged by construction operations or lack of adequate protection during construction operations shall be at Contractor's Expense.

3.02 CONSTRUCTION FENCE

A. Furnished by Owner.

B. The Contractor shall maintain the chain link construction fence with screen and gates during the life of this contract and shall repair or replace all members that are disturbed or damaged as result of the Contractor’s operations at no cost to the Owner. Contractor is

responsible for construction fence relocation as required by the construction sequence and operations.

3.03 PIPE ABANDONMENT

A. Twelve (12) inch and larger pipes to be abandoned shall be plugged and filled with a cement-based grout slurry mixture.

B. Filling of the pipe with the cement slurry grout shall be accomplished by pumping or gravity and will be checked by comparing the volume of the pipe with the volume of slurry material used. If the volume is more than ten (10) percent greater than the actual volume of slurry used, the Contractor shall excavate two or more exploratory holes where directed by the Engineer and shall do all work necessary to satisfactorily fill any voids encountered. The abandonment method shall provide for the release of air. When intermediate points are required for the abandonment of the system, they shall be a part of the abandonment process.

C. Ten-inch (10") and smaller pipes to be abandoned shall be plugged at both ends with a non-shrink mortar not less than 2'-0" thick.

D. The abandonment method shall adequately provide for the removal and legal disposal of all existing pipe materials, of whatever nature, removed from the system.

3.04 SITE IMPROVEMENTS

A. Remove existing site improvements within contract limits as indicated. Include the following:

1. As shown on Drawing L-100.

2. Light Bases - coordinate with Electrical Contractor.

B. Existing utilities:

1. Information on the drawings relating to existing utility lines and services is from the best sources presently available. All such information is furnished only for information and is not guaranteed. Excavate test pits as required to determine exact locations of existing utilities.

2. Perform work and provide necessary materials to disconnect or relocate existing utilities as indicated. Record existing utility termination points before disconnecting.

3. Coordinate utility work with electrical work performed under Division 16, Electrical.

C. Remove existing sidewalks, curbs, and paving, including all base material, as required to accommodate new construction.

3.05 STOCKPILING OF EXISTING SOIL AND DEBRIS AND/OR OBSTRUCTION MATERIALS

A. Stockpiling of unsuitable existing soil, debris and/or obstruction materials within the contract limits of the job site is restricted to no more than the needs of what can be off loaded in a 24-hour period. Under no circumstances shall on-site stored material exceed a total of 50 cubic yards. Stockpiles should be no more than 6 feet in height.

B. Stockpiling of existing soil materials and debris and/or obstructions for longer than 24 hours and/or exceeding 50 cubic yards may be removed by the Construction Manager and back charged to the Contractor with no additional cost to the Contract.

C. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.06 DISPOSAL

A. Disposal: Remove all unsuitable existing soil materials, debris and/or obstructions, demolished materials, waste materials, including trash, and legally dispose of them off of the Owner's property.

B. Remove materials resulting from construction operations as the work progresses, and in compliance with stockpiling requirements of this Section, and/or at the direction of the Construction Manager.

3.07 CLEANING

A. Upon completion of site preparation work, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean and free of materials and debris and suitable for site work operations.

3.08 SALVAGED MATERIALS

A. Remove, store, protect and reinstall as per Architect.

B. Materials, items and equipment not scheduled for reinstallation or salvaged for the Owner's use are the property of the Contractor. Remove cleared materials from the site as the work progresses. Storage and sale of Contractor's salvage items on site is not permitted.

3.09 CLEAN-UP AND RESTORATION

A. Clean-up:
The Contractor shall clean up and remove all refuse, rubbish, scrap materials, unsuitable materials and debris caused by his operations so that at all times the site of the work shall present a neat, orderly and workmanlike appearance. Materials from the Contractor's operations shall not be allowed to accumulate and cause hazardous or unsightly conditions.

B. Restoration:

1. Where and as directed by the Architect the Contractor shall replace all surfaces disturbed and shall restore paving, curbing, sidewalks, driveways, gutters,

shrubbery, fences, lawns and other surfaces disturbed to a condition equal to or better than that which existed before the work began, furnishing all labor, material, and equipment necessary thereto. Restore to original grades and conditions, areas adjacent to site disturbed or damaged as a result of site preparation work.

2. The Contractor shall, at said contractor's own expense and to the satisfaction of the Architect, clean-up and correct unsightliness, inconvenience, hazard or damage caused by water, mud, stones, dust rubbish, construction debris, traffic, workmen or the general operations. Wheel tracks, paths, puddles, damaged growth, ragged edges, undesirable spoil from excavation and rough slopes are to be removed, obliterated, corrected, graded, leveled, patched or smoothed. All adjacent areas that have been damaged or that require regrading shall be smoothed and worked to make the project area blend into existing conditions.

3. Unsightliness extending onto adjacent private or public property shall be corrected to the satisfaction of both the Owner of the adjacent property and the Architect, and no private agreements allowing a waiver of clean up will be recognized.

END OF SECTION

SECTION 31 20 00
EARTHWORK

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 the following:

1. Earthwork by each prime contractor in conducting unclassified excavation in bulk and in trenches/pits, backfilling, filling, compacting, and rough grading.

2. Testing of off-site borrow soil materials for approved use in earthwork operations.

3. Furnish materials from approved off-site sources for approved use in earthwork operations.

4. Bulk Excavation
   a. Placement of fill and mounding materials in both compacted and uncompacted conditions depending upon contract requirements and anticipated subsequent construction.

5. Earthwork shall occur primarily in landscaped areas and around building areas and for site conditions as required to provide foundation elements, appurtenant structures, sub bases, site landscaping and improvements, utility lines, and other miscellaneous elements of each separate contractor's respective work: Earthwork shall further include:
   a. Excavation in bulk and in pits and trenches for foundations and substructure utilities including but not limited to mechanical, electrical, site water, storm and sanity drainage, irrigation, site security, telephone, etc. including pits for buried utility structures.
   b. Protection of excavations, adjacent conditions, and previously installed work of the project.
   c. Designing, furnishing, installing and removing temporary excavation supports and other temporary protection including erosion control required for earthwork.
   d. Dewatering of excavations incidental to performing, maintaining, and protecting excavation work of this Section.
   e. Soil erosion controls in addition to those controls specified in Division 1, Section "Temporary Facilities & Controls".
   f. Placing fill materials at and around foundation areas of structures including from footing levels to slab on grade level and at site areas to design grades related to other systems and fills (Horticultural soil mixes) to be installed as required to complete work.
      1) Rough grading of site and backfilled areas to design grades with allowance for design thicknesses of mixed planting soils, paving systems, and the like, and allowing for even flow of grade transitions to adjacent site areas.
      2) Obtaining imported (borrow) material from off-site sources to extent required and of materials specified.

6. Disposal of excess and unsuitable materials resulting from earthwork operations.

7. Field survey work including staking out lines and grades, topographic surveys, verification of job site elevations, and other identification of site work locations. Refer also to Section “Execution Requirements” for final survey requirements.

8. Preservation and protection of existing site work, structures, curbs, decorative pavements; and utilities to remain.

9. Coordinating this work between contracts and with related work; including sequencing and scheduling of construction operations and use.

B. Related Sections include the following:

1. Division 31 Section “Site Demolition, Clearing and Preparation”.

2. Division 31 Section "Excavation, Support and Protection".

3. Division 33 Section “Storm Utility Drainage Piping”.

4. Division 31 Section “Planting, Seeding and Topsoil”.

5. Division 3 Section “Site Concrete”.

6. See Mechanical, Plumbing and Electrical Drawings for excavating and backfilling buried mechanical and electrical utilities and buried utility structures.

1.3 UNIT PRICES

A. Excavation Measurement: Volume of material in cubic yards removed and properly disposed off, measured to the lines of excavation.

B. Controlled Fill Measurement: Volume of Controlled Fill, furnished and installed, measured in place in a fully compacted position.

C. Crushed Stone Measurement: Volume of Crushed Stone furnished and installed, measured in place in a fully compacted position.

D. Sand Measurement: Volume of sand material, furnished and installed, measured in place in a fully compacted position.

E. Soil Separation Fabric Measurement: Square yards of soil separation fabric, furnished and installed, measured in place.

1.4 DEFINITIONS

A. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by the Construction Manager. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by the Construction Manager. Unauthorized excavation, as well as remedial work directed by the Construction Manager, shall be without additional compensation.

B. Bulk Excavation: Excavation of soils and unclassified materials in any areas not defined as trench or pit excavation.

C. Design Bearing Grades or Elevations: The design vertical levels of the bottoms of foundations indicated on the Drawings.

D. Excavation Grades or Elevations: The design vertical levels specified or indicated in the Contract Documents (or revised during construction by the Construction Manager to accommodate field conditions) to which excavation shall be conducted.

E. Pit Excavation: Small, local excavations, such as for column footings where the plan dimensions do not exceed 10 feet in either length or width.

F. Suitable Fill Materials: Classified as specified for each type and condition of use such as described as "Controlled Fill", Article 2.1 herein.

G. Trench Excavation: Excavations where the required depth is greater than twice the width such as required for installation of utilities and pipes.

H. Unclassified Excavation: Removal of materials encountered within the required excavations between the existing ground surface and design excavation grade to the top of suitable sub-grade material, whichever is deeper, regardless of the nature of the materials encountered, their geologic definitions, the water contents thereof, and the means of excavation required. Resultant Unclassified Excavation material will be further classified as "Suitable Fill Material" or "Unsuitable Fill Material". Classification of unsuitable material shall be made exclusively by the Construction Manager.

I. Unsuitable Fill Material(s): Whenever the words "Unsuitable Fill Material" or words of similar meaning are used, they are taken to include combustible, organic and frozen materials, vegetation, debris and/or obstructions, trash, snow, ice and/or fill materials previously placed on the site in an uncontrolled manner or with uncontrolled material, material with excessive water content, material with an inability to obtain necessary compaction, and material which is not in conformance with approved test results of fill materials as per this Section. The classification of unsuitable material(s) shall be made exclusively by the Construction Manager.

J. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 13.0 cu ft. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 13.0 cu ft. shall be classified as rock.
   1. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
   2. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.

K. Debris and/or Obstructions: See Division 2, Section "Site Demolition Clearing and Preparation".

L. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

M. Structures: See Division 2, Section “Site Demolition Clearing and Preparation”.

N. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase.

O. Utilities: Existing and proposed utilities including on-site underground pipes, conduits, ducts, and cables, wiring as well as underground services within buildings

1.5 SUBMITTALS

A. Product Data: For the following:
1. Each type of plastic warning tape.
2. Drainage filter fabric.
3. Separation fabric.

B. Samples: For the following:
1. 30-lb (14-kg) samples, sealed in airtight containers, of each proposed soil material from on-site or borrow sources.
2. 12-by-12-inch (300-by-300-mm) sample of drainage fabric.
3. 12-by-12-inch (300-by-300-mm) sample of separation fabric.
4. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
5. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
6. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

C. Seismic survey agency report, for record purposes.

1.2 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.3 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than three days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: All materials utilized for this Project shall be obtained from a source that has been licensed or permitted for such use by local and state authorities. The CONTRACTOR shall be required to submit evidence of such if so requested.
   1. Suitable materials: Suitable soil materials are defined as those complying with ASTM D2487 soil classification groups GW, SM, SW, and SP.
   2. Unsuitable materials: Materials containing excessive amounts of water, plastic clay, vegetation, organic matter, debris, pavement, stones or boulders over 3" inches in greatest dimension, frozen material, and material which, in the opinion of the ENGINEER, will not provide a suitable foundation or subgrade.
   3. Existing On-Site Fill Material: Any suitable material 3" or less in greatest dimension, "Well Graded" taken from on-site excavation.
   4. Inspection: The ENGINEER may inspect off-site sources of materials and order tests of these materials to verify compliance with these Specifications.
   5. All materials for use as backfill and fill material shall be tested by the laboratory and approved by the ENGINEER.
   6. If existing on-site fill material is unsuitable as determined by the ENGINEER, select backfill or approved imported off-site fill shall be used.
   7. Site Stripped topsoil may be used as fill in landscape areas. It may not be used under footings, slabs, drives and parking areas.
   8. Imported soil or fill materials to the site shall be analyzed for the following chemical parameters using EPA methods: Volatiles, Semi-Volatiles, TAL Metals, Pesticides/Herbicides, PCBs. Concentrations shall be compared to the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 5 – Allowable Constituent Leveling for Imported Fill or Soil and approved by ENGINEER. Samples shall be taken at a frequency of 1 per 5,000 cubic yards if originating from a natural borrow source and 1 per 1,000 cubic yards if manufactured or recycled.

B. General Backfill and Fill Materials:
   1. Provide approved soil materials for backfill and fill that are uniformly mixed, free of clay, rock or gravel larger than 3-inches in any dimension, Well Graded, free of debris, waste, frozen materials, vegetation and other organic matter and other deleterious materials. Previously excavated materials meeting these requirements may be used for backfill but not under, above or around utilities.
   2. All materials for use as described above shall be tested by the laboratory and approved by the ENGINEER.

C. Select Granular Fill: Well graded hard, clean, durable particles free from wood, organic matter, roots, debris, vegetation, sod and other deleterious material. Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
3"	100
No. 40	70
No. 200	10

D. Crushed Stone:

1. Crushed Stone shall consist of hard, durable crushed rock consisting of angular fragments obtained by breaking and crushing solid or shattered natural rock. Material shall be free (one percent maximum) from a detrimental quantity of flat, elongated (where average width exceeds 4 times the average thickness) pieces, or other objectionable pieces.

2. Crushed Stone shall have the following gradation as determined by ASTM Designation D-422, Particle Size Analysis of Soils:

Sieve Size	Max. % Passing by Weight
1 inch	100
1/2 inch	45 to 85
1/4 inch	30 to 65
No.10	15 to 45
No.200	0 to 5

3. Provide processed crushed stone material obtained from off-site sources.

E. Sand:

1. Sand shall consist of natural mineral soils or processed mineral materials free of combustible, organic and frozen materials, roots, topsoil, loam, trash, snow, ice, wood and other objectionable materials which may be compressible or cannot be compacted as specified.
2. Gradation of sand shall conform to ASTM C-33 for fine aggregate.
3. Sand shall be supplied from off-site suppliers.

F. 3/4" Drainage Stone Fill: See Section 33 49 00 – Storm Drainage System.

G. Bedding Material: Generally, bedding material for utilities and the like shall be the same as Crushed Stone as specified herein except use Sand as specified, where Sand is indicated for specific condition of use.

H. Subsurface Drainage Mat: Shall be extruded HDPE: High Density Polyethylene Polymer Drainage Panel with non-woven needle punched polyproplyene fabric.

1. Compressive strength: 15,000 psi, As per ASTM D-162l.
2. Fabric shall be UV stabilized such as J-Drain 420 Series; as manufactured by JDR Enterprises, Inc., or approved equivalent

I. Soil Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 325 lbf; ASTM D 4632.
2. Tear Strength: (333 N) 90 lbf, ASTM D 4533.
3. Puncture Resistance: (400 N) 115 lbf, ASTM D 4833.
4. Water Flow Rate: 145 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 40 (0.425); ASTM D 4751.

Soil Separation Fabric shall be Mirafi 500X Woven Geotextile as manufactured by TC Mirafi www.tcmirafi.com, or approved equal.

J. Erosion Control Materials:
   1. Erosion Control Netting: Provide as specified in Section 31 21 30: Erosion & Sediment Control.
   2. Other, as approved by the Construction Manager to suit conditions of use.

K. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
   1. Yellow: Electric.
   2. Red: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 – EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXCAVATION, GENERAL

A. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavation to subgrade elevations classified as earth and rock.
   1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm) except for footing volumes which will be within 4" of the bottom of the footing as per Section 03 30 00. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.5 EXCAVATION FOR TRENCHES

A. Excavation for Trenches: Excavate to widths shown on the Drawings and depths indicated or required to establish indicated slope and invert elevations.

Produce an evenly graded, flat trench bottom at the subgrade elevation required for installation of pipe and bedding material. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill along edges of trenches. Load excavated material directly into trucks, unless otherwise permitted by the ENGINEER.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 APPROVAL OF SUBGRADE

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

C. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

D. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use Suitable Fill Material.
2. Under walks and pavements, use Suitable Fill Material.
3. Under steps and ramps, use Suitable Fill Material.
4. Under building slabs and foundations, use Suitable Fill Material approved by Geotechnical Engineer.
5. Under footings and foundations, use Suitable Fill Material.

3.11 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches (150 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 95 percent.
   2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 95 percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 90 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: +/- 1 inch (25 mm).
   2. Walks: +/- 1 inch (25 mm).
   3. Pavements: +/- 1/2 inch (13 mm).
   4. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.14 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch (150-mm) course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches (300 mm) of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches (150 mm).
   1. Compact each course of filter material to 92 percent of maximum dry unit weight according to ASTM D 1557.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches (150 mm).
   1. Compact each course of filter material to 92 percent of maximum dry density according to ASTM D 1557.
   2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.15 SUBBASE AND BASE COURSES

A. If specified on plans, install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

B. Under pavements and walks, place subbase course on prepared subgrade and as follows:
   1. Place base course material over subbase.
   2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
   3. Shape subbase and base to required crown elevations and cross-slope grades.
   4. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
   5. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.16. DRAINAGE COURSE

A. If specified on plans, under slabs-on-grade, install drainage fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Place drainage course on drainage fabric and as follows:

B. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:
   1. Compact drainage course to required cross sections and thickness to not less than 92 percent of maximum dry unit weight according to ASTM D 1557.

2. When compacted thickness of drainage course is 6 inches (150 mm) or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet (30 m) or less of wall length, but no fewer than two tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet (46 m) or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

F. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

G. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

H. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 23 16
ROCK REMOVAL

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this Section as shown on the drawings, as specified and as required by job conditions.

B. The work shall include but not be limited to the following:

1. Carefully loosen, break up and excavate existing rock required for proper completion of the work shown on the plans, including trenching.

2. Break up and dispose of the excavated material in accordance with the plans, specifications and directions of the engineer.

1.02 RELATED SECTIONS

A. Applicable provisions of the General conditions

B. Section 31 20 00 - Earthwork

C. Section 31 23 33 - Trenching and Backfilling

D. The Geotechnical Report for test pit locations and findings of subsurface materials and conditions is given as reference information only (Appendix A). The contractor is to verify all subsurface conditions in the field.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Determine all environmental effects associated with the proposed work and safeguard those concerns as regulated by law and all others by reasonable and practical methods.

1.04 JOB CONDITIONS

A. The payment of rock excavation (or trench rock excavation) shall be based on the unit price specified in the bid proposal mulitiplied by the actual quantity measured in the field.

B. Rock Excavation will be paid for as a Unit Price as established in the base bid. Any discrepancy with plans and specifications regarding amount, type and depth of rock to be removed shall immediately be brought to the attention of the Architect, Owner and the Geotechnical Engineer. A revised removal plan and schedule shall subsequently be provided and followed by the Contractor.

C. Rock excavation shall include only excavation of boulders of more than thirteen (13) cubic feet in volume and ledge rock which is determined by the Engineer to be so hard that it is necessary to loosen and handle with a power shovel, special rock breaking equipment.

D. Excess material and material not suited for backfill shall be removed from the site and disposed of by the Contractor. No additional payment will be made for material removed from the site, but the cost thereof shall be deemed included in the price bid for this item.

1.05 QUALIFICATIONS

A. Prior to the start of any rock removal under this Contract, the Contractor shall indicate his capability of performing this type of work by submitting qualifications of personnel or firms who will be executing the rock excavation work. In order to prove capability and qualifications, the Contractor must include, but not be limited to the following:

1. Meeting and complying with all applicable local, state, and federal standards set forth in regulations covering the work.

2. General qualifications and evidence of experience sufficient to be “accepted” by the Owner’s Representatives. Furnish evidence of successfully completing projects of this type and sensitivity within the last ten years.

3. The Contractor shall obtain permits for performing the work from all necessary local, state, and federal agencies governing the site and shall present evidence of obtaining all of the proper permits prior to rock removal.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 GENERAL

A. General Requirements:

1. If rock is encountered, the Contractor shall excavate, remove and dispose of rock within the limits specified and in accordance with the Drawings and Specifications and as approved by the Owner’s Representatives. The Contractor may excavate the rock by any method which is satisfactory to the Engineer and which will prevent damage to existing surfaces and structures adjacent to the work. The approval of the method of excavation shall not be construed as relieving the Contractor of any of his responsibilities or liabilities for damages.

2. It is the Contractor's responsibility to protect the surrounding area including but not limited to all utilities, concrete and facilities, etc. Any damage shall be repaired at the Contractor's expense.

3. Unless otherwise specified or directed rock excavation shall be carried to a depth to allow for future site improvement as indicated by the drawings. Work that is excavated to a greater extent than required by the drawings and which is within the bearing area of walls, footings

4. Where rock occurs and footings or walls rest on same, the rock shall be leveled to a clean, even hard surface.

5. Slope Preservation: Where rock cuts requiring drilling will be exposed after the Project is completed, all necessary precautions shall be exercised to preserve the rock in the finished slope in a natural undamaged condition, with the surface remaining reasonably straight and clean. Where rock excavation requires drilling holes shall be drilled at the inclination of slope along the line of the proposed finished slope. The Contractor shall adjust his operations to obtain the required slope conditions, as called for on the Drawings and as specified herein.

END OF SECTION

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 WORK INCLUDED

A. Work of this Section includes all labor, materials, equipment and services necessary to complete the Trenching and Backfilling as shown on the drawings and specified herein, including, but not limited to, the following:

1. All necessary backfill and compaction, including furnishing additional suitable backfill material as required for trench backfilling.

2. Sheeting, shoring and bracing.

3. Dewatering of trenches.

1.03 RELATED WORK

A. Division 31 Earthwork

B. Division 31 Soil Erosion and Sediment Control

1.04 QUALITY ASSURANCE

A. Quality Assurances indicated in Section 31 20 00 of these Project Specifications shall apply to this Section.

1.05 REFERENCES

ASTM C136	Sieve Analysis of Fine and Course Aggregates
ASTM D1556	Density of Soil in Place by Sand-Cone Method
ASTM D1557	Laboratory Compaction of Soil Using Modified Effort
ASTM D2922	Density of Soil in Place by Nuclear Methods
ASTM D3017	Water Content of Soil in Place by Nuclear Methods
OSHA	Occupational Safety and Health Administration

1.06 SUBMITTALS

A. Submit copies of material gradation for the aggregate bedding material for review and approval prior to any materials being delivered to the site.

PART 2.00 - PRODUCTS

2.01 MATERIALS DEFINITIONS

A. Standard Backfill - Onsite material approved by the Geotechnical Engineer. Should there be a deficiency of proper onsite material for backfilling, the Contractor shall furnish additional proper backfill material, at no additional cost to the Owner.

B. Select Granular Backfill - Soil material which meets the requirements of Section 203-2.02.C of the NYSDOT Specifications.

C. All backfill material shall be free from large stones (3 inches or larger), clods, topsoil, sod, frozen earth, wood or any other objectionable material.

D. Unless otherwise specified, Standard Backfill shall be used.

2.02 BORROW:

A. Obtain borrow materials from sources outside the project site, at the Contractor’s option. Materials shall conform to the requirements for fill and backfill. Fill supplied by the Contractor from an offsite source shall be granular fill, free of organic or other deleterious material with a maximum particle size of 3 inches, with less the 15% passing the No. 200 sieve.

B. This borrow material shall meet with the approval of the Owner and/or Geotechnical Engineer and shall generally be consistent with onsite material approved for fill areas.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions where Trench Excavation and Backfill operations are to be performed and notify the Owner's Field Representative of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Owner's Field Representative.

3.02 INSTALLATION

A. General Construction Details

1. Trench excavation shall be performed by the Contractor to conform with the line and grade of the various utilities and the bottom of the foundations and/or footings for subsurface structures as shown on the Drawings and as specified herein.

2. All excavations shall be kept free from water, snow and ice during construction.

3. The Contractor shall be responsible at all times for conducting all operations in a safe and prudent manner so that all workmen and the public will be protected from hazard. The Contractor shall observe all applicable local, State and/or Federal requirements, and he shall obtain all necessary permits and pay all fees, deposits and charges in connection with the acquiring of said permits.

4. All fills shall be constructed to a minimum of two (2) feet above the outside top of the pipe or conduit prior to beginning the Trench Excavation.

B. Trench Excavation

1. General Requirements

(a) The Contractor shall be responsible for the excavation of all materials encountered. There shall be no extra compensation for any excavation regardless of the character or type of subsoils.

2. Method of Trenching

(a) Trenching shall be performed with excavating equipment except in such places where Work performed in this manner will injure trees, buildings, existing utilities or structures, or where the use of equipment is specifically forbidden, in which case hand methods shall be employed.

3. Preparation of Bottom of Trench

(a) The bottom of the trenches shall be prepared to conform to the grade of the pipe and the bottom of the foundation of structures. The bottom of trenches shall be shaped as shown on the Details of the Drawings and recessed for pipe bells. Special precautions shall be exercised to ensure that pipes, when installed, will not rest on rock, masonry or any other materials which would present a nonuniform foundation. Where two or more pipes are to be laid in the same trench, the Contractor will excavate the trench so that all pipes are laid on undisturbed material.

4. Unsuitable Material at Bottom of Trench

(a) When the material at the bottom of a trench is unsuitable, as determined by the Owner's Field Representative and/or Geotechnical Engineer, it shall be removed to such depth as the Owner's Field Representative and/or Geotechnical Engineer may direct and backfilled with suitable granular material obtained from the project excavation, or from borrow excavation if it is not available within the project. Payment for removal and replacement of this unsuitable material shall be made in accordance with the Contract Documents, as hereinafter defined.

5. Excavation Below Required Grade

(a) Excavation carried below the required level without authorization by Geotechnical Engineer and/or Owner's Field Representative shall be backfilled at the Contractor's expense with granular material as approved by the Owner's Field Representative. Compaction of backfill material shall be as specified elsewhere herein.

6. Excavation in Paved Areas

(a) When excavations are to be made in paved surfaces, the paved surfaces shall be line-cut one (1) foot beyond each side of the trench and ahead of the excavation by means of pneumatic tools, saw cutting or other approved tools to provide a clean, uniform edge, with minimum disturbance of remaining pavements. The pavements so removed shall not be used for trench backfill but shall be disposed of as approved by the Owner's Field Representative.

7. Surplus Excavated Material

(a) Excavated material not required for fill or backfill shall be disposed of by the Contractor as approved by the Owner's Field Representative. In general, suitable surplus excavated material may be used as embankment. Unsuitable surplus material shall be disposed of in accordance with the approval of the Owner's Field Representative and/or the Geotechnical Engineer.

C. Additional Trench Excavation

1. Authorized Changes and/or Alterations

(a) The Site Engineer and/or Owner's Field representative may, as a result of unforeseen conditions arising during the progress of the work, order the grade or location of any pipe or other structure, changed from that established on the Drawings or previously designated in the field, or may order the removal of unsuitable material from the bottom of any trench.

2. Additional Payment to Contractor

(a) Should such changes or alterations result in an addition to the quantity of earth trench excavation, this additional earth excavation shall be considered as "Extra Work" and payment for same shall be made to the Contractor in accordance with the Contract Documents.

3. Credit to Owner

(a) Should such changes or alterations result in a reduction in the quantity of earth excavation, then a credit to the Owner for the reduction in the amount of earth trench excavation occasioned by such change shall be made in accordance with the Contract Documents.

4. Method of Measurement

(a) The quantity of additional earth excavation in trench measured for payment to the Contractor or reduction of earth excavation in trench measured for credit to the Owner shall be determined by plotting the profile of the bottom of the trench as indicated on the Drawings and the final location of pipe and/or structure(s). The amount of earth excavation computed as payment or credit shall be the volume measured between these limits using a constant width of trench equal to the outside pipe diameter, plus two (2) feet for pipe and one (1) foot outside of walls for structure(s). The depth of the excavation shall be limited to the lesser of the subgrade elevation or two (2) feet above the outside top of pipe in embankments, as shown on the Details of the Drawings.

D. Backfilling

1. General Requirements

(a) Approval by the Engineer upon completion of proper inspection and tests, shall be given to the Contractor prior backfilling of pipes and/or structures.

(b) Excavations shall be backfilled using the backfill material as defined in Section 2.01A of this Project Specification.

2. Placement and Compaction

(a) Backfill for pipe and ducts shall be placed evenly and carefully around and over the pipe in six (6) inch maximum layers. Each layer shall be thoroughly and carefully rammed until one (1) foot of cover exists over the pipe. The remainder of the backfill shall then be placed and compacted in maximum one (1) foot layers. Each layer shall be compacted by approved mechanical tamping machines to a density equal to that of adjacent original material, but not less than 95% of the maximum dry density as defined by ASTM D-1557, latest issue for that soil.

(b) Backfill shall proceed to the lines and grades as shown on the Drawings and/or as approved by the Owner's Field Representative. Backfill areas which settle shall be corrected to the satisfaction of the Owner's Field Representative at the Contractor's expense.

3. Plastic pipe

(a) Pipe shall be supported on a minimum of four (4) inches of compacted screened gravel, or as directed by the Owner's Field Representative. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Screened gravel shall be well graded in size from 3/8 inch to 3/4 inch or such other sized as may be approved. The gravel shall consist of clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter and free from an excess of soft, thin elongated, laminated or disintegrated pieces. The screened gravel shall be spread in layers of uniform thickness and

shall be compacted to a minimum density of ninety-five (95) percent of the maximum density of the soil as determined by the Standard Proctor Test (AASHTO Designation T-99).

(b) After each pipe has been properly bedded, enough screened gravel shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes, provided for jointing, shall be filled with screened gravel and compacted, and then screened gravel shall be placed and compacted to a minimum of six (6) inches over the top of the pipe to complete the pipe bedding.

4. Removal of Sheeting

(a) During backfill operations, sheeting which is to be removed shall at no time extend into the backfill which is being compacted. The sheeting shall be withdrawn so as to always be above the backfill.

5. Protection

(a) The Contractor shall be responsible for safeguarding all pipes and structures being backfilled, as any damage occurring to same either during the backfilling operations or after the backfilling operations have been completed shall be corrected to the satisfaction of the Owner's Field Representative at the Contractor's expense.

(b) The Contractor shall place six (6) inch wide red plastic tape above all underground utility lines where accidental rupture would be potentially hazardous. The tape shall be buried six to eight inches below grade directly above the utility line surface.

E. Sheeting, Shoring and Bracing

1. General Requirements

(a) At his own expense, the Contractor shall furnish, install and maintain such sheeting, shoring, bracing and cofferdamming, etc., as may be needed to support the sides and roofs of excavations and to prevent any earth or rock movements which might in any way diminish or affect the necessary width of the excavation, endanger the safety of persons, injure or delay the work, or jeopardize the safety of adjacent pavements, property, buildings or other structures. The Work of sheeting, shoring and bracing shall, at all times, be in accordance with the requirements of all authorities having jurisdiction.

2. Contractor to be Solely Responsible

(a) The Contractor shall be entirely and solely responsible for the adequacy and sufficiency of all supports and of all sheeting, bracing, shoring cofferdamming, etc. The Contractor shall assume entire and sole liability for damages on account of injury to persons, adjacent pavements, and public and private

property including, but not limited to, the Work under construction, buildings and other structures, which injury shall result directly or indirectly from Contractor's failure to install or to leave in place adequate and sufficient supports, sheeting, bracing, shoring, cofferdamming, etc.

F. Disposal of Water

1. General Requirements

(a) The Contractor shall remove, by pumping or other means approved by the Owner's Field Representative, any surface or groundwater which may accumulate in excavations, and shall at all times keep excavations free from water while Work is being performed. If the bearing soils are disturbed by water seepage, the Contractor shall use a predrainage system (wells or wellpoints) to lower the water table.

2. Method of Disposal

(a) The water from the excavations shall be disposed of in such a manner as will not cause injury to the public health, degrade the water quality of nearby streams or rivers, or damage the work contemplated or in progress, surfaces of the streets, nor cause any interference with the use of the same. The disposal of this water shall be performed in a manner satisfactory to the Owner's Field Representative and authorities having jurisdiction.

3. Erosion Control

(a) The Contractor is advised that all operations must conform to Section 31 21 30 of these Project Specifications dealing with Soil Erosion and Sediment Controls.

4. Protection of Masonry

(a) Newly laid masonry shall be protected from damage resulting from dewatering operations by the use of canvas or other methods as may be approved. No water shall be allowed to pass through masonry or pipes without the approval of the Owner's Field Representative.

END OF SECTION

SECTION 31 25 00
EROSION & SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.01 SCOPE

A. Temporary and permanent storm water pollution protection, sediment and erosion control measures.

B. Slope protection systems.

A. To prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards and traffic safety problems.

B. Compliance with New York State Storm Water Management Program as administered by the New York State Department of Environmental Conservation.

C. Compliance with the Storm Water Pollution Protection Plan.

D. Compliance with *New York State Department of Environmental Conservation SPDES General Permit for Storm Water Discharges from Construction Activity – Permit No. GP-0-20-001.*

1.02 SITE REQUIREMENTS

A. The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract.

1.03 REFERENCE STANDARDS

A. New York Guidelines for Urban Erosion and Sediment Control, latest edition.

B. Storm Water Pollution Prevention Plan, narrative report and plans for project (SWPPP).

C. SPDES General Permit for Storm Water Discharges from Construction Activity; Permit No. GP-0-20-001; Expiration January 28, 2025.

PART 2 – PRODUCTS & MATERIALS

2.01 PRODUCTS & MATERIALS

A. Quick growing grasses such as wheat, rye or oats.

B. Straw bales: Standard rectangular hay bales bound by bailing wire.

C. Silt Fence: Lundin “Silt Buster”, Mirafi “Envirofence”, or approved equal.

D. Curlex blankets by American Excelsior Company or approved equal.

E. Bale stakes for each bale shall be a minimum of 4 feet in length and shall be either two (2) #5 reinforcing bars, or two (2) 2”x2” timber stakes driven 1’-6” to 2’-0” into ground.

F. Temporary mulches such as loose straw, netting, wood cellulose or agricultural silage.

G. Fence stakes shall be metal stakes a minimum of 6 feet in length. Stakes shall be driven at least 2’-0” into the ground.

H. Rip Rap.

I. Dust control measures.

J. Spray adhesives such as acrylic polymer, latex emulsion, or resin in water.

K. Water sprinkling.

L. The use of stone for stabilized construction roads and entrances.

M. Jute mesh.

N. Bio-Bags: Bio-filter bags shall be clean 100 percent recycled wood product waste. Size of bag shall be 18x8x30 inches and weigh approximately 45 pounds, and made of ½-inch plastic mesh.

PART 3 - EXECUTION

3.01 PREPARATION & QUALITY CONTROL

A. Review site conditions throughout duration of project.

B. Monitor, modify and update ongoing erosion protection measures.

C. Maintain SWPPP on site in accordance with provision of the New York State Stormwater Management Program as administered by the New York State Department of Environmental Conservation.

D. All required modifications to the SWPPP must be completed within seven (7) days of notification.

3.02 EROSION CONTROL & SLOPE PROTECTION

A. General:

1. Contractor shall keep disturbed areas to a minimum required to adequately perform the work. At all times the Contractor shall maintain the site in such a manner that minimizes erosion of the site. Place erosion control systems in accordance with sound judgment and good construction practice or as ordered by the Town.

2. The Owner has the authority to limit the surface area of erodable earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the contractor to provide immediate permanent or temporary pollution control measures. The contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.

3. The temporary erosion control systems installed by the Contractor shall be maintained as directed by the Owner to control siltation at all times during the life of the contract. The contractor must respond to any maintenance or additional work ordered by the Owner within a 48-hour period.

4. Slopes that erode easily shall be temporary seeded as the work progresses with a wheat, rye, oats application, or as otherwise ordered by Engineer.

B. FILL AND CUT SLOPES:

1. Fill slopes in all cases shall be no steeper than 3:1 unless specifically stated on the plans or approved by the Owners' soil's engineer.

2. When cut slopes exceed 2:1 for depths over 3-feet, proper bracing and shoring per OSHA requirements shall be used and maintained.

C. EROSION CONTROL BARRIERS:

1. Erosion control barriers shall be installed around the perimeter of the site prior to the start of work.

2. The barriers shall be silt fence, straw bales, or bio bags placed as shown on the drawings and details.

3. Barriers shall be maintained in good working condition and replaced when damaged.

4. Straw bales shall be placed at all catch basins and drainage inlets where site drainage is directed.

END OF SECTION 31 25 00

SECTION 31 50 00
EXCAVATION SUPPORT & PROTECTION

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, but is not limited to:

1. Temporary sheeting whenever an excavation exceeds five (5’-0”) feet in depth and the side slopes are not laid back to a safe gradient as set forth in Title 29 Code of Federal Regulations, Part 1926, Safety and Health Regulation for Construction (OSHA).

B. Related Sections include the following:

1. Division 31, Section “Earthwork.”

2. Division 31, Section “Trenching and Backfilling.”

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalks and of resisting soil and hydrostatic pressure and superimposed and construction loads when an excavation exceeds five (5’-0”) feet in depth and on the side slopes are not laid back to a safe gradient as set forth in Title 29 Code of Federal Regulations, Part 1926, Safety and Health Regulation for Construction (OSHA).

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.

2. Prevent surface water from entering excavations by grading, dikes, or other means.

3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For Installer and professional engineer.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, or the performance of excavation support and protection systems.

1.5 PROJECT CONDITIONS

A. Acquaintance with Existing Site Conditions

1. See Sections 02 31 00 and 31 20 00.

B. Subsurface Conditions

1. See Sections 02 41 10 and 31 10 00.

C. Existing Utilities and Services

1. See Sections 02 31 00 and 31 20 00.

D. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly reserve benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Construction Manager if changes in elevations or positions occur of if cracks, sags, or other damage is evident in adjacent construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

1. Timber sheeting shall consist of structurally sound hardwood at least two inches by six inches in size or of lumber of equivalent strength. The actual thickness of such timber sheeting shall be consistent with the size of the supporting timbers and the depth of the excavation.

2. Metal, steel aluminum or combinations of steel, aluminum and timber bracing systems of equivalent strength and capacity may be used in place of timber bracing systems.

3. Cast-In-Place Concrete: ACI 301, of comprehensive strength required for application.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 GENERAL

A. Inspect site, examine existing conditions and make all necessary preparations for the safe and proper sequence of work.

B. Properly guard and protect excavations so as to prevent them from becoming dangerous to person or property.

C. Properly slope sides of excavation or provide shoring, sheeting and bracing to prevent caving, erosion, or gullying of sides of excavations.

D. Brace, shore, and protect existing structures when excavations are made adjacent to the existing structures or within a distance that they will be affected by the excavation. Underpin adjacent structures when excavations are carried to a depth that will require it by the applicable Building Code or when indicated on Contract Drawings.

E. Maintain sides and slope of excavation in safe condition until backfilling or other work is complete. Maintain shoring and bracing in place until the completion of work.

3.3 INSPECTION AND CODE REQUIREMENTS

A. Sheet piling, shoring, and underpinning for protection of excavations and protection of adjacent structures and the public is the responsibility of the Contractor and shall comply with the requirements of the applicable Building Code.

B. The most stringent requirements of the Building Code, Contract Drawings, Specifications, or any authorities having jurisdiction shall govern this Work.

C. Coordinate Work of this Section with Work of all other Divisions so as to properly, and completely, install all Work as drawn or specified.

D. Engage a Professional Engineer licensed in the State of New York to prepare details of underpinning, cofferdams, caissons, bracing, and other construction required for protection of excavations and support of adjacent properties or buildings. These drawings shall be submitted to the Owner’s Representative for general review, which does not relieve the Contractor's Engineer of responsibility for the adequacy of the design.

E. At the conclusion of the work all temporary sheet piling and support systems shall be removed by the Contractor.

3.4 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches (1200mm) below overlying construction and abandon remainder.

2. Repair or replace, as approved by Construction Manager, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION

SECTION 32 12 16

ASPHALT

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

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

1.01 GENERAL REQUIREMENTS

A. Work of this section shall be governed by the contract documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

B. Work shall include, but not be limited to:

1. Installation of all pavements consisting of base, bituminous concrete intermediate and surface courses, and including all associated items and operations necessary and required to complete the pavement installation.

2. Preparation of sub-grade to include fine grading, compaction and proof-rolling.

3. All necessary and required line cutting of existing pavements.

4. All formwork, finishing, curing and testing necessary and required for the installation of pavements, including:
   a. Parking Lots
   b. Paths

1.03 DESCRIPTION

A. Related Work Specified Elsewhere:

1. Division 31: Site Demolition, Clearing and Preparation

2. Division 31: Earthwork

3. Division 31: Trenching and Backfilling

B. Description of the Asphalt Paving (depth of the different courses shall conform with the drawings).

1. Compacted sub-grade.

2. Bituminous bond base course.

3. Tack coat.

4. Asphaltic wearing course.

5. Sealer.

6. Painted lines and symbols.

7. Asphalt curbs.

8. Repair and saw cutting of existing paving.

1.04 SUBMITTALS

A. Submit three (3) each of the following to Architect for review prior to delivery and installation.

1. Notarized certificates of materials.

2. Submit complete materials list of items proposed for the work. Identify materials source.

1.05 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:

1. American Society for Testing and Materials, (ASTM).

2. American Association of State and Highway and Transportation Officials, (AASHTO).

3. Asphalt Institute, (AI).

4. National Crushed Stone Association, (NCSA).

B. Provide material furnished by a bulk ashpaltic concrete producer regularly engaged in the production of hot-mix, hot-laid asphaltic concrete paving materials.

C. Tolerances:
1. In-place compacted thickness:
   a. Base course: Maximum 1/2" plus, minus 0".
   b. Surface course: Maximum 1/4" plus, minus 0".
2. Finished surface smoothness:
   a. Base course: Maximum 3/8" in 10'-0".
   b. Surface course: Maximum 1/4" in 10'-0", any direction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery manufactured products in manufacturer's original, unopened, and undamaged containers with labels intact and legible.

B. Store and handle manufactured products to prevent damage and deterioration.

C. Shipments of material shall be made in tight vehicles previously cleaned of all foreign material and delivered to the work so that it will not become contaminated in any way.

1.07 PROJECT CONDITIONS

A. Weather limitations:

1. Do not install base course materials over wet or frozen subgrade surfaces.

2. Do not apply prime and tack coat materials when temperature is 50 degrees F. or below. Do not apply to wet base surfaces.

3. Install asphalt surface materials only when base is dry and air temperature is 40 degrees F. or above.

B. Grade control: Match and maintain the existing lines and grades, including crown, inverted crown and cross-slopes, for each course during paving operations.

C. Painting: All contact surfaces manholes, etc., shall before the surface mixture is laid be painted with hot asphaltic cement.

D. Placing: Except where the mixture is spread and finished by approved mechanical equipment the mixture, upon arrival at the site shall be dumped on steel dump boards, and spread and screened to leave the required amount of material so that after compression the course will be of the thickness shown on the plans.

Mixture shall be laid only where the surface to be covered is free from loose or foreign material, dry and only when weather conditions are suitable. (Asphaltic pavement shall not be applied when temperature is 40 degrees Fahrenheit or below.)

The contractor shall provide suitable means for keeping all small tools clean and free from bituminous accumulation. The contractor shall provide and have ready for use at all times sufficient tarpaulins or covers as may be directed by the Architect for use in any emergency such as rain, chilling winds, or unavoidable delay, for the purpose of covering or protecting any material that may be dumped but not spread.

E. Provide temporary barricades and warning lights as required for protection of project work and public safety.

F. Protect adjacent work from damage, soiling and staining during paving operations.

PART 2 - PRODUCTS

2.01 BASE COURSE

A. A gravel base course to be NYSDOT Item 304.05, Type 4.

2.02 ASPHALTIC CONCRETE

A. The asphalt pavement shall consist of a binder course and a top course to the dimensions as shown on the plans and details. The binder course for all asphalt surfaces shall be asphalt concrete, Type 3 as defined herein and by the N.Y.S. D.O.T. Standard Specifications. The top course(s) for all pedestrian pathways and/or play surfaces shall be Type 7F as defined herin and by the N.Y.S. D.O.T. Standard Specifications and Type 6F as defined herein by the N.Y.S. D.O.T. Standard Specifications for all roadway and vehicular parking surfaces.

B. The following requirements shall apply for both Binder Course and Top Course:

1. Asphalt Cement shall be 100% soluble in Trichloroethylene. The mixing and placing temperature shall be 250 degrees to 325 degrees F. The viscosity of the asphalt shall be AC 20.

2. The mix shall have a minimum Marshall Stability of 500 lbs, flow of 8 to 16, and percent of air voids 3 to 5 percent. For full depth asphalt pavement (top and base courses) and the base course (only) for tennis courts, the asphalt mix may contain a maximum of 15% by weight of Recycled Asphalt Pavement (R.A.P.) material. The R.A.P. shall be certified by the inspection service before use and shall be free of dirt, debris, garbage, metal, glass and any other deleterious material. R.A.P. shall be tested by an approved laboratory for (%) percent asphalt cement before mixing. R.A.P. shall be screened prior to mixing so that final mix meets the specification delineated below. The City reserves the right to reject the R.A.P. asphalt mix if in the determination of the Engineer, the mix is contaminated with dirt, debris, garbage, metal, or glass. R.A.P. is not acceptable for the top courses of asphalt pavement for tennis courts. R.A.P. shall comply with N.Y.S. D.O.T. Section 703-09 “Reclaimed Asphalt”.

C. Binder Course: The material for the binder course shall meet the requirements of the latest edition of the N.Y.S. Department of Transportation Standard Specification Section 400 "Bituminous Pavements". Composition of the asphalt concrete binder shall be Type 3 as indicated in the following table:

COMPOSITION OF BINDER TYPE 3

SCREEN SIZE	GENERAL LIMITS % PASSING	JOB MIX TOL. %
1 1/2"	100	---
1"	95-100	---
1/2"	70-90	+/-6
1/4"	48-74	+/-7
1/8"	32-62	+/-7
No. 20	15-39	+/-7
No. 40	8-27	+/-7
No. 80	4-16	+/-4
No. 200	2-8	+/-2
Asphalt Content, %	4.5-6.5	+/-0.4

D. Top Course: The material for the top course shall be a fine asphaltic concrete mixture and shall meet the requirements of the latest edition of the NYS DOT Standard Specifications Section 400 "Bituminous Pavements".

1. Asphaltic cement shall be of one grade and of the penetration specified.

2. Asphaltic cement shall be either fluxed natural asphalt or residual asphalt derived from the distillation of asphaltic petroleum.

3. Asphaltic cement shall be homogeneous and free from water, shall not foam when heated to 347 degrees F., and shall comply with the following requirements.

4. If the asphaltic cement contains natural mineral matter, the penetration limits as indicated above for 77 degrees F. shall be reduced at the rate of 5 for each 15 per cent of such mineral matter present.

5. Loss on heating - at 325 degrees F. in 5 hours - 1.0 percent maximum penetration of residue at 77 degrees F. - not less than 75 percent of original penetration.

6. Composition of the asphalt concrete top course shall be Type 7F or 6F as indicated in the following tables:

COMPOSITION OF TOP COURSE- TYPE 6F

SCREEN SIZE	GENERAL LIMITS % PASSING	JOB MIX TOL %
1”	100	-
1/2"	95-100	-
1/4"	65-85	+/-7
1/8"	36-65	+/-7
No. 20	15-39	+/-7
No. 40	8-27	+/-7
No. 80	4-16	+/-4
No. 200	2-6	+/-2
Asphalt Content %	5.8-7.0 (+/-.4)	

COMPOSITION OF TOP COURSE- TYPE 7F

SCREEN SIZE	GENERAL LIMITS % PASSING	JOB MIX TOL %
1/2"	100	-
1/4"	90-100	-
1/8"	45-70	+/-6
No. 20	15-40	+/-7
No. 40	8-27	+/-7
No. 80	4-16	+/-4
No. 200	2-6	+/-2
Asphalt Content %	6.0-8.0 (+/-.4)	

E. Sand: Sand shall be natural sand, consisting of hard durable, angular, rough-surfaced material particles passing the following sieve analysis:

Total Passing - Percent by Weight

Sieve Number	Sand
3/8 inch	
No. 4	100
No. 8	85-100
No. 16	45-85
No. 50	10-30
No. 100	2-10

F. Aggregate: Aggregate shall be broken stone or gravel moderately resistant to abrasion, and shall comply with the following sieve analysis. Aggregate shall comply with N.Y.S.D.O.T. standards, see Section 304.1.

G. Mineral Dust: Mineral dust shall be limestone or other approved dust. It shall be thoroughly dry when delivered and shall contain not more than 50% free silicon dioxide and conform to the following requirements:

Dust shall have a record of satisfactory performance in pavements for not less than three (3) years.

It shall be uniform in quality, satisfactorily reduce voids, produce density, stability and durability in the pavement according to tests as described in Asphalt Institute Research Bulletin No. 1, and any other tests approved by the municipal engineer. The use of dusts of a siliceous nature shall conform with the requirements of Industrial Bulletin No. 33 of the New York State Department of Labor, Board of Standards and Appeals.

Mineral dust shall comply with the following sieve analysis:

Passing No. 30 sieve	100%
Passing No. 200 sieve	70% - 100%

2.03 SEALER AND PAINT

A. Sealer Coat: "Pavement Sealer" conforming to Fed. Spec. R-P-355d.

B. Paint for parking space lines shall be a white paint for regular parking spaces, yellow for fire lane and blue for handicapped parking spaces. All paint shall be acrylic base paint formulated especially for this purpose.

2.04 EQUIPMENT

A. Paving equipment: spreading, self-propelled asphalt paving machines capable of maintaining line, grade and thickness shown.

B. Compacting equipment: self-propelled rollers, minimum 10 ton weight.

C. Hand tools: rakes, shovels, tampers and other miscellaneous equipment required to complete the work.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect surfaces of compacted sub-grades prior to installation of materials to assure that these surfaces have been properly prepared to receive asphalt paving.

B. Verify finished elevations, and perimeter conditions. Where concrete or other vertical material is not present at the paving edges, provide other means to contain the asphaltic paving to the limits indicated.

C. Check on catch basins, drains, and other surface items, and be sure they are fixed and properly located.

D. Remove debris and rubbish completely from the compacted sub-grade prior to installation.

E. Start of the work of this section shall imply that the contract surfaces have been inspected and have been found adequate, or corrective measures have made them adequate, for the asphaltic paving specified herein.

3.02 PREPARATION

A. Field verify extent and location of paving scheduled. The work includes:

1. Paving of access road, parking lot and pedestrian paths.

B. The Contractor shall install all on-site pavements as specified in the locations and to the grades as shown on the drawings and/or as directed by the Architect. Materials, methods of construction and type and thickness of pavement courses shall be as shown on the drawings and as specified herein.

C. The Contractor will be responsible for laying out and installing all pavements to the proper cross sections and in accordance with the lines and grades as specified herein and, on the drawings, and/or in accordance with the directions of the Architect and/or site engineer. Pavements which are not constructed to the proper section, grade and alignment shall be corrected by repair and/or replacement by the Contractor in accordance with the Architect and/or Site Engineer's directions and at no additional cost to the Owner.

D. Thoroughly clean and prepare the base course prior to application of the wearing surfaces.

E. Do required cutting out of soft spots and repair as required to provide a satisfactory installation.

F. Obtain and pay for required approvals and permits.

G. All materials plant mixed ready for use at site.

H. Formulate asphaltic paving materials in strict accordance with the recommendations and procedures of the Asphalt Institute Applicable Specification and Manual Series publications

(latest editions) are hereby made a part of this specification, and Construction Leaflet No. CL-12.

I. Execute the work using skilled workmen and the proper equipment as recommended by the Asphalt Institute.

J. Mix asphaltic materials and formulate in a plant specifically designed for that purpose. Materials, plant-mixed and delivered to the job site ready for installation.

K. Coordinate junction of new and existing pavement. Saw cut existing pavement to provide a uniform straight-line transition. Meet existing surface levels and maintain drainage slopes. Feathering of transitions is not acceptable.

L. Asphalt Replacement

All saw cutting shall be done to accurate, neat and straight lines. Pavements and curbs shall be marked before cutting, with approved power saws specifically designed and manufactured for such purpose. Workmen shall wear necessary safety clothing and eye protection while operating saw cutting equipment and shall be thoroughly familiar in the safe operation of the equipment.

3.03 PREPARATION OF SUBGRADE

A. General Requirements - Prior to the start of paving operations, the subgrade surface shall be prepared by filling in wheel ruts, erosions and all other ground disturbances regardless of cause, and the ground surface shall be fine graded so that after compaction the subgrade surface will be at the proper elevation (+ or - .05') to accommodate the pavement structure.

B. Fine Grading - Fine grading of the subgrade shall be performed in section, working the equipment perpendicular to the contours and constructing the respective valleys and ridges in accordance with the drawings. Particular care shall be exercised with the grades of the valleys which lead to the catch basins. Fine grading shall not be done when the ground is excessively wet or frozen.

C. Compaction - Fine grading of the subgrade shall be accompanied by proper compaction to the extent that the upper twelve (12) inches of subgrade shall have a density not less than that as specified under the Section 31 20 00. Compaction shall be done by means of a roller weighing not less than ten (10) tons or other compaction equipment satisfactory to the Soils Engineer and/or the Architect.

D. Proof-rolling - Immediately prior to the start of paving operations, the contractor shall proof-roll the subgrade in the presence of the Architect and/or Owner's Field Representative. If, in their opinion the subgrade is not suitable for support of the pavement structure, measures shall be taken by the Contractor to correct the subgrade deficiencies to the satisfaction of the Architect and/or Owner's Field Representative at no cost to the Owner.

E. Subgrade Approval - The Architect and/or Owner's Field Representative must approve the subgrade prior to placement of the initial pavement course. Installation of all or any portion of the pavement without subgrade approval by the Architect and/or Owner's Field Representative is done at the Contractor's risk.

F. Protection of Approved Subgrade - Approval of the subgrade by the Architect and/or Owner's Representative shall not relieve the Contractor of his responsibility to protect the subgrade from damage caused from excessive moisture, rutting from trucks or heavy equipment or from any other cause, and any damage occurring to the subgrade either before or during the paving operations shall be corrected to the satisfaction of the Architect and/or the Owner's Field Representative at the Contractor's expense.

3.04 INSTALLATION: GENERAL

A. Comply with Asphalt Institute (AI) MS-3 Asphalt Plant Manual for material storage, control and mixing, and for plant equipment and operation.

B. Transport asphaltic concrete mixtures form the mixing plant to the project site in trucks with tight, clean compartments.

C. Thoroughly clean existing pavement surfaces by air blowing, brooming or vacuuming before starting repair or resurfacing operations.

D. Place engineered fill in layers not to exceed 12" in loose thickness with each layer compacted to 95% of the maximum dry density in accordance with ASTM D698 Standard Proctor Method or as specified by the Soils Engineer.

E. Install base material as specified herein.

F. Install prime coat or tack coat as applicable and specified herein.

G. Install leveling and surface courses as specified herein.

3.05 INSTALLATION: BASE MATERIALS

A. Install gravel base course (NYSDOT Item 304.5, Type 4) over properly prepared subgrade. Compacted thickness to be as shown on the drawings. The base course material shall be compacted by rolling with a powered steel tandem roller weighing not less than eight (8) not more than ten (10) ton or by other approved equipment producing an equivalent density.

3.06 INSTALLATION: SURFACE MATERIALS

A. Remove loose and foreign material from compacted base immediately before application of surface materials. Do not start surface work until all other work which may damage the finish surface is completed.

B. Apply prime coat uniformly to aggregate base at the rate of 0.15 to 0.25 gal. per sq. yd. Allow to dry and cure as required.

C. Install asphalt surface materials in two courses, leveling course and surface course, total compacted depth as scheduled.

D. Place, spread and strike off the asphalt concrete mixture on a properly prepared and conditioned surface. Inaccessible and small areas may be placed by hand. Place each course to the required grade, cross-section and scheduled compacted thickness.

E. Apply tack coat to contact surfaces of existing pavement, curbs and structures abutting pavement.

F. Begin rolling operations when the asphalt concrete mixture will bear the weight of the roller without excessive displacement. Compact areas inaccessible to rollers with vibrating plate compactors.

G. Perform breakdown, second and finish rolling until the asphalt concrete mixture has been compacted to the required surface density and smoothness. Continue rolling until all roller marks are eliminated. Provide a smooth compacted surface true to thickness and elevations required.

H. After final rolling, do not permit vehicular traffic on the pavement until it has cooled and hardened, and in no case sooner than 8 hours.

I. Protect newly placed material from traffic by barricades or other suitable methods acceptable to the Landscape Architect.

3.07 INSTALLATION: PAVING RESURFACING

A. Obtain inspection and approval of surfaces by the Architect prior to installing paving.

B. Install sealer as described for asphaltic paving, filling all cracks.

C. Level all voids and low spots.

D. Install prime coat or tack coat as applicable and as described for asphaltic paving.

E. Install leveling and surface courses as described for asphaltic paving.

3.08 PAINTED LINES

A. Paint pavement lines and numbers on the finished pavement to mark off each parking space.

B. The paint, a well ground, uniform mixture of good brushing consistency which shall thoroughly dry and free from tackiness within one hour after application.

C. Traffic marking paint: a fast-drying medium oil alkyd series B46 manufactured by Sherwin-Williams or an equal approved by the Architect in white or yellow plus handicapped markings.

D. The surface of pavement, thoroughly clean and perfectly dry at the time the paint is applied. The lines, uniform and applied by hand and/or machine. Use templates to define width when the stripes are painted by hand. The stripes shall be 4" wide. Numbers as selected by Owner 6" high x 1" wide.

E. Erect suitable barriers to prevent tracking of the paint until it has thoroughly dried. Before the final acceptance of the work, retouch or repaint markings which have become discolored or worn out, due to defective materials or construction traffic.

3.09 PROTECTION

A. Protect paving from damage due to construction and vehicular traffic until final acceptance.

3.10 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess material, debris and equipment. Repair damage resulting from paving operations.

B. Sweep pavement and wash free of stains, discoloration, dirt and other foreign material immediately prior to final acceptance.

3.11 GUARANTEE AND MAINTENANCE

A. The Contractor shall guarantee all pavement installation, including materials and workmanship for a period of one year from the date of acceptance.

END OF SECTION

SECTION 32 13 73
SITE WORK JOINT SEALANTS

PART 1 GENERAL

1.0 RELATED DOCUMENTS

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

1.1 SUMMARY

A. This Section includes, but is not limited to:
   1. Expansion and contraction joints within curbs, stairs, paving, granite bands and walls.

B. Related Sections include the following:

   1. Division 3, Section “Site Concrete”.

   2. Division 32, Section “Unit Pavers”.

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Approval: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- (13-mm-) wide joints formed between two 6-inch-(150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

D. LEED Submittals: provide submittals as listed and/or enumerated in division 1 of these specifications.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than that allowed by joint sealant manufacturer for application indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 PRODUCTS

2.0 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Match approved samples.

2.1 COLD-APPLIED JOINT SEALANTS

A. Products: Multicomponent Jet-Fuel-Resistant Sealant for Concrete.

B. Subject to compliance with requirements, provide one of the following:

1. Sikaflex-2CNS: Sika Corporation, Lyndhurst, NJ

2. Sonolastic SL2 (slope grade); Sonneborn Building Products Div., ChemRex, Inc.

2.2 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

B. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.3 PRIMERS

A. Primers: Product 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.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Refer to Division 3 Section “03 30 50 Site Concrete” for construction and expansion joint installation.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type 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.

1. Do not leave gaps between ends of backer materials.

2. Do not stretch, twist, puncture, or tear backer materials.

3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants by proven techniques to 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 provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.

2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period 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 the original work.

END OF SECTION

SECTION 32 16 40
GRANITE (BELGIUM) BLOCK CURB

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work under this Section shall consist of providing all labor, plant, materials and equipment necessary and required to install all of the granite curbs in accordance with the Contract Documents.

Work shall include, but not be limited to:
1. Stone Curb – Granite Block

B. Work shall also include all associated items and operations necessary and required to complete the installations, including but not limited to surface preparation, formwork, finishing and curing.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Asphalt Concrete Pavement: Section 32 12 16

B. Site Concrete: Section 03 30 50

1.03 GENERAL CONDITIONS

A. General Requirements - The Contractor shall install all curbs and sidewalks as specified in the locations and to the lines and grades as shown on the Drawings and/or as directed by the Architect.

B. Contractor's Responsibility - The Contractor shall be responsible for laying out and installing all curbs and sidewalks in accordance with the cross-sections, lines and grades as specified herein and shown on the Drawings and/or in accordance with the directions of the Architect. All curbs and sidewalks which are not constructed to the proper section, grade or alignment shall be corrected by repair or replacement by the Contractor in accordance with the directions of the Architect and at no additional cost to the Owner.

C. Protection from Damage - The Contractor shall protect all curb and sidewalk installation from damage until acceptance of the Work by the Owner. Any damage prior to acceptance of the Work, shall be repaired or replaced by the Contractor, at his expense.

D. Submittals - A sample of the stone to be used for curb shall be submitted to the Architect for his review and approval prior to ordering.

PART 2 – MATERIALS

2.01 MATERIALS

A. Granite Block Curb – stone for curb shall be grey Jumbo Belgium Block, 4” x 8” x 10” thick.

B. Granite Block Curb to be supplied by Masonry Depot, Yonkers, NY. (914)969-777 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Unless otherwise specified, granite block curb shall be set in a continuous concrete foundation as shown in detail on the Drawings. Concrete shall be placed in such a manner that will provide firm and uniform bearing for the full length of the curb. Care shall be taken not to displace the curb during the placement of the concrete.

3.02 JOINTS

A. Individual stone sections shall be fitted so that the width of joints will not exceed 3/4 inch. The joints between individual curb sections shall be fully grouted with a 1:2 cement mortar grout and neatly pointed flush with the curb surface. Grout shall be carefully applied, and extreme care taken so as not to stain the exposed face and top of the curb.

3.03 CLEANING

A. Excess materials shall be cleaned with water immediately as the work progresses. Cleaning the stone shall be done when mortar is fresh and before it hardens.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCE

PART 1 - GENERAL

1.00 GENERAL REQUIREMENTS

A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver, and install all work of this section as shown on the drawings as specified herein, and/or as required by job conditions.

1.01 RELATED DOCUMENTS

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

1.02 SCOPE

A. Work of this section shall include but not be limited to the following:

1. Chain link fences at locations and of height shown on the drawings.

2. Swing gates, sizes as noted, complete with frames and hardware.

1.03 SUBMITTALS

A. Shop Drawings

1. Submit shop drawings to the Architect for review in accordance with the requirements of the Contract Documents.

2. Shop drawings shall include elevations, plans, sections and details with gauges, sizes, dimensions and finishes clearly noted. Anchoring of line posts shall be indicated as well as all other fencing and bracing components.
3. Gates shall be indicated in elevation and all hardware shall be scheduled and clearly noted.

B. Samples:

1. Fabric with vinyl cladding - 6" x 6".

C. Provide submittals as listed and/or enumerated in Division 1 of these specifications.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site, ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name, and manufacturer's name. Delivered materials shall be identical to approved samples and certificates.

B. Store materials under cover in a dry and clean location, off the ground, and remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.

PART 2 - PRODUCTS

2.00 MATERIALS

A. All fittings, hardware and equipment shall be designed to carry one hundred percent (100%) overload.

B. Malleable iron castings shall be powder coated after hot dipped galvanizing in accordance with ASTM Serial Designation: A-153-82.

C. Pressed steel fittings and appurtenances shall be powder coated after hot dipped galvanizing in accordance with ASTM Serial Designation: A-123-89.

D. All fittings, hardware and equipment shall be powder coated of a color to match the framework and shall be of the materials listed in the following schedule:

FENCE/GATE PART	MATERIAL
1. Boulevards, Corner (Split) Fittings and End Fittings	Malleable Iron or Pressed Steel-3/16" thick
2. Post Caps and Post Line Tops	Malleable Iron or Pressed Steel - 3/16" thick
3. Couplings	Galv. Steel Pipe - 1/8" thick with 1/4" Dia. Full Depth Rivet
4. Gate Hinges	Malleable Iron or Pressed Steel-1/4" thick with 1" Dia. Stainless Steel Pin Welded to 1/2" thick Pin Support
5. Bolts and Nuts	Galv. Steel or Stainless Steel as indicated on Plans
6. Tension Bars	1/4" x 3/4" Galv. Steel for 2" and 1-3/4" Mesh, 3/16" x 3/8" Galv. Flat Steel for 1” Mesh
7. Tension Bands	1/8" x 1" Pressed Steel
8. Truss Rods	1/2" Dia. Galv. Steel
9. Truss Tightener	3/8" x 1" Galv. Steel
10. Truss Clamp	1/4" Pressed Steel
11. Locking Device	Outer Housing - Malleable Iron Inner Parts, including Bolt- Stainless Steel, 18-8, 14 gauge
12. Gate Stop	7/16” malleable iron
13. Drive Pins and Set Screws	Stainless Steel, 18-8

E. POSTS AND RAILS: TYPE I - Posts and rails shall be standard weight galvanized steel pipe of the sizes shown on the plans and shall conform to ASTM Serial Designation F-1083 Schedule 40, except for chain link fence posts 20'-0" height, which shall be Schedule 80.Posts and rails shall be hot dip galvanized inside and outside in accordance with ASTM Serial Designation F-1083 or:
For fence up to and including ten (10) feet height, posts and rails may be TYPE II, SS-40 steel tubing as manufactured by Allied Tube and Conduit Corp. of Harvey, Illinois, or approved equal. Tubing must conform to ASTM A-569, cold rolled steel pipe and coated with a minimum of 0.9 ounces of zinc per square foot, a minimum of 15 micrograms of zinc chromate per square inch. Steel pipe supplied under this option shall be of the same outside diameter as Schedule 40 pipe and achieve a minimum yield strength of 50,000 p.s.i.

F. SURFACE COATINGS:

1. All posts, rails and fittings shall be powder coated with either polyvinyl chloride (PVC) or TGIC-Polyester (with the exception of the turnbuckles and threaded ends of the truss rods, both of which shall be sprayed with powder coat touch-up after installation).

2. Galvanizing of all components shall provide an acceptable substrate for applied powder coatings. No lacquer, urethane or other coatings which would prevent proper adhesion of powder coating shall be applied to the pipe.

3. The powder coating shall be applied to the galvanized surfaces in such a manner that the coating will not peel off. Insure surfaces to be coated are clean and dry and free of grease, dust, rust, etc. All coated parts shall first receive phosphating and chromatizing treatments to improve the adhesion of the surface coating. Color to be black unless otherwise indicated on the plans.

4. The entire fence installation shall be coated with one of the two following types of powder coating, (with the exception of gates, all of which shall be TGIC-Polyester and fabric which shall always be PVC). All Fence components shall be coated on all surfaces, of a color to match the framework. All coated surfaces shall comply with the adhesion specifications listed in ASTM F1043.

G. TYPE A - Polyvinyl Chloride Powder Coating: PVC Powder coating shall be applied to the galvanized steel or iron by the fluid bed method to a preheated base which has been cleaned and primed prior to submersion in vinyl, resulting in a firm bond between the PVC and the metal. PVC shall be applied to a film thickness of 10 to 15 mils on framework and fittings, and 7 to 12 mils on fabric without voids, tears or cuts that reveal the substrate and shall thoroughly adhere to the metal without peeling when scratched with a pick device or knife blade point.

H. TYPE B - TGIC-Polyester Powder Coating:

1. TGIC-Polyester Powder shall be applied to the galvanized steel or iron in such a manner that the coating will not peel off. The TGIC-Polyester shall be applied at a film thickness of 3 to 6 mils by electrostatic spray process and bake finished per manufacturer's directions. The TGIC-Polyester shall be applied without voids, tears or cuts that reveal the substrate and shall thoroughly adhere to the metal without peeling when scratched with a pick device or knife blade point.

I. TESTS:

1. Field Test For PVC Powder Coating: As per ASTM F668, three sample sections of the PVC powder coated fence shall be tested for bonding of the powder coat to the metal. Each test will consist of making two cuts parallel to the axis of the pipe or fitting, through the coating, appx. 1/16 inch (1.6 mm) apart, at least 1/2 inch (12.7 mm) long. With a knife peel back a section of the coating between 1/8 inch (3.2 mm) and 1/4 inch (6.4 mm) long to produce a tab. Attempt to remove the 1/16 inch strip of coating by pulling the tab. The fence shall be deemed acceptable if the coating breaks rather than separates from the metal on all three samples.

2. Laboratory Test For TGIC-Polyester Powder Coat: At the discretion of the Engineer, a sample of the TGIC-Polyester powder coated fence shall be laboratory tested for bonding of the powder coating to the metal. Test shall be the Cross Hatch test per ASTM D3359, Method B. Failure to satisfactorily pass this test shall be a basis for rejection.

3. TOUCH-UP & REPAIR: For minor damage caused by installation, transportation, field welding and cutting of metal powder coated surfaces: clean welds, bolted connections, abraded or sawcut areas, then:
    a. On welded and cut surfaces, apply organic zinc repair paint complying with ASTM A780, then repair powder coating per number 2 below. Galvanizing repair paint shall have 65 percent zinc by weight. Thickness of repair paint shall be not less than that required by ASTM A123.
    b. On damaged powder coated surfaces, touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of six feet (6').

J. FABRIC:

1. Fabric shall be hot dip galvanized steel wire mesh as per ASTM A641, with a thermally fused polyvinyl chloride powder coating of 7 to 12 mils thick as per ASTM F668 class 2b. Color to match framework. Fabric shall be produced by methods recognized as good commercial practices. Core wire tensile strength shall be 75,000 psi (517 MPa).

2. Wire used for the manufacture of fabric shall meet the requirements of ASTM F668 and shall be capable of being woven into fabric without the PVC coating cracking or peeling. PVC coating shall be a dense, impervious covering free of voids. Excessive roughness, bubbles, blisters, bruises and flaking will be a basis for rejection. PVC shall be thermally fused. Bonded or extruded and glued surface coating will not be permitted. Fabric shall be stretched to provide a smooth, taut, uniform appearance free from sag.

3. Field Test: PVC coating on fabric shall be field tested for adherence to the metal as outlined elsewhere in this specification.

4. Thickness of Fabric: One (1) Inch Mesh: Uncoated wire dimension shall be .120 inches in diameter (11 gauge). Zinc coating shall be 0.30 ounces per square foot of wire surface.

5. One and Three Quarter (1-3/4) Inch and Two (2) Inch Mesh: Uncoated wire dimension shall be .192 inches in diameter (6 gauge). Zinc coating shall be .3 ounces per square foot of wire surface.
6. Selvages: Fabric shall be barbed at the top and knuckled at the bottom on fences over 6'-0" high. Fabric on fences 4'-0" and 6'-0" shall be knuckled top and bottom. Loops of knuckled fabric shall be closed or nearly closed. The wire ends of barbed selvages shall be twisted in a closed helix of 1- matching turns and cut at an acute angle. The length of the ends beyond the twist shall be at least 1/4 inch long. One (1) inch mesh shall be knuckled both top and bottom.

K. TIES:

1. Tie-wire core thickness shall be 6 gauge (.192") wrought aluminum alloy 1100-H16 wire with an extruded vinyl coating in accordance with ASTM A641 Class 3. PVC shall be applied to a film thickness of 20 to 22 mils. Ties shall be spaced fifteen (15) inches apart on rails and twelve (12) inches apart on posts. The ends of ties shall be wound in a telegraph twist two and one half turns. Color to match mesh. Contractor shall touch-up PVC coating on ties damaged as result of installation.

L. GATES:

1. Gates shall be furnished and installed on reinforced concrete slabs where indicated on the plans or directed by the Engineer. All gates shall be galvanized steel and shall be TGIC-Polyester powder coated after fabrication per requirements for fence framework outlined elsewhere in this specification. Welded joints shall have a suitable rust preventive coating applied to the welds prior to powder coating. Gate fabric shall match line fabric adjacent to gate opening. Gates shall be installed plumb, level and secure for full opening without interference. The hinges shall be so designed to permit the gate to swing a full 180 degrees.

M. Gate Locking Device:

1. This latch shall be a stainless steel drop rod or plunger bar arranged to engage the gate stop. Gate Stop shall be installed as per the plans. Locking device shall be constructed so that the center drop rod or plunger bar cannot be raised when the gate is locked. The locking device bolt hardware shall be tack welded and filed smooth after installation to prevent loosening. The locking device shall have provisions for a padlock. All necessary fittings and gate holders to lock gates in both open and closed positions shall be furnished. The locking device shall be entirely enclosed as shown on the plans or shall be an approved equal locking device.

N. PADLOCK:

1. The Contractor shall furnish one (1) padlock for each single gate and each leaf of double gates. The padlocks shall be American No. 5571 as manufactured by American Lock Co. of Crete, Illinois, or approved equal. All padlocks for the same park facility shall be keyed alike, with two (2) inch width by three-quarter (3/4) inch thick brass body, maximum security, five (5) pin tumblers with hardened alloy steel chrome plated shackle no less than three-eighths (3/8) inch diameter and two (2) inch clearance (elongated shackle). A galvanized steel chain, nine (9) inches long shall be fastened to the gate and body of each lock. The chain shall be five-sixteenths (5/16) inch by one and three-eighths (1-3/8) inch. The Contractor shall furnish two (2) keys for each padlock.

O. BOLT AND HARDWARE INSTALLATION:

1. Nuts and bolts shall be galvanized but not powder coated. Cans of TGIC-Polyester or PVC touch-up powder coating shall be used to paint the nuts and bolts per manufacturer's recommendations. The ends of all bolts shall be peened after tightening.

2. Bolts which are installed six feet (6') or less above grade shall not protrude more than 1/4" beyond the nut after tightening. All rough edges resulting from the cutting of bolts to achieve this requirement shall be filed smooth to the satisfaction of the Engineer. All post caps, corner and end fittings, and gate hinges on all fence elevations are to be secured in place with #14 SS drive screws to the satisfaction of the Engineer.

PART 3 - EXECUTION

3.00 INSPECTION

A. Study the contract drawings and specifications with regard to the work as shown and required under this section so as to insure its completeness.

B. Examine surfaces and conditions to which this work is to be attached and notify the Architect if conditions or surfaces exist with are detrimental to the proper and expeditious

installation of the work. Starting on the work shall imply acceptance of the surfaces and conditions to perform the work as specified.

C. Verify dimensions taken at the job site affecting the work. Bring field dimensions which are at variance to the attention of the Architect. Obtain decision regarding corrective measures before the start of the installation.

D. Cooperate in the coordination and scheduling of the work of this Section with the work of other sections so as not to delay job progress.

3.01 INSTALLATION

A. Installation of fencing and gates specified herein shall be performed by experienced workmen in strict accordance with reviewed shop drawings.

B. Prior to installation of the fence the Contractor shall check the fence layout with the Architect who must approve the layout before any of the work is done.

C. Chain link fence shall be as shown on drawings.

D. All posts shall be set vertical and plumb in concrete foundations of the depth and diameter shown in detail on the drawings. Posts shall be equally spaced along each side with post spacing not greater than ten (10) feet and shall be set to the required grade and alignment.

E. Fabric shall be securely fastened to posts, rails, braces and tension wire by approved method. The fabric shall be secured to all end, corner and gate posts with stretcher bars fastened to the posts and stretcher bands spaced at a maximum of 14 inches in a manner permitting adjustment of fabric tension. Fabric shall be continuous along each stretch of fence.

F. All top rails shall pass through the base of the post caps and shall form a continuous brace from end to end of each stretch of fence. Top rail lengths shall be joined with sleeve couplings with expansion sleeves provided at 100-foot intervals. Top rails shall be securely fastened to end posts by approved rail end connectors. Horizontal braces shall be provided at end and corner panels between line post and each adjacent end, corner, and gate post midway between the top rail and ground as shown in detail on the Drawings. Diagonal truss rod with turn buckle shall also be provided at these locations.

G. Gate(s) and their hardware shall operate smoothly and quietly for use intended and acceptable to the Architect and the Owner.

3.03 PROTECTION AND CLEANING

A. Afford installed work proper and adequate protection. Vinyl coated elements which are damaged, scratched or chipped shall be repaired and/or replaced as directed by the Architect or Owner.

1. Clean surfaces of dirt and grime.

END OF SECTION

SECTION 32 31 19

SITE HANDRAILS & RAILINGS

PART 1 - GENERAL

1.0 GENERAL REQUIREMENTS

A. Work of this Section shall be governed by the contract documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the Drawings, as specified herein, and/or as required by job conditions.

B. The work shall include but not be limited to the following:
1. Handrails, Railings and Panels.

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 PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding structural loads required by ASCE 7 without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, details, and attachments to other Work.

1. For installed railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Paint Substitution: A written request for paint substitution must be submitted to the Architect. The Contractor shall submit this request, along with manufacturer's data sheets for approval, a minimum of two (2) weeks prior to the intended date of paint application. All paint substitutes must be approved in writing prior to use.

B. Provide submittals as listed and/or enumerated in Division 1 of these specifications.

1.4 QUALITY ASSURANCE

A. 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 railings that are similar to those indicated for this Project in material, design, and extent.

B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

1.5 STORAGE

A. Store railings in a dry, well-ventilated, weathertight place.

1.6 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.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 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.

1.8 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.0 SUSTAINABILITY REQUIREMENTS

A. Minimum Recycled Content defined in Section “Sustainable Design Requirements”.

1. Steel Products: 25%.

B. Regional Content defined in Section “Sustainable Design Requirements”. Report Regional Content only. No minimum requirement.

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Custom Fabrication Inc. 2903 NY Route 7 P.O. Box 431 Harpursville, NY 13787 (215)922-4579.

2.2 METALS

A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
1. Handrails, Railings and panels shall have galvanized and powdercoated steel components.

B. Steel: Comply with the following requirements for each form required:
1. Steel Tubing: Cold-formed steel tubing, ASTM A500, Grade A, unless another grade is indicated or required by structural loads.
2. Steel Rails and Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
3. Steel Plates, Channels, Shapes, and Bars: ASTM A 36/A 36M.
4. Welded -Wire Mesh: lockcrimp weave square pattern 2" x 2" wire mesh made from .192 inch (4.9-mm) nominal diameter wire complying with ASTM A510M.
5. Fasteners shall be Type 304 stainless steel and conform to ASTM A307.

C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
1. Provide cast brackets with flange tapped for concealed anchorage to threaded hanger bolt.
2. Provide formed or cast brackets with predrilled hole for exposed bolt anchorage.
3. Provide formed steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
4. Provide brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

2.3 MISCELLANEOUS MATERIALS

A. FILLER METAL & ELECTRODES: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as required for color match, strength, corrosion resistance, and compatibility in fabricated items.

B. GROUT: Grout for fence posts shall be non-shrink, cement-based grout such as Sonneborn 10K Grout as manufactured by ChemRex, Shakopee, MN or SikaGrout 212, as manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.

C. SEALANT: Sealant around fence post shall be one-part polyurethane, elastomeric adhesive such as Sonneborn's Ultra Sealant, as manufactured by ChemRex, Shakopee, MN or Sikaflex-1a, as manufactured by Sika Corporation, Lyndhurst, NJ, or approved equal.

2.4 GALVANIZING:

A. Galvanized Handrails and Railings: All components to be powdercoated shall be Galvanized. Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153/A 153M. Galvanized components to be let dry and cool naturally and shall not be "quenched"

B. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

2.5 POWDER COATING:

A. Handrails, Railings and panels shall receive corrosion resistant treatment followed by two step powder coating as follows:

B. Corrosion Resistant Treatment: All fabrication and welding shall be completed prior to application of the corrosion resistant coating, metal pieces shall be cleaned of all weld spatter, mill scale, varnish, rust, grease, and the like and the surface mechanically or chemically prepared to receive the coating. This corrosion resistant coating shall be a multi-step iron phosphate bath coating process.

C. Polyester Powder Coating shall be applied to the iron phosphate coated metal pieces in such a manner that the coating will not peel off. The manufacturer shall perform all processes required to achieve a smooth material bond. The surface coat shall be an electrostatically sprayed, lead-free, TGIC (triglycidyl isocynanurate) polyester powder coating applied to a minimum of 5 mil thickness (total) applied in two applications. Each powder application shall be oven cured at temperatures between 400- and 450-degrees Fahrenheit for a period of 20 minutes. The TGIC polyester powder coating shall be Secural by Spraylat, Mt. Vernon, NY; or Tiger Drylac Series 38 as manufactured by Tiger Drylac U.S.A., Reading, PA, or approved equal. Finished surfaces shall comply with ASTM Standard as follows:

D.

	PHYSICAL PROPERTIES	TEST METHODS	ACCEPTANCE CRITERIA
1.	Adhesion cross hatching	D-3359B	5B (0% area removed)
2.	Flexibility conical mandrel	D-522	Pass 3/8" mandrel
3.	Pencil hardness	D-3363	Pencil hardness 2H minimum
4.	Impact resistance	D-2794	140-inch pounds minimum
5.	Overbake resistance-Adhesion	D-2454	5B
6.	Overbake resistance-Hardness	D-2454	Pencil hardness 2H minimum
7.	Overbake resistance-Direct Impact	D-2454	140-inch pounds minimum
8.	Humidity resistance-250 hours	D-4585	No visible change to surface
9.	Weatherability	D-822	No visible change to surface

2.6 PAINTING FENCE POSTS AND PANELS:

A. If so, determined by the owner or the architect the handrails and railings shall receive three (3) coats of paint. The first coat shall be shop applied; the second and third coat shall be field applied. Immediately prior to painting, all surfaces of fences and gates shall be thoroughly free of debris. All surfaces that are rust free shall be treated in accordance with SP-1, Solvent Cleaning. Treatment shall be performed with a solvent such as mineral spirits, xylol, or turpentine to remove all dirt, grease, and foreign matter. Surfaces that show evidence of scale and rust shall be cleaned in accordance with SP-2, Hand Tool Cleaning, a method generally confined to wire-brushing, sandpaper, hand scrapers, or hand impact tools or SP-3, Power Tool Cleaning, a method generally confined to power wire brushes, impact tools, power sanders, and grinders in order to achieve a sound substrate. After the fence and gates have been cleaned and prepared, they shall be painted as follows:

1. First Coat (Shop Applied): Sherwin Williams # E41N1 Metal Primer, Brown, as manufactured by Sherwin Williams Company, Woodside, NY, or approved equal. Primer is an alkyd oil, flat finish coating having a dry film thickness of 3 to 4 mils. Paint requires twenty-four (24) hours drying time before recoating. Performance shall meet or exceed the standards of Federal Specification TT-P-86H.

2. Second Coat (Field Applied): Sherwin Williams High Solids Alkyd Metal Primer, B50 Series, Reddish Brown, or approved equal. Primer is an alkyd low luster coating having a dry film thickness of 3-5 mils. Paint requires four (4) hours drying time before recoating (with alkyds)

3. Third Coat (Field Applied): Sherwin Williams Steel Master 9500 Silicone Alkyd # B56-300 Black or approved equal. Topcoat silicone alkyd high gloss coating having a dry film thickness of 2-4 mils. Paint requires sixteen (16) hours drying time @ 77 degrees F.

4. All paints shall be applied when ambient air temperature is forty-five (45) degrees F. and rising and when surfaces to be painted are moisture free. No painting will be allowed below the minimum ambient air temperature. In addition, no painting will be allowed below the temperature at which moisture will condense on surfaces. Refer to the Dew Point Chart in Section C, Article 16 to find the minimum allowed moisture free temperature.

2.7 FABRICATION

A. Assemble handrails and railings in 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 reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

B. Form changes in direction of railing members as follows:
   1. As detailed.

C. 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 continuously 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.

D. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.

E. Provide inserts and other anchorage devices to connect handrails and railings to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

F. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

G. 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.

H. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

I. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.

J. Fabricate joints that will be exposed to weather in a watertight manner.

K. Close exposed ends of railing members with prefabricated end fittings.

L. 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 1/4 inch or less.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.9 STEEL FINISHES

A. For ungalvanized steel handrails and railings, provide ungalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

B. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

C. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings:

1. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."

D. Apply shop primer to prepared surfaces of handrails and railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Do not apply primer to galvanized surfaces.

2. Stripe paint edges, corners, crevices, bolts, and welds.

E. Painted Finish: Comply with Section 2.5 of this specification.

PART 3 - EXECUTION

3.0 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railings. 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 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 handrails and railings before anchoring to ensure 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 handrails and railings and for properly transferring loads to in-place construction.

3.1 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

2. For hollow masonry anchorage, use toggle bolts.

3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.2 ANCHORING POSTS

A. Anchor posts to metal surfaces with flanges, angle or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel railings, weld flanges to post and bolt to metal supporting members.

B. Install removable railing sections, where indicated, in slip-fit metal sockets cast into concrete.

3.3 CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 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 correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 32 93 00
PLANTING, SEEDING and TOPSOIL

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division I specification sections, apply to this section.

1.02 SUMMARY

A. Unless specifically excluded hereinafter under WORK OF OTHER SECTIONS, provide labor, materials, equipment, and services necessary and incidental to complete work described by this Section's title shown above. Work includes, but is not necessarily limited to:

1. Fine Grading.
2. Landscape Contractor is responsible for amending and re-working all On-Site Topsoil and Planting Soil Backfill Mix required to complete the Landscape Development Work. The Earthwork & Drainage Contractor is responsible under this contract for obtaining any off-site topsoil, if needed, or disposing of excess topsoil unless otherwise directed by the Owner's Representative
   Topsoil: Earthwork & Drainage Contractor to provide on site topsoil that is screened (without admixture of subsoil or slag and shall be free of stones, lumps, plants, roots, sticks, and extraneous matter.
3. The Earthwork & Drainage Contractor shall provide screened topsoil meeting the requirements in section 2.01 of this Specification. The Contractor shall stockpile this topsoil within the project area at a location designated by the Owner and shall provide the Owner with measurements of the stockpile certified by a licensed surveyor to verify the quantity.
4. Preparation of Planting Areas as required.
5. Furnishing and installing all Plant Material.
6. Furnishing and installing all Shredded Hardwood Bark Mulch.
7. Independent Soil Testing for each area to be seeded (provide results to Owner/Landscape Architect before amending soil or proceeding with any seeding operations).
8. Furnish and Hydroseed all Lawn Areas (as required).
9. Furnish and Hydroseed all Upland Grass Areas (as required).
10. Furnish and Hydroseed all Shaded Upland Grass Areas (as required).
11. Rebuild pre-existing stacked stone wall (allowance per Bid Guide)
11. Removal of excess soil after completion of Landscaping work from site.
12. Maintenance of all Work until Final Acceptance.
13. Clean up of Work Area as outlined in these specifications.

B. Related sections include the following:

1. Division 31, "Site Demolition, Clearing and Preparation".
2. Division 31, "Earthwork".
3. Division 31, "Erosion and Sediment Control".

1.03 QUALITY ASSURANCE:

A. Project Execution:
1. The Landscape Work shall be done by a single firm specializing in landscaping work.

B. Field Supervision:
1. Landscape Contractor shall maintain an experienced full-time supervisor on project site when Landscape installation is in progress.

C. Source Quality Control:
1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulation applicable to landscape materials.

2. Do not make substitutions: If specified landscape material is not obtainable, submit to Landscape Architect proof of non-availability and proposal for use of equivalent material. When authorized, adjustment of Contract amount will be made.

Analysis and Standards: Package standard products with manufacturer's laboratory made in a accordance with methods established by the certified analysis. For other materials, provide analysis by recognized Association of Official Agricultural Chemists, wherever applicable or as further specified.

3. Trees and Shrubs: Provide trees and shrubs grown in a recognized nursery in accordance with good horticultural practice. Provide healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions or disfigurement.

Sizes: Provide trees and shrubs of the sizes shown as specified. Trees and shrubs of larger size may be used if acceptable to Landscape Architect, and if sizes of roots or balls are increased proportionately.

4. Inspection: The Landscape Architect reserves the right to inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for name, variety, size and quality.

1.04 SUBMITTALS

A. Certification: For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendor's certified analysis for soil

amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

B. Schedule of Work: For information only, submit 3 copies of tentative schedule to Owner and/or Owner's Agent along with Landscape Architect. Contractor shall keep all parties above apprised of any changes so that the Owner's Agent is aware of scheduled work at least 24 hours prior to said work being started.

C. Maintenance Instructions: Submit two copies of typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape work for one year. Submit prior to expiration of required maintenance period(s).

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site. Include the year of production and date of packaging.

B. Plant Materials:

1. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not use trees or shrubs which have been in cold storage or heeled-in. Do not prune prior to delivery. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

2. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist.

3. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

4. Do not remove container-grown stock from containers until planting time.

5. Contractor shall be responsible for the storage and maintenance of any and all plant material, which cannot be planted once it has been received by the Contractor. It is anticipated that this storage and maintenance will need to be done off site, since onsite space for plant storage will be very limited. Contractor shall provide the Landscape Architect with a detailed program for this storage and maintenance including but not limited to Mulching, Fertilizing, Irrigating, Wind Protection, etc.

1.06 JOB CONDITIONS

A. Installer must examine the sub-grade, verify the elevations, observe the conditions under which work is to be performed, and notify the Landscape Architect of unsatisfactory

conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.

C. Utilities: Determine location of underground utilities and perform work in a manner, which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

D. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, immediately notify Landscape Architect and wait for approval before planting.

1.07 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

B. No trees, shrubs or vines shall be planted when the ground is frozen or in excessively moist condition.

C. Coordinate work with Landscape Architect to facilitate delivery and unloading of plant material.

D. Coordinate work with preparation of planting areas, availability of approved soil analysis and recommendations for each area.

E. Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Landscape Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.08 INSPECTION OF MATERIALS

A. All materials shall be subject at any time and at any place to the inspection and approval of the Landscape Architect. Samples of any materials may be required by the Landscape Architect.

1.09 PROTECTION

A. Protect existing trees, shrubs and other hardscape elements against damage including trespassing, and erosion.

B. Protect all existing plant material in the area of this contract, whether inside or outside the contract limit line, against any damage, which in the opinion of the Landscape Architect will cause death or major retardation. Such material shall be replaced with same size and species by the Contractor at no additional cost should such damage occur.

1.10 PURCHASE ORDER

A. One copy of all purchase orders and shipping bills, invoices, or memoranda of shipment of materials used in work under this division shall be furnished to the Landscape Architect upon request during or at completion of work.

1.11 FINAL INSPECTION

A. Inspection of work will be made at the conclusion of work (at acceptance of the project). Submit written notice requesting final inspection at least 10 days prior to anticipated date.

1.12 MAINTENANCE

A. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.
   1. Seeded and/or sodded lawns, 60 days from point of installation. If seeded in the Fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following Spring until acceptable lawn is established.

B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, re-grading, and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
   1. Watering:
      Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4” inches (100 mm).

      a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

      b. Water lawn at a minimum rate of 1” inch (25 mm) per week.

   2. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

C. Maintain plant material by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to

proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings. Maintain plant material for the following period:

1. Maintenance Period: 12 months following Final Acceptance.

D. Maintain plant material immediately after placement until plants are well established and exhibit a vigorous growing condition. Continue maintenance until termination of warranty period.

E. Maintenance to include:

1. Cultivation and weeding plant beds and tree pits.
2. Irrigating sufficient to saturate root system.
3. Pruning, including removal of dead or broken branches and treatment of pruned areas or other wounds.
4. Neatly trimming plants when necessary.
5. Disease and pest control.
6. Maintaining guys and stakes. Repair or replace accessories when required.
7. Replacement of mulch.
8. Remove leaves from planting areas.
9. Insure watering when rainfall is less than 1" per week and during periods of excessive heat. Shrubs will receive 3.5 gallons per plant and trees 7-10 gallons per inch of caliper per week or as directed by the Landscape Architect acceptance of the completed contract or at a minimum until the end of the Maintenance Season (end of November). Maintenance shall include watering, cultivating, control of insects, fungus, and other horticultural operations necessary for the proper growth of all plants.

1.13 TAGGING MATERIAL

A. All trees shall be tagged at the nurseries while still in the ground prior to digging. The Contractor shall purchase landscape materials at nurseries within one hundred and fifty (150) miles from the project site allowing the landscape architect to travel to the nurseries to tag the trees. The contractor shall obtain the nurseries digging seasons schedule as soon as possible so tagging trips can be scheduled while the trees are still in the ground.

B. Landscape Architect reserves the right to select and seal all plants in the field.

C. No substitutions will be made unless authorized by the Landscape Architect.

D. The Landscape Architect may reject any material which does not represent species as outlined in the Plant List.

1.14 GUARANTEE INSPECTIONS

Guarantee inspections shall take place after maintenance and guarantee period.

1.15 FINAL ACCEPTANCE

The work of this Section will be accepted upon the completion of all work of this Project including maintenance and guarantee.

1.16 GUARANTEE

A. Guarantee all seeded areas through the specified maintenance period, and until final acceptance.

B. Guarantee trees and shrubs, for a period of **ONE YEAR** after date of acceptance, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond landscape installers control. Final decisions regarding replacement shall be made by the Landscape Architect. Contractor, if not maintaining the property during the two-year guarantee, shall be responsible for making monthly inspections and issuing written reports detailing any maintenance practices he observes which would in anyway negate his guarantee obligation. These written reports will be submitted to the parties designated by the owner.

C. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during guarantee period. Plant missing trees, shrubs, and plants. Make final replacements prior to or during growth season following end of guarantee period. Furnish and plant replacements, which comply with requirements shown and specified. Also, at request of Landscape Architect, replace trees and shrubs which are in doubtful condition at end of guarantee period.

PART 2 - PRODUCTS

2.01 SOIL

A. TOPSOIL

Topsoil for seeded and sodded areas shall be stripped natural topsoil as described below:

1. Stripped Topsoil: Topsoil shall be from on-site sources as treated and amended by the landscape contractor. It shall be without admixture of subsoil or slag and shall be free of stones, lumps, plants or their roots, sticks and extraneous matter, and shall not be moved, placed or used while in a frozen or muddy condition.

   If approved, natural topsoil not having the hydrogen-ion value specified above may be amended by the contractor, at his own expense, to bring it within the specified limits. Topsoil shall meet the following mechanical analysis:

	Passing %
1" Screen	100%
1/2" Screen	97-100%
No. 4 Mesh Sieve	90-100%
No. 10	85-95%
No. 140	20-50%
No. 270	10-30%

Topsoil shall consist of natural mineral soil supplemented by the contractor with compost or other organic material or supplement intended to raise the percentage of organic matter or adjust the pH. Topsoil shall contain the required organic matter determined by loss, on ignition, of moisture-free samples dried in accordance with the current method of the Association of Agricultural Chemists. The organic content shall range from 5 - 15%. The acidity range shall be pH 5.0 to pH 7 inclusive. When necessary, limestone shall be added to the topsoil to reach the specified pH range.

2. Soil sample tests will be ordered by the Landscape Architect and shall be made by a state or commercial laboratory using methods approved by the Associates of Official Agricultural chemists or the State Agricultural Experiment Station (AgSource Laboratories or approved equal)

   Such analysis will be paid for by the Landscape Contractor. Re-working of topsoil may be made after approval of the analysis by the Landscape Architect.

   There shall be a minimum of 6" of topsoil (after settlement) in all landscaped areas.

   Note: The Screened Topsoil shall adhere to the properties outlined in Section 2.01 “Topsoil”.

2.02 SOIL AMENDMENTS (applied per soil test recommendations)

A. Limestone: Limestone to be used at topsoil for all seeded areas.

C. Compost: Organic Compost (sludge derived compost is not acceptable) with the texture and pH range suitable for the intended use.

D. Fertilizer: Fertilizer to be used for all seeded areas.

E. Organic Fertilizer and Soil Conditioner for Tree Pits: All trees and shrubs shall be treated with PHC Tree Saver which is a Mycorrhizal Fungal Transplant Inoculant. Apply in tree pits in rates indicated by manufacturer. PHC Tree Saver is manufactured by Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, Pennsylvania, 1-800-421-9051.

F. Organic Fertilizer to be Spread Over Tree Pits Mulch: All mulch over tree pits shall receive organic slow release 8-4-4 fertilizer to prevent the decomposition process of robbing the soil form nitrogen. Fertilizer shall be Sustane 8-4-4 which is manufactured by Sustane Natural Fertilizer Inc. 310 Holiday Ave., P.O. 19, Cannon Falls, Minnesota 55009, 1-800-352-9245.

2.03 GRASS MATERIALS

A. Seed for Lawn Areas: Provide fresh, clean, new crop seed complying with the tolerance for purity and germination established by the official seed Analysts of North America. Provide grass Mix as indicated below and provided by All Pro Horticultural 516-777-8668 or approved equal of the grass species, proportions and minimum percentages of purity, germination and maximum percentage of weed seed as specified. Seeding Rate to be ten (10) pounds per 1000 square feet.

Blend	Parts	Purity	Min % Germination
BLUEGRASS - One or more of the following varieties: Bluenote, Arrowhead, Volt, Bluechip Plus, Rugby	20%	98%	80%
PERENNIAL RYEGRASS - One or more of the following varieties: Stellar II, Topgun II Apple GLX, Revenge, Secretariat II	20%	98%	85%
TALL FESCUE - One or more of the following varieties: Spyder LS, Summer, Rhizing Star, Regenerate	60%	98%	85%

Total weed content shall not exceed .25% of total seed mixture.

B. Other Seed Mixes. All seed mixes shall be supplied by All Pro Horticultural 516-777-8668 or by approved equal.

1. Upland Grass Mix

Avena sativa, Cereal Oats, 35% @ 40 lbs/acre
Schizachyrium scoparium (Andropogon scoparius), Little Bluestem, 30% @ 15 lbs/acre
Festuca brevipila, Hard Fescue, 28% @ 40 lbs/acre
Chamaecrista fasciculata (Cassia f.), Partridge Pea, 3% @ 10 lbs/acre
Rudbeckia hirta, Blackeyed Susan, 3% @ 10 lbs/acre
Penstemon digitalis, Tall White Beardtongue, 1% @ 3 lbs/acre

2. Basin Mix for Basin Area in Parking Lot
   Seeding rate: 5 lbs/1,000 SF

   Panicum clandestinum (Dichanthelium c.), Deer Tongue, 30%
   Poa palustris, Fowl Bluegras, 30%
   Bromus ciliates, Fringed Brome, 20%
   Carex scoparia, Blunt Broom Sedge, 14%
   Juncus effuses, Soft Rush 2%
   Ageratina altissima, Wite Snakeroot, 2%
   Seaside Goldenrod (S), 2%

C. Sod Quality Standards: Unless otherwise specified, all sod shall be nursery cultivated Sports Turf Bluegrass Blend Sod, well rooted, reasonably free from weeds and meeting the following minimum requirements:

1. Grown in accordance with The Department of Agriculture rules and regulations for "Certified Turfgrass Sod". Sod shall be free of quackgrass, annual bluegrass, bindweed, Canada thistle, wild garlic, wild onion, Muhlenbergia, bentgrass, bermuda grass, clover, common broadleaf weeds and plants of varieties other than those specified.
2. Sod shall be inspected in the nursery and approved by the OWNER prior to harvesting.
3. Blend: the seed blend will consist of the three following Hybrid Bluegrass varieties (blended by volume):

   40% P-105
   30% MIDNIGHT STAR
   30% BRILLIANT
4. Substantiating Information: Submit grower's name, soil type where grown, thatch thickness, age, species, and blend of grass or field location from which sod is to be cut.
5. Thatch Layer: Not more than 3/16".
6. ALL SOD shall have been grown on a sand based SOIL MATCHING THE ANALYSIS as follows:

Particle Size Analysis	
% Gravel	0.3%
% Sand	92.4%
% Silt	4.5%
% Clay	2.8%

Sand Sieve Size Analysis (ASTM F-1632)		
Gravel	(>2mm)	0.3%
V. Coarse Sand	(2.0-1.0mm)	4.3%
Coarse Sand	(1.0-0.5mm)	25.9%
Medium Sand	(0.5-0.25mm)	42.3%
Fine Sand	(0.25-0.15mm)	15.1%

Very	(0.15-.010mm)	2.8%
Fine Sand	(0.10-0.05mm)	2.0%
Silt	(0.05-0.002mm)	4.5%
Clay	(<0.002mm)	2.8%

Acid Reaction	None	D15	D85
Sphericity/Angularity	medium sphericity/sub-rounded	0.16mm	0.74mm

Physical Properties (ASTM F -1815-97)

Bulk density g/cm3	Total porosity	Air-filled porosity at 30 cm	Capillary porosity at 30cm	Saturated Conductivity in/hr 0.7

(ASTM F-1647-97,Method A)

Particle density (g/cm3) Organic matter percentage (LOI)

7. Pre-Harvest Sod Maintenance: Maintain for a minimum of three (3) months at a maximum height of 2"; mow prior to harvesting and on same day as harvesting at a minimum height of 1-5/8 inches.
8. Sod shall be of a uniform color, density and thickness and of the species, variety (ies) and/or blend specified.
9. Dimensions of Sod: 42-48" contiguous width by 40-70' long of uniform thatch thickness and delivered in rolls. Split widths, voids, breaks, splits or partial rolls will not be accepted. Sod shall maintain the original cut size or original shape and dimensions throughout handling and installation.
10. Sod shall be delivered and placed within forty-eight (48) hours after being harvested.

2.04 HYDROSEEDING MATERIALS

A. Lawn Area Hydro-Seeding.
   1. Stockosorb 660 water holding gel, as manufactured by Evonik,
   3. Conwed 1000, 100% Wood Hydro Mulch
   4. Tackifier 3, Tacking Agent as manufactured by Profile Products.
   5. 19-26-5 Starter Fertilizer, as manufactured by The Andersons
   6. Weed control shall be Tenacity, as manufactured by Syngenta

B. Upland Area & Shaded Upland Area Hydro-Seeding.
   1. Upland Grass Mix & Shaded Upland Grass Mix, specification item # 2.03-B, to be manually sown under prior to hydro-mulching. Alternatively, the seed mixture may be Hydro-Seeded using no more than 300 Lbs of Hydro Mulch per Acre, serving as a visual marker without impeding seed-soil contact.
   2. Hydro-Mulching over the top of the sown seed.
      a. Hydro mulch shall be a combination of Flexterra, as manufactured by Profile Products and of Conwed 1000 Wood Mulch Such that each Hydro-Seeder load contains equal portions of both mulches.
      b. Stockosorb 660 water holding gel, as manufactured by Evonik. Tackifier 3, Tacking Agent as manufactured by Profile Products.

c. 19-26-5 Starter Fertilizer, as manufactured by The Andersons.

2.05 PLANT MATERIALS

A. Name and Variety: Provide plant materials true to name and variety established by the American Joint Committee on Horticultural Nomenclature "Standardized Plant Names," Second Edition, 1942.

B. Quality: Provide trees, shrubs and other plants complying with the recommendations and requirements of ANSI Z60.1 "Standard for Nursery Stock" and as further specified.

C. Deciduous Trees: Provide trees of height and caliper listed in contract drawings. Provide single stem trees except where special forms are shown or listed.
1. Provide balled and burlapped (B&B) deciduous trees.
2. Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.

D. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than the minimum number of canes required by ANSI 260.1 for the type and height of shrub required.
1. Provide balled and burlapped (B&B), bare root (B.R.) or container deciduous shrubs as specified in plant list.
2. Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to the specified limitations for container grown stock.

2.06 MISCELLANEOUS LANDSCAPE MATERIALS

A. Mulch:
1. Mulch around tree Pits: Shredded Hardwood Bark Mulch shall be a natural forest product composed of shredded bark or wood not exceeding three inches (3”) in length and one inch (1”) in width. Mulch shall be derived from tree material, not from wood waste or by-products like sawdust, shredded palettes, or other debris. Mulch shall be natural in color and not dyed. It shall be of a uniform grade with no additives or any other treatment. Mulch with leaves, twigs, and/or debris shall not be acceptable. The pH factor should range from 5.8 to 6.2. Mulch shall be free from any extraneous materials, and shall be spread to a 4" depth minimum (after settlement).

B. Deer Tree Protector: Provide and install deer protection tubes clamped to a stake at each tree sapling. Protector shall be 48” tall Miracle Tube as manufactured by Tree Pro (800)875-8071.

C. Tree Guying:
1. Guy Cable: 5-strand, $^{3}/_{16}$ inch (4.8mm) diameter, galvanized steel cable, with three (3) ⅜”x6” galvanized turnbuckle, with epoxy anchoring system.

2. Anchor: three (3) ⅜ inch (10 mm) galvanized eyebolts.
3. Cable Cover: PVC, brightly colored.

4. Nylon Tree Strap: 1"x18" long with grommets to receive cable. As supplied by: GCS Inc., North Wales, PA or approved equivalent.

D. Trunk-Wrap: Two layers of burlap wrapped and tied around all tree trunks of 2"–2½" caliper trees for protection from deer antlers rubbing.

PART 3 - EXECUTION

3.01 PREPARATION OF PLANTING SOIL

A. Amended screened Topsoil shall be further amended by the Landscape Contractor as outlined in "B" below.

B. Mix amended Topsoil to include the following:
1. For Trees, Shrubs and all Ground covers (herbaceous and coniferous): Compost at three part topsoil to one part compost.

2. For Trees and Shrubs: PHC Tree Saver Organic fertilizer/soil conditioner, shall be applied as follows:

Plant Size	Ounce Rate	Tree Saver packet Rate
1 Gallon	1	1/3
2 Gallon	2	2/3
3 to 7 Gallons	3	1
7 to 15 Gallons	3	1
20 to 30 Gallons	6	2
24" Ball/Box	6	2
36" Ball/Box	9	3
48" Ball/Box	12	4

3.02 GENERAL PREPARATION

A. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Landscape Architect's acceptance before start of planting work. Make minor adjustments as may be requested and/or dictated by field conditions.

3.03 EXCAVATION FOR TREES AND SHRUBS

A. Excavate pits, beds, and trenches, with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.

B. For balled and burlapped (B&B) trees and shrubs, make excavations at least the equivalent of two and a half times as wide as the ball radius and equal to the ball depth, plus the

following allowance for setting of ball on a layer of compacted backfill: Allow for 6" setting layer of planting soil mixture. If ball depth is less than depth of excavation, use ¾" clean gravel with a soil separator on top to make up the difference.

C. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

D. Fill excavations for trees and shrubs with water and allow to percolate out before planting. If no percolation or poor percolation is evidenced, Drill 12" diameter vertical drains 6' deep minimum or until a free draining material is encountered. Fill vertical drains with ¾" clean gravel and cover with a soil separator or provide drainage as per plans for various locations.

3.04 PLANTING

A. Planting Trees and Shrubs

1. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades.

Apply the solution to the excavated planting hole at the rate of 5 gallons per inch of caliper for trees and 3 gallons for 12" of root ball for shrubs. Subsequently place plant in planting hole and drench plant ball with "Terra-Wet". After "Terra-Wet" application place backfill around base and sides of ball and work each layer to settle backfill and eliminate voids and air pockets.

During the placement of backfill place PHC Tree Saver at quantities specified and as per manufacturer's recommendations. Spread granules about 6" below top of root ball and cover with compost and topsoil mix.

When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill. Remove collar ropes only. Retain burlap on balls.

2. Set bare root stock on cushion of planting soil mixture. Spread roots, apply "Terra-Wet" to root mass by spraying. Then carefully work backfill around roots by hand and puddle with water until backfill layers are completely saturated. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers above roots. Set collar 1" to 2" above adjacent finish landscape grades. Spread cut roots without tangling or turning up to surface. Cut injured roots clean, do not break.

3. Set container grown stock as specified for balled and burlapped stock, except cut cans on two sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.

4. Dish top of backfill to allow for mulching. For spring planting, provide additional backfill berm around edge of excavations to form shallow saucer to collect water. Note: Surface of all Shrub Beds shall be crowned or sloped as required to achieve a 3% minimum surface pitch and insure positive surface drainage.

5. Guy trees with no fewer than 3 guy cables, utilize nylon tree straps to protect tree trunk. Anchor guys to planter walls with eyebolts. Provide turnbuckles for each guy cable and tighten securely.

6. Wrap burlap around all trunks of size trees 2”-21/2” caliper for deer antlers rubbing protection. Tie burlap around entire length of tree trunks to height of branching

7. Mulch pits, trenches, planted areas, and existing trees to remain (not including woodland trees). Provide not less than the following thickness of mulch and work into top of backfill and finish level with adjacent finish grades. Provide 4" depth minimum (after settlement).

8. Install Tree Pro tree protector for all saplings. Sleeve protector around trunk clump provided plastic clamps to stake and stake firmly into the ground next to sapling.

9. Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the Landscape Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character and accomplish their use in the landscape design. Required shrub sizes are the size after pruning.

10. Remove and replace excessively pruned or misformed stock resulting from improper pruning.

C. Preparation for Seeded Areas

1. Earthwork & Drainage Contractor shall be responsible for subgrade. Landscape Contractor shall be responsible for accepting or rejecting this grade prior to starting his work. Commencing Landscape operations constitutes acceptance of subgrade. Loosen subgrade of lawn areas to a minimum depth of 4”. Remove stones over 1” in any dimension and sticks, roots, rubbish and other extraneous matter.

   Limit preparation to areas, which will be planted promptly after preparation. Place a minimum of 4” inches of un-amended topsoil over prepared grade and again remove stones and other extraneous matter as described above. See site drawings for information on subgrade in various areas.

2. Spread topsoil to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement (4” after settlement). Place

approximately 1/2 of total amount of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remains of topsoil. Add specified soil amendments (as per Section 3.01 of this specification) and mix thoroughly into the upper 4 inches of topsoil.

3. Where final grades are not indicated, finish grades shall be of uniform level or slope between points for which elevations are given or from such points to existing grades, except that tops and bottoms of banks shall be rounded. Subgrade elevations shall be understood to be the specified depth below finished grades.

4. Swales, where shown, shall not be considered narrow gutters or trenches. They shall be of definite or uniform lawn surface without sharp breaks in grade. The soil of the subgrades is to be made loose and friable to a depth of four inches.

5. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before seeding. Do not create a muddy soil condition.

6. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

D. Hydro-seeding for Lawn, Upland and Shaded Upland Grass Mixes

Type I. Lawn Area Hydro-Seeding

1. Lawn Area Mix shall be applied at 10 Lbs per 1,000 SqFt.
2. Stockosorb 660 water holding gel, as manufactured by Evonik, applied at 10 Lbs per Acre.
3. Conwed 1000, 100% Wood Hydro Mulch, shall be applied at 2,500 Lbs per Acre.
4. Tackifier 3, Tacking Agent as manufactured by Profile Products, applied at 72 Lbs per Acre.
5. 19-26-5 Starter Fertilizer, as manufactured by The Andersons, applied at 200 Lbs per Acre.
6. Tenacity, as manufactured by Syngenta, applied at 5oz per Acre for weed control.

Type II. Upland Area & Shaded Upland Area Hydro-Seeding

3. Upland Grass Mix & Shaded Upland Grass Mix, specification item # 2.03-C, to be manually sown under prior to hydro-mulching. Alternatively, the seed mixture may be Hydro-Seeded using no more than 300 Lbs of Hydro Mulch per Acre, serving as a visual marker without impeding seed-soil contact.

4. Hydro-Mulching over the top of the sown seed.

    a. Hydro mulch shall be a combination of 1,250 Lbs of Flexterra, as manufactured by Profile Products, per Acre and 1,250 Lbs of Conwed 1000 Wood Mulch per Acre. Such that each Hydro-

Seeder load contains equal portions of both mulches.

b. Stockosorb 660 water holding gel, as manufactured by Evonik, applied at 10 Lbs per Acre.
c. Tackifier 3, Tacking Agent as manufactured by Profile Products, applied at 72 Lbs per Acre.
d. 19-26-5 Starter Fertilizer, as manufactured by The Andersons, applied at 100 Lbs per Acre.

3.05 CLEANUP AND PROTECTION

A. During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.

B. Protect landscape work and material from damage due to landscape operations, operations by other Contractors and trades and trespassers. Maintain protection during installations and maintenance periods. Treat, repair or replace damaged landscape work as directed. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after Landscape is established.

3.06 MAINTENANCE INSTRUCTIONS

A. Begin maintenance immediately after planting. Maintain trees, shrubs, and other plants until end of Maintenance Season (end of November), but in no case less than 60 days after planting.

B. Maintain trees, shrubs and other plants by pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers. Reset trees and shrubs to proper grades or vertical position as required. Spray as required to keep trees and shrubs free of insects and disease.

C. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.

1. Seeded lawns, until end of Maintenance Season at end of November (But Not Less Than 60 Days). If seeded in fall continue maintenance the following spring until acceptable lawn is established.

D. Maintain lawns by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, regrading, and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare area, all to the acceptance of the Landscape Architect.

E. Submit two copies of typewritten instructions recommending procedures to be established by the Owner for the maintenance of landscape work for one full year. Based on the outline contained herein.

3.07 INSPECTION & ACCEPTANCE

A. When the landscape work is completed, including maintenance, the Landscape Architect will, upon request, make an inspection to determine acceptability. The landscape work may be inspected for acceptance in parts agreeable to the Landscape Architect, provided the work offered for inspection is complete, including maintenance, and that the area comprises a complete unit or area of substantial size.

B. Where inspected landscape work does not comply with the requirements replace rejected work and continue specified maintenance until re-inspected by the Landscape Architect and found to be acceptable. Remove rejected plants and material promptly from the project site.

END OF SECTION

SECTION 33 10 00
WATER UTILITIES

PART 1 - GENERAL

1.01 SCOPE

Providing labor, materials, services, equipment, and other necessary items required for the construction of water systems. This shall include, but not be limited to the following: pipe and fittings for site water line including domestic water line and fire sprinkler system water line, valves and fire hydrants, setting line locations, elevations, and grades for water distribution systems work and control system for duration of work including careful maintenance of benchmarks, property corners, monuments, or other reference points.

1.02 QUALITY CONTROL

A. Perform work in accordance with utility company and/or municipality requirements.

B. Manufacturer's name and pressure rating marked on body of valves.

C. Compaction testing of trench backfill shall be performed in accordance with Section 31 20 00, “Earthwork”.

D. Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:

1. The Contractor shall perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains to determine leakage and watertightness. All pressure pipeline shall be tested in accordance with A.W.W.A. C600 or latest revision. In the event any state or local code requires a more stringent test, the more stringent shall apply.

1.03 SUBMITTALS

A. The Contractor shall submit to the Owner and representatives of the municipal agency having jurisdiction delivery tickets showing but not limited to the material type, date, time, project, amount and source and supplier certifications of the materials delivered and utilized on the site, to show compliance with the specifications.

B. Contractor shall retain a licensed Land Surveyor to prepare a record drawing, accurately indicating exact location (horizontally & vertically) of all components

of the water distribution system. Record plan must indicate pipe size, barrel elevation, valves, etc.

C. The Contractor shall submit a minimum of three (3) copies of the record plan bearing the “wet” seal and signature of the licensed Land Surveyor who prepared the document to the Engineer.

D. The water main Contractor shall be responsible for securing a Town Plumbing Permit for the installation of the fire service and domestic water service from the water main to the proposed structures.

PART 2 – PRODUCTS & MATERIALS

2.01 PRODUCTS & MATERIALS

A. Pipe sizes less than or equal to 3 inches in diameter that are installed below grade and outside building shall comply with the following:

1. Seamless Copper Tubing: Type "K" soft copper to comply with ASTM Standards, latest edition.

B. Pipe sizes 4 inches in diameter and larger that are installed below grade and outside building shall comply with the following, unless otherwise indicated on the drawings:

1. Cement-Lined Ductile Iron Pipe shall be centrifugally cast with a pipe barrel conforming to A.W.W.A. specification C151 or latest revision and A.N.S.I. specification A21.51-81 or latest revision, with thickness class as tabulated below unless otherwise indicated on the drawings.

Pipe Size (in.)	Thickness Class
4	52
6	52
8	52
10	52
12	52
16	51
20	51
24	51

Ductile Iron Pipe shall be furnished in nominal laying lengths of 18 to 20 feet. Each length of pipe shall have the weight, class, manufacturer’s mark and the letters “DI” or ductile cast or stamped on the pipe by the manufacturer. All pipe and special castings shall be supplied by the same

approved manufacturer. Manufacturers shall be U.S. Pipe & Foundry Co., Griffen Pipe Products Co., or specifically approved equal.

All ductile Iron Pipe shall be cement, lined in accordance with A.W.W.A. specification C104-80 or latest revision. The lining shall be centrifugally applied and shall be free from voids, ridges or corrugation that reduce the thickness of the lining to less than the specified thickness. The thickness of cement lining for pipe shall be double thickness and nowhere less than the following for the respective diameters:

4 to 12 inches = 1/8 inch

14 to 24 inches = 3/16 inch

The interior seal coat shall be continuous and shall adhere to the mortar lining at all points. The seal coat, after drying for at least 48 hours, shall have no deleterious effect upon the quality, color, taste or odor of potable water.

The exterior seal coating shall be a bituminous coating approximately 1 mil thick. This finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe.

C. Gate Valves – 2 inches and larger

1. Manufacturers: Clow Valve Company, Mueller Company, or approved equal.

2. A.W.W.A. C500-86 or latest revision, iron body, bronze mounted double discs with either parallel or inclined seats, forged bronze non-rising stem with two (2) “O” ring seals, two inch square wrench nut, flanged or mechanical joint ends, control rod, post indicator where indicated on plans, extension box, and valve key and 200 psi minimum working pressure.

D. Ball Valves – 2 inches and smaller

1. Manufacturers: Clow Valve Company, Mueller Company, or approved equal.

2. Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, A.W.W.A. compression inlet end,

compression outlet with electrical ground connector, with control rod, extension box and valve key.

E. Butterfly Valves – from 2 inches to 24 inches

1. A.W.W.A. C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

F. Check Valves and Backflow Preventors shall be as manufactured by FEBCO Backflow Prevention, Watts Regulator, unless otherwise indicated on the drawings.

G. Valve Boxes

1. Manufacturers: Mueller Company or approved equal.

2. Valve boxes shall be three-piece cast iron, 5 ¼" shaft, sliding type, with cast iron covers with "water" cast on the covers.

3. Valve boxes shall have the following dimensions:

≤ 4" gate valves – No. 4 round (10 7/8" diameter, 8" high)
6" and 8" gate valves – No. 6 round (14 3/8" diameter, 11" high)
10" and 12" gate valves – No. 8 round (17 ¼" diameter, 11" high)

H. Hydrants:

1. Manufacturers: Clow Valve Company, Mueller Company or approved equal.

2. Hydrant type as required by local fire district and/or water purveyor. Contractor shall verify individual fire district requirements prior to ordering hydrants.

3. Hose and Steamer Connection shall be coordinated with the fire district.

4. Fire Hydrant finish and color shall be per fire district.

I. Accessories:

1. Place thrust blocking consisting of 2,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Bend Diameter	Dead End or Tees Sq. Ft.	90° Bend Sq. Ft.	45° Bend Sq. Ft.	22½° Bend Sq. Ft.	11¼° Sq. Ft.
3"	1.0	1.0	1.0	1.0	1.0
4"	1.0	1.5	1.0	1.0	1.0
6"	2.0	3.0	2.0	1.5	1.0
8"	4.0	5.5	3.0	1.5	1.0
10"	6.0	8.5	4.5	2.5	1.0
12"	9.0	12.0	6.5	3.5	1.5
14"	15.0	22.0	12.0	6.0	2.0
16"	15.0	22.0	12.0	6.0	3.0
18"	15.0	22.0	12.0	6.0	4.0

2. Locked Mechanical Joint fittings shall be installed where vertical changes in direction are required and, if approved by the Owner and governing authority, can be installed in lieu of the above thrust blocking requirements.

3. Water Service identification plastic marker tape, nomenclature: “CAUTION, BURIED WATER LINE BELOW” shall be placed 18” above water service.

J. Rubber Gasket Joints:

1. Push On Joints shall conform to A.W.W.A. Standards C111-85 or latest revision and be “Tyton” as manufactured by US Pipe and Foundry Co. or approved equal.

2. Mechanical Joints shall conform to A.W.W.A. Standards C111-85 or latest revision and be manufactured by US Pipe and Foundry Co. or approved equal.

K. Underground warning tape:

1. The material shall be solid plastic tape with a minimum thickness of 4.5 mil. The tape shall be resistant to alkalis, acids and other destructive elements. The tape shall be blue in color, 3” minimum width, marked with the words “CATION – WATER LINE BURIED BELOW”. The warning shall be repeated every 16” – 36”.

2. After partially backfilling and leveling the trenches to a height of 18” – 24” above the crown of pipe, the roll of tape shall be mounted to a wheel and spread above the prepared surface as straight as possible. The tape shall be

held in position by adding backfill with hand shovels before using mechanical equipment to backfill.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground utilities, structures and conflicts. Care should be exercised by the Contractor during excavation to avoid damage to existing structures.

B. Verify that building service connection and municipal utility water main size, location and depth are as indicated.

3.02 INSTALLATION

A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code.

B. Install pipe and fittings in accordance with A.W.W.A. C600, latest revision.

C. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.

D. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.

E. Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline and in compliance with the local utility company.

F. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.

G. The Contractor shall be required to keep water out of the trenches by approved means while pipe is being laid, and away from joints until they are in place. Contractor shall dewater trenches as required.

H. Backfill and compaction shall be done in accordance to Section 02300, “Earthwork”.

I. Pipe shall be laid to a grade required to pass over or under sanitary sewer, storm drainage systems, utilities, etc. with a minimum vertical clearance of 18 inches. All pipe shall have a minimum cover of 4'-6" measured from finished grade.

J. When the subgrade is found to be unstable or to include ashes, cinders, refuse, organic material or other unsuitable material, additional excavation is required. Additional excavation shall be done in accordance with Section 31 00 00, "Earthwork".

K. The Contractor shall furnish, install and maintain temporary shoring and bracing as required. Work shall be done in accordance to Section 02260, "Shoring and Bracing Earthwork".

L. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools or other materials shall be placed in the pipe.

M. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.

N. Install fire hydrant assemblies as indicated on Drawings in vertical and plum position with steamer/pumper nozzle pointed perpendicular to traffic where hydrant is adjacent to a street, roadway or parking lot drive or toward the protected building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil and concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.

3.03 COORDINATION

A. Contractor shall coordinate work with and retain the services of a licensed plumber in order to make final connection of building. Contractor shall be responsible for obtaining plumbing permit for the installation of the water and fire services from the water main to the structures.

B. Contractor shall notify the municipal agency having jurisdiction and the Engineer 48 hours in advance of commencement of construction to arrange for the required site observations.

C. Any section of the water distribution system backfilled prior to the required observations by the Engineer and the municipality having jurisdiction shall be uncovered at the Contractor's expense.

D. The water main Contractor, all other Contractors, and all Subcontractors shall coordinated their work with all adjacent work and shall coordinate with all other trades so as to facilitate the general progress of the work.

3.04 TESTING

A. Disinfect distribution system with chlorine before acceptance of domestic operation. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours. The Contractor by means of a comparator, which will be provided by the Contractor, shall check a chlorine residual of not less than 50 mg/L. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriologically test in accordance with A.W.W.A. C-651 or latest revision. After each section of main has been blown off, lab personnel of a New York State approved laboratory shall take samples of water for bacteria. Samples shall be taken at the rate of at least one sample per 1,000 LF or portion thereof of water main or as directed by the Engineer. If positive samples are obtained in any area, more detailed sampling is required.

B. Pressure Test Restrictions: Pressure testing shall conform to A.W.W.A. C-600, latest revision.

1. Test pressure shall not be less than 1.50 times the working pressure at the point of testing.

2. The hydrostatic test shall have a minimum duration of two (2) hours.

3. Test pressure shall not vary by more than +/-5 psi for the duration of the test.

4. Before applying the test pressure, air shall be completely expelled from the section of pipe under test.

5. Any damaged or defective pipe, fittings, valves, hydrants or joints that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until satisfactory results are obtained.

C. Leakage Test: Leakage testing shall conform to A.W.W.A. C-600, latest revision.

1. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the test pressure after the pipe has been filled with water and the air has been expelled.

2. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

   In inch/pound units,

   $$L = \frac{SD\sqrt{P}}{133{,}200}$$

   where L=allowable leakage, in gallons per hour
   S=length of pipe tested, in feet
   D=nominal diameter of pipe, in inches
   P=average test pressure during the leakage test, in psi.

3. When hydrants are in test section, the test shall be made against the main valve in the hydrant.

4. Pressure testing and leakage testing must be witnessed by the Engineer. Contractor shall notify Engineer at least 48 hours prior to testing to properly schedule.

D. Contractor shall coordinate observations with the Health Department, Water Purveyor and Engineer. Any portion of the water distribution system backfilled prior to observation by Health Department, Water Purveyor and Engineer shall be uncovered at the Contractor's expense.

E. Contractor shall supply all water for testing at no additional cost to Owner.

3.05 ACCEPTANCE

A. No Sections of the new main shall be opened to the distribution system until negative bacteriological test results are obtained from a New York State approved laboratory (with a certificate that the samples were processed by laboratory personnel) and approval is granted by the Engineer or governing authority.

B. Pressure test must pass.

C. Leakage test must pass.

END SECTION 33 10 00

SECTION 33 30 00
SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 SCOPE

A. Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the sanitary sewer systems. This shall include, but not be limited to, the following: Sanitary sewer piping, Fittings and accessories, Cleanouts, Grease traps, Septic tanks, Manholes, Leaching pools and bedding.

B. Set lines, elevations, and grades for sanitary sewer system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

1.02 QUALITY CONTROL

A. Work, and types or methods of construction, shall in no event be less than that necessary to conform to all the provisions of the Town and local law, ordinances and regulations of the Town or any of the jurisdictional departments, applicable to the work included in this section, including but not limited to:

1. Department of Health Services and Department of Public Works.

2. Site Plan Requirements of the Town.

3. "Standard Specifications Construction and Materials" of the New York State Department of Transportation, latest edition.

4. Title 29 Code of Federal Regulations, Part 1926, Safety, and Health Regulations for Construction, (O.S.H.A.), latest edition.

5. Industrial Code Rules of the New York State Department of Labor, Board of Standards and Appeals, latest edition.

6. New York State Labor Law sections pertaining to safety and health of employees, latest edition.

7. Town Plumbing Code.

B. Sanitary sewer collection system work shall be accomplished in accordance with the requirements and regulations of the municipal agency having jurisdiction, unless otherwise indicated on the drawings.

1. Work within the Road R.O.W. shall conform to the requirements specified in the appropriate road opening permit of the municipal agency having jurisdiction.

2. Provide continuous access to the site. Coordinate work with other contractors and subcontractors working on the site, adjacent roadways, or adjacent properties. The Contractor shall not obstruct access to and from the adjacent properties from adjacent roadways and driveways.

3. Observe applicable local and/or State requirements. Take immediate steps to rectify hazardous or unsafe conditions. Conform to the maintenance and protection of traffic requirements of the municipal authorities and State and County agencies having jurisdiction and the N.Y.S.D.O.T. M.U.T.C.D.

C. Purchase and submit copies of permits and bonds necessary in connection with the performance of the work specified in this section. At the job site, post notices and copies of permits necessary to the proper and lawful performance of the work, in accordance with such permits. The Contractor shall obtain releases from the municipal agencies having jurisdiction approving the sanitary facilities and submit copies to the Owner and its authorized representatives.

D. The Contractor shall provide access to the Owner, their representatives, representatives of the municipal agencies having jurisdiction and testing laboratories engaged by the Owner for purposes of observing and testing the earthwork, at any time during the progress of the work, for purposes of determining the conformance to the specifications. Subsequent, observations and testing of redone work (of work that was determined to be unacceptable) will be at the Contractor's expense. Construction is subject to site observations. The Contractor shall notify the municipality having jurisdiction 48 hours prior to commencing construction and coordinate and arrange for the inspection. All work shall be acceptable to the municipality having jurisdiction before the Owner will accept it as complete.

E. Inverts at sanitary structures shall not exceed 0.02 feet from the design invert elevations. Pipes with no gradient, back-pitched pipes with a gradient of less than 1% will not be acceptable, unless otherwise indicated on the drawings. Invert elevations exceeding the tolerance or unacceptable gradients shall be removed, replaced and be compacted to meet the required specifications and contract drawings at no additional compensation, and as ordered by the Engineer. Actual elevation will be determined using field survey methods.

1.03 SUBMITTALS

A. Contractor shall submit Shop Drawings for review and approval by Engineer prior to ordering materials. Shop drawings shall include but not be limited to frames, covers, precast concrete structures and pipe.

B. Contractor shall retain a licensed Land Surveyor or Engineer to prepare a record as-built plan, accurately indicating exact location (horizontally and vertically) of all components of the sanitary sewer system. Record plan to indicate all inverts, tops, pipe size, slopes, tie dimensions from fixed points, etc. Contractor shall submit a minimum of six (6) copies of the record plan bearing the "wet" seal and signature of the licensed Land Surveyor or Engineer who prepared the document

to the Engineer. Plan must be submitted to the municipal agency having jurisdiction for final approval.

C. The Sanitary Sewer Contractor shall be responsible for securing a Town Plumbing Permit for the installation of the sanitary sewer connections form the sewer lateral to the proposed structures.

1.04 SITE CONDITIONS

A. Protect existing and new facilities and improvements against damage and maintain said existing and new improvements, etc. in a working or specified condition. The Contractor shall repair or replace damaged existing or new improvements on this site or adjacent properties or R.O.W.'s, which are damaged by construction operations, in conformance to the Contract Plans and Specifications to the satisfaction of the Owner and the representative of the municipal agency having jurisdiction, at no additional compensation.

B. Conduct sanitary system work so as not to interfere with other contractors and subcontractors working on the site, and adjacent roadways or properties and the public utilizing the adjacent roadways and driveways. Do not close or obstruct streets, driveways, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Maintain traffic and protect contiguous roadways and driveways during progress of the work. Materials, warning signs and traffic control devices used shall be acceptable to the State, County or municipal authorities having jurisdiction and in accordance with the N.Y.S.D.O.T. M.U.T.C.D.

PART 2 – PRODUCTS & MATERIALS

2.01 PRODUCTS & MATERIALS

A. Polyvinyl Chloride (SDR-35) & (DR-18)

1. Pipe and fittings shall comply with ASTM Standards unless otherwise specified on the drawings. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification and SDR rating.

2. Pipe joints shall be integrally molded bell ends per ASTM Standards with factory supplied elastomeric gaskets and lubricant.

C. Frames and Covers shall be manufactured by Campbell Foundry or approved equal.

D. Underground warning tape:

a. The material shall be solid plastic tape with a minimum thickness of 4.5 mil. The tape shall be resistant to alkalis, acids and other destructive elements. The tape shall be green in color, 3" minimum width, marked with the words "CATION – SANITARY SEWER". The warning shall be repeated every 16" – 36".

b. After partially backfilling and leveling the trenches to a height of 18" – 24" above the crown of pipe, the roll of tape shall be mounted to a wheel and spread above the prepared surface as straight as possible. The tape shall be held in position by adding backfill with hand shovels before using mechanical equipment to backfill.

c. If the sewer line or house connection does not end into a manhole, the tape shall be extended at least three (3) feet beyond the plugged end of the pipe.

PART 3 - EXECUTION

3.01 TRENCH & EXCAVATION PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove 2" or larger size stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.02 EXAMINATION

A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Civil Engineering drawings.

B. Excavate pipe trench and place bedding material in accordance with Section 31 00 00, "Earthwork".

C. Brace excavations in accordance with Section 02260, "Shoring and Bracing Earthwork".

3.03 INSTALLATION

A. Install pipe, fittings, and accessories in accordance with A.S.T.M. latest edition and/or manufacturer's instructions and state or local requirements.

B. Lay pipe to slope gradients noted on Civil Engineering drawings.

C. Install pipe on bedding in accordance with Section 31 00 00, "Earthwork" for work in this Section.

D. Refer to Section 31 00 00, “Earthwork” for trenching requirements. Do not displace or damage pipe when compacting.

A. Connect to building sanitary sewer outlet as indicated on the drawings.

B. Form bottom of excavation clean and smooth to correct elevation.

3.04 COORDINATION

A. Contractor shall coordinate with and retain the services of a licensed plumber in order to make final connection outside building.

B. Contractor to obtain plumbing permit for the installation of sanitary house connection.

C. Contractor shall notify the municipal agency having jurisdiction and the Engineer 48 hours in advance of commencement of construction to arrange for the required site observations.

D. Any portion of the sanitary system backfilled prior to observation by Engineer or municipal agency having jurisdiction, etc. shall be uncovered at the Contractor’s expense.

E. The sanitary sewer collection system Contractor, all other Contractors, and all Subcontractors shall coordinate their work with all adjacent work and shall coordinate with all other trades so as to facilitate the general progress of the work.

3.05 ACCEPTANCE

A. Record as-built plan must be approved by the municipal agency having jurisdiction as part of the acceptance.

B. Contractor shall comply with all testing requirements of the municipal agency having jurisdiction, and the Contractor is solely responsible for coordinating site observations with the Engineer and appropriate agency.

C. The Owner and/or Governing Agency reserves the right to mandrell test any flexible pipe sewer line before acceptance, and also prior to expiration of the first year of operation. If a previously accepted line fails a mandrell test performed during the first year of operation, the defects must be corrected at the Contractor's expense.

END OF SECTION 33 30 00

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SCOPE

A. Extent of the stormwater collection system is shown on the Contract Drawings and by the requirements specified in this section. Stormwater collection system work includes, but is not limited to, the following:

1. Connection to roof stormwater runoff drainage exiting the building.

2. Furnishing and installation of catch basins, Cultecs, manholes, piping and other stormwater drainage appurtenances.

3. Backfilling and compaction around stormwater facilities and appurtenances.

4. Maintenance of existing or new facilities in vicinity of stormwater facilities and appurtenances.

5. Cleaning of complete drainage system to the satisfaction of the Engineer and municipality having jurisdiction.

1.02 QUALITY CONTROL

A. Work, and types or methods of construction, shall in no event be less than that necessary to conform to all the provisions of the Town and local law, ordinances and regulations of the Town or any of the jurisdictional departments, applicable to the work included in this section, including but not limited to:

1. Town Highway Specifications.

2. Site Plan Requirements of the Town.

3. "Standard Specifications Construction and Materials" of the New York State Department of Transportation, latest edition.

4. Title 29 Code of Federal Regulations, Part 1926, Safety, and Health Regulations for Construction, (O.S.H.A.), latest edition.

5. Industrial Code Rules of the New York State Department of Labor, Board of Standards and Appeals, latest edition.

6. New York State Labor Law sections pertaining to safety and health of employees, latest edition.

B. Storm sewer collection system work shall be accomplished in accordance with the requirements and regulations of the Town, or as otherwise noted.

1. Work within the Road R.O.W. shall conform to the requirements specified in the appropriate road opening permit of the municipal agency having jurisdiction.

2. Provide continuous access to the site. Coordinate work with other contractors and subcontractors working on the site, adjacent roadways, or adjacent properties. The Contractor shall not obstruct access to and from the adjacent properties from adjacent roadways and driveways.

3. Observe applicable local and/or State requirements. Take immediate steps to rectify hazardous or unsafe conditions. Conform to the maintenance and protection of traffic requirements of the municipal authorities and State and County agencies having jurisdiction and the N.Y.S.D.O.T. M.U.T.C.D.

C. Purchase and submit copies of permits and bonds necessary in connection with the performance of the work specified in this section. At the job site, post notices and copies of permits necessary to the proper and lawful performance of the work, in accordance with such permits. The Contractor shall obtain releases from the municipal agencies having jurisdiction approving the stormwater facilities and submit copies to the Owner and its authorized representatives.

D. The Contractor shall provide access to the Owner, their representatives, representatives of the municipal agencies having jurisdiction and testing laboratories engaged by the Owner for purposes of observing and testing the earthwork, at any time during the progress of the work, for purposes of determining the conformance to the specifications. Subsequent, observations and testing of redone work (of work that was determined to be unacceptable) will be at the Contractor's expense. All construction is subject to site observations. The Contractor shall notify the municipality having jurisdiction 48 hours prior to commencing drainage construction and coordinate and arrange for the inspection. All work shall be acceptable to the municipality having jurisdiction before the Owner will accept it as complete.

E. Inverts at drainage structures shall not exceed 0.02 feet from the design invert elevations. Pipes with no gradient, back-pitched pipes with a gradient of less than 1% will not be acceptable, unless otherwise indicated on the drawings. Pipes with invert elevations exceeding the tolerance or unacceptable gradients shall be removed, replaced and be compacted to meet the required specifications and contract drawings at no additional compensation. Actual elevation will be determined using field survey methods.

1.03 SUBMITTALS

A. The Contractor shall submit to the Owner and representatives of the municipal agency having jurisdiction delivery tickets showing but not limited to the material type, date, time, project, amount and source and supplier certifications of the

materials delivered and utilized on the site, to show compliance with the specifications.

B. Contractor shall submit shop drawings for review and approval by Engineer prior to ordering material. Shop drawings shall include but not be limited to frames, covers, grates, cultec detention structures, precast concrete structures and pipe.

1.04 SITE CONDITIONS

A. Protect existing and new facilities and improvements against damage and maintain said existing and new improvements, etc. in a working or specified condition. The Contractor shall repair or replace damaged existing or new improvements on this site or adjacent properties or R.O.W.'s, which are damaged by construction operations, in conformance to the Contract Plans and Specifications to the satisfaction of the Owner and the representative of the municipal agency having jurisdiction, at no additional compensation.

B. Conduct drainage system work so as not to interfere with other contractors and subcontractors working on the site, and adjacent roadways or properties and the public utilizing the adjacent roadways and driveways. Do not close or obstruct streets, driveways, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Maintain traffic and protect contiguous roadways and driveways during progress of the work. Materials, warning signs and traffic control devices used shall be acceptable to the State, County or municipal authorities having jurisdiction and in accordance with the N.Y.S.D.O.T. M.U.T.C.D.

PART 2 – PRODUCTS & MATERIALS

2.01 PRODUCTS & MATERIALS

A. As a minimum, precast concrete stormwater structures shall conform to the requirements of the Town and New York State Department of Transportation. Collaring material shall be as specified in Section 31 00 00 – “Earthwork”. Structures shall be manufactured by Carlson Precast Inc., Long Island Precast, or approved equal.

B. Frames, covers and grates shall be extra heavy cast iron and steel of the type specified on the contract drawings conforming to the New York State Department of Transportation unless otherwise indicated on the drawings. Frames, covers and grates shall be manufactured by Campbell Foundry or approved equal.

C. Miscellaneous masonry, joint material and metal shall conform to Section 604 Catch Basins, Manholes, Field Inlets, Drop Inlets and Leaching Basins of the New York State Department of Transportation Standard Specifications.

D. Reinforced Concrete Pipe (RCP) and joints shall be Class IV, unless otherwise specified on the drawings.

E. Polyvinyl Chloride (SDR-35) & (DR-18)

1. Pipe and fittings shall comply with ASTM Standards unless otherwise specified on the drawings. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification and SDR rating.

2. Pipe joints shall be integrally molded bell ends per ASTM Standards with factory supplied elastomeric gaskets and lubricant.

F. Corrugated High Density Polyethylene Pipe, (HDPE) shall conform to ASTM Standards, latest edition. HDPE shall be ADS N-12 as manufactured by Advanced Drainage Systems or Hi-Q as manufactured by Hancor, Inc., or approved equal.

G. Downspout pipe exiting the building shall conform to the manufacturer's recommendations and building code requirements. The pipe type exiting the building and that connecting to the drainage facilities may differ in type. Connection shall be non-corrosive and watertight.

H. If the Contractor elects to use other pipe type besides what is specified on contract drawings, approval must be obtained by the appropriate jurisdiction, Owner and the Engineer prior to ordering.

I. Stormwater Chamber Disposal System shall be CULTEC Inc 902HD Rechargers. Chambers shall conform with ASTM F2787, ASTM F3430. Filtering Material to be Cultec No 4800 Woven geotextile fabric .

PART 3 - EXECUTION

3.01 TRENCH & EXCAVATION PREPARATION

A. Contractor shall prepare and compact trench or excavation bottom as specified in Section 31 00 00, “Earthwork”. Minimum bearing surface undisturbed or compaction shall be to 95% of the Maximum Modified Proctor Density at the optimum moisture content.

A. Contractor shall provide temporary excavation bracing as required per Section 02260, “Shoring and Bracing Earthwork”.

3.02 EXAMINATION

A. Verify existing conditions. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground utilities, structures and conflicts. Care should be exercised by the Contractor during excavation to avoid damage to existing structures.

B. Verify and coordinate locations of roof drains.

3.03 INSTALLATION

A. Installation shall conform to the requirements of the applicable sections of the Town specifications the manufacturer's recommendations, and the contract drawings.

B. The pipe type shall be as shown and specified on the contract drawings. Pipe types shall not be varied in a run between two successive structures.

C. Construct joints with the material specified herein in accordance with the manufacturer's recommendation and conforming as a minimum to the Town.

D. Backfill with suitable material and compact in accordance with the requirements of Section 31 00 00 “Earthwork”.

E. Connect to existing or new stormwater facilities as depicted on the drawings and specified herein to the satisfaction of the Owner and its authorized representatives or representative of authority jurisdiction. Any facilities damaged by the Contractor in the course of the connection, shall be repaired or replaced by the Contractor in accordance with the specifications and contract drawings at no additional compensation. Roof leader piping shall be connected to the piping exiting the building in accordance to the manufacturer's recommendation or building code requirements.

F. Unless shown otherwise on the plans, all structure wall openings resulting from connection of piping shall be completely sealed using brick and mortar, at a minimum.

G. Contractor shall set all castings, covers and grates to the line and grade shown on the contract drawings.

H. The Contractor shall maintain and protect existing and new structures in a workable or specified condition. All existing and new drainage improvements shall be kept clean of silt, dirt, rocks and debris. The drainage system shall be in a clean and complete condition, as specified herein, before the Owner will accept it as complete and be acceptable to the municipality having jurisdiction. The municipal agency having jurisdiction may require the system to be completely cleaned immediately prior to their final site visitation. The Contractor will be responsible for the cleaning and its costs.

I. Contractor shall install chamber system and backfill according to chamber manufacturer’s written instructions. Include storage and leaching chambers, filtering material, and filter mat.

3.04 COORDINATION

A. The stormwater collection system Contractor, all other Contractors, and all Subcontractors shall coordinated their work with all adjacent work and shall coordinate with all other trades so as to facilitate the general progress of the work.

END OF SECTION 33 40 00

SECTION 33 51 13

NATURAL GAS PIPING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 31 20 00.

1.02 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and catalog literature for the plastic gas piping including:
a. Table of pipe dimensions.
b. Physical properties of the pipe.
c. Design strengths of the pipe.
d. Brochure of available pipefittings and appurtenances.
2. Manufacturer's specifications and catalog literature for the following appurtenances:
a. Plastic gas valves.
b. Plastic gas valve service boxes.
c. Mechanical link seals.
d. Steel pipe sleeves.
d. Underground marking tape.

B. Verification of compliance with the rules and regulations of the gas utility company and approval of worker's qualifications by the gas utility company.

1.03 QUALITY ASSURANCE

A. Provide gas pipe and gas valve products manufactured to Title 49 of the Code of Federal Regulations, Part 192, "Transportation of Natural and Other Gas by Pipeline, Minimum Federal Safety Standards", issued by the Office of Pipeline Safety Operations, Materials Transportation Bureau, Department of Transportation.

B. Workers' Qualifications:
1. Employ only workers personally certified by the gas utility company as being experienced and skilled in actually making fused joints in plastic gas piping and appurtenances.
2. Submit credentials of the workers to be engaged in fusing and/or welding the plastic gas piping and appurtenances to the gas utility

company for its review. Obtain the gas utility company's approval of those individuals for performing such work.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Plastic Gas Piping: Performance Pipe Div. of Chevron Phillips Chemical Co., 2929 N. Central Expressway, Richardson, TX 75083, (972) 783-2665.

B. Plastic Gas Valves: Nordstrom Valves, Inc., 1511 Jefferson St., Sulphur Springs, TX 75482, (903) 885-4691.

C. Plastic Valve Service Boxes: Handley Industries, Inc., 2101 Brooklyn Rd., Jackson, MI 49203, (517) 787-8821.

D. Mechanical Link Seals: Thunderline/Link Seal, Div. of PSI, 6526 Goforth St., Houston, TX 77021, (800) 454-8104.

2.02 PLASTIC GAS PIPE

A. Pipe:
1. Extra High Molecular Weight (EHMW), High Density Polyethylene pipe meeting the requirements of ASTM D 2513.
2. Standard Dimension Ratio - 11.
3. Plastic Pipe Institute (PPI) Material Designation - PE 3408.
4. Long-term hydrostatic strength of 1600 psi at 73.4 degrees F.
5. Sizes as indicated on the Drawings.

B. Butt Fusion Fittings:
1. Match pipe size and pipe SDR rating.
2. Molded of EHMW, High Density Polyethylene resin and meeting the requirements of ASTM D 3261, as required by ASTM D 2513.
3. PPI Material Designation - PE 3408.
4. Design pressure rating of 102.4 psi at 73.4 degrees F.

2.03 PLASTIC GAS VALVES

A. Nordstrom 86111 Poly-Gas Ball Valve:
1. Full opening, SDR pipe ends.
2. Phillips TR-480 resin (ASTM Material Designation PE 3408) polyethylene body.
3. Polypropylene ball, High Nitrile Buna N seat seals, dual elastomeric stem seals.
4. Sizes: Same size as piping in which each is installed.

2.04 PLASTIC VALVE BOXES

A. Handley Industries Heavy Duty GHA-2/VVS to accept specified gas valve:
   1. High-grade ABS Polymer construction.
   2. Plastic Valve support designed to fit size and type of specified gas valve.
   3. Heavy-duty cast iron top collar with built-in magnet.

2.05 STEEL PIPE SLEEVES

A. API 5L Grade B seamless or electrically welded steel pipe: ASTM A 53.
   1. Wall thickness: Standard Weight (Sch. 40).
B. Size: Carrier pipe size plus 4 inches in diameter.

2.06 MECHANICAL LINK SEALS

A. Thunderline Pipe Line (PL) Model:
   1. Interlocking links of solid synthetic rubber connected by rubber-coated corrosion resistant bolts and nuts to form a sealing belt in an annular pipe space.
   2. Thunderline 400 series.
   3. Model LS-425-C for use with Sch. 40, steel pipe sleeves.

2.07 WOOD SKIDS

A. PressureTreated (AWPB LP-22) Southern Yellow Pine lumber trimmed and shaped as required.

2.08 SAND FILL

A. No. 1B Crushed Stone as specified in DOT Section 703 - Aggregates.

2.09 CAST-IN-PLACE CONCRETE (GAS VALVE SERVICE BOX APRONS)

A. Concrete: Normal weight, air-entrained concrete having a minimum compressive strength of 3000 psi at the end of 28 days.

2.10 PRECAST CONCRETE BLOCKS (GAS VALVE SUPPORTS)

A. Comply with DOT Section 704-04.

2.11 UNDERGROUND MARKING TAPE

A. Detectable Marking Tape: 6-inch width, yellow color-coding, wording - “CAUTION: BURIED GAS LINE BELOW”.

PART 3 EXECUTION

3.01 GENERAL

A. Except for the transitions between plastic pipe and steel pipe, join the plastic piping including the plastic gas valves into homogenous union by butt fusion using equipment employing temperature and pressure to complete the fused joints.

B. Employ only workers personally certified by the gas utility company as being experienced and skilled in actually making the fused joints.

C. Use only molded plastic pipefittings for tee and elbow connections. Fittings formed of fused mitered pipe sections will not be acceptable.

D. Support plastic gas valves on precast concrete blocks and provide a cast-in-place concrete apron at the top of each valve box as indicated on the Drawings.

3.02 INSTALLATION

A. Install piping in accordance with the trenching detail and layout indicated on the Drawings. Avoid interference with existing utilities.

B. Install the plastic gas valves as indicated on the Drawings. As part of each installation, provide the specially molded and formed valve support for the specified gas valve.

C. Connect the new gas service to the gas utility company's system, or metering and pressure regulating station in accordance with the gas utility company's requirements.

D. Make transitions to steel piping with molded plastic flange adapters equipped with steel slip-on flanges. Butt fuse adapters to the plastic gas line terminal ends and connect to the flanged ends of the steel lines with Type 317 stainless steel bolts and nuts.

3.03 STREET CROSSINGS

A. Install the plastic pipe in steel sleeves at the locations indicated on the Drawings.

B. Blow sand fill into the annular space within the sleeves to firmly cushion the plastic gas pipe. Close both ends of the sleeves with mechanical link seals.

3.04 TESTING

A. Ascertain requirements, procedures, etc. of the gas utility company for air testing the plastic gas piping and appurtenances following their installation.

B. Perform tests as required by and to the satisfaction and approval of the gas utility company.

C. Provide necessary labor, materials and equipment for the tests.

3.05 BACKFILL

A. Backfill trenches for the gas piping in accordance with Section 310000.

B. Install underground marking tape as indicated on the Drawing.

END OF SECTION

SECTION 34 41 13
TRAFFIC SIGNS

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings: Show shop drawings, not necessarily to scale, but sufficient enough in detail to show color, wording, lettering size and style, overall sign size, construction details and installation details for each type of sign.

PART 2 PRODUCTS

2.01 TRAFFIC SIGNS

A. Construction Materials: Comply with the applicable requirements of DOT Section 645.

B. Posts: Galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Erect signs in their designated locations, as indicated and in accordance with the approved shop drawings and the applicable requirements of DOT Section 645.

B. Protect surfaces and finishes from abrasion and other damage during handling and installation.

C. Replace damaged or faulty signs.

END OF SECTION

CARLIN • SIMPSON & ASSOCIATES

Consulting Geotechnical and Environmental Engineers

61 Main Street, Sayreville, New Jersey 08872
Tel. (732) 432-5757
Fax. (732) 432-5717

Principal:
Robert B. Simpson, P.E.

Associates:
Meredith R. Anke, P.E.
Stephen Rossi, P.E.
Catherine Simpson, E.I.T.
Kurt W. Anke
Eric J. Shaw

7 August 2020

Iona Preparatory School
255 Wilmot Rd
New Rochelle, NY 10804

Attn: Brother Thomas Leto, CFC
President

Re: Report on Subsurface Soil and Foundation Investigation
Proposed Building
Iona Preparatory School
255 Wilmot Rd.
New Rochelle, NY (CSA Job #20-116)

Dear Brother Thomas:

In accordance with our revised proposal dated 11 June 2020 and your subsequent authorization, we have completed a Subsurface Soil and Foundation Investigation for the referenced site. The purpose of this study was to determine the nature and engineering properties of the subsurface soil and the groundwater conditions for the new construction, to recommend a practical foundation scheme, to determine the allowable bearing capacity of the site soils, and to determine the soil permeability in the new stormwater management areas.

We understand that the planned construction will consist of new building. The construction will also include a new stormwater management system. To guides us in our study, you have provided us with plans that indicate the location of the proposed development.

Our scope of work for this project included the following:

1. Reviewed the proposed layout, the existing site conditions, the expected soil conditions, and planned this study.

2. Retained General Borings Inc. to advance seven (7) test borings at selected locations on the subject site.

3. Performed one (1) infiltration test in the proposed stormwater management area.

4. Laid out the boring locations in the field, visually identified the soil layers encountered, obtained soil samples, and prepared detailed boring logs and a Boring Location Plan.

5. Performed laboratory soil identification tests on selected representative samples.

6. Analyzed the field and laboratory test data and prepared this report containing the results of this study.

1.0 SITE DESCRIPTION

The project site is on the Iona Preparatory School Campus, located at 255 Wilmont Road in New Rochelle, NY. The proposed building footprint is currently being used as a landscape staging area with several stockpiles of mulch and topsoil. The area is also lightly wooded. Site grades vary and generally slope down to the east and range from in elevation from +226.0 to +215.0.

2.0 PROPOSED CONSTRUCTION

We understand that the planned construction will consist of new building just to the north of the Wellington T. Mara Field. Other site improvements will include a new stormwater management system. The finished floor elevation and building loads of the new building were unknown at the time of this report.

The following evaluation is based on information that has been provided to our office as of the date of this report. Once the construction plans have been further developed, a copy of the final plans should be forwarded to our office so that we can review them along with the recommendations in this report. At that time, any changes or additional recommendations can be provided, if required.

3.0 SUBSURFACE CONDITIONS

To determine the subsurface soil and groundwater conditions at the site, seven (7) test borings were advanced by General Borings Inc. All locations of the borings are shown on the enclosed Boring Location Plan. Detailed boring logs have been prepared and are included in this report. The borings were completed in July 2020 under the full-time inspection of Carlin-Simpson & Associates. Our field representative visually identified all soil samples and selected soil samples were tested in our laboratory.

3.1 Soil and Rock

The soil descriptions shown on the boring logs are based on the Burmister Classification System. In this system, the soil is divided into three components: Sand (S), Silt ($) and Gravel (G). The major component is indicated in all capital letters, the lesser in lower case letters. The following modifiers indicate the quantity of each lesser component:

Modifier	Quantity
trace (t)	0 -10%
little (l)	10% - 20%
some (s)	20% - 35%
and (a)	35% - 50%

The subsurface soil and rock conditions encountered in the borings can be summarized as follows:

Stratum 1 Existing Fill — The surface layer in each of the test borings is loose to medium dense existing fill that generally consists of brown or dark brown coarse to fine SAND, some (-) (to some) Silt, trace (to little) coarse to fine Gravel. Large amounts of debris was encountered in this stratum consisting of glass, millings, wood and mulch. This stratum extends to depths ranging from 1'6" to 2'6" below the existing ground surface.

Deeper existing fill was encountered in boring B-4 to a depth of 7'0" below the existing ground surface.

Stratum 2 Sand — Underlying the existing fill in test borings B-1 and B-3 to B-7 is medium dense to dense virgin soil consisting of brown coarse to fine SAND, trace Silt, little medium to fine Gravel. This layer extends to a depth of 5'6" to 10'0" below existing ground surface.

Stratum 3 Completely Weathered Schist Bedrock — Underlying the existing fill in boring B-2 and beneath the sand in the remaining borings is completely weathered schist bedrock. This layer is soil like in state, however there are denser pockets that likely cannot be conventionally excavated. The weathered rock was encountered at depths ranging from 2'0" to 10'0" below the existing ground surface. Borings B-2, B-4, B-6 and B-7 were terminated upon auger refusal at depths ranging from 4'6" to 12'0" below the existing ground surface.

Stratum 4 Schist Bedrock — Schist bedrock was encountered throughout the site. The bedrock was cored at boring locations B-1, B-3 and B-5 in the building footprint. The rock is generally poor to fair quality. Recoveries ranged from 93 to 100% with rock quality designations (RQD) ranging from 27% to 75%. Based on the RQD and visual inspection, the recovered cores ranged highly weathered, shattered, very blocky and seamy to moderately weathered, blocky and seamy.

3.2 Bedrock

Based on our experience and the boring observations, the in-situ bedrock at the site will range from completely weathered rock in a soil-like state, to blocky and seamy condition. The rock generally transitions into harder, more intact, bedrock with increasing depth. The completely weathered rock was encountered at depths ranging from 2'0" to 10'0" below the ground surface (elevations +218.0 to +209.75). Auger refusal on harder bedrock was encountered at depths ranging from 4'6" to 12'0" below the existing ground surface (elevation +217.0 to +206.5). The bedrock observations are summarized in Table 1 below.

The finished floor elevation of the proposed building is unknown. During the building foundation excavation, rock removal may be required. Penetration into the bedrock and completely weathered rock with excavation equipment will depend on the degree of weathering and fracturing in the rock. The upper few feet of rock may be "rippable" by using large construction equipment, but we anticipate that the "rippability" of the bedrock will be variable and limited. It should not be assumed that the completely weathered rock (very dense material in a soil-like state) can be excavated with conventional equipment. Harder rock may be encountered, and the use of hydraulic hammers may be required to excavate the harder, intact bedrock. Additional issues related to rock removal are discussed in Section 5.1 of this report.

3.3 Groundwater

During the subsurface investigation, groundwater was not encountered above the bedrock surface in any of the borings. During construction, we expect that perched or trapped water may be encountered within the silty site soils and/or along the soil/rock interface, especially during wet periods. Proper groundwater control measures will be required where water is encountered in the site excavations. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration.

3.4 Summary of Boring Observations

A summary of the observations of the borings are provided below.

Table 1 – Summary of Boring Observations

Boring No.	Approximate Existing Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth to Bottom of Existing Fill (Elevation)	Depth to Bedrock (Elevation)
B-1	+219.0	NWR	1'6" (+217.5)	CWR @ 6'3" (+212.75) C @ 8'0" (+211.0)
B-2	+218.5	NE to 8'0"	2'0" (+216.5)	CWR @ 2'0" (+216.5) AR @ 8'0" (+210.5)
B-3	+221.0	NWR	2'6" (+218.5)	CWR @ 5'6" (+215.5) C @ 11'0" (+210.0)
B-4	+221.0	NE to 11'6"	7'0" (+214.0)	CWR @ 10'0" (+211.0) AR @ 11'6" (+209.5)
B-5	+221.0	NWR	2'0" (+219.0)	CWR @ 3'0" (+218.0) C @ 4'0" (+217.0)
B-6	+218.5	NE to 4'6"	2'0" (+216.5)	CWR @ 4'0" (+214.5) AR @ 4'6" (+214.0)
B-7	+218.5	NE to 12'0"	2'0" (+216.5)	CWR @ 8'3" (+209.75) AR @ 12'0" (+206.5)

AR –Auger Refusal on Probable Intact Schist Bedrock
CWR – Completely Weathered Rock
NE – Not Encountered
C – Cored Bedrock
NWR – No Water Reading

4.0 SUMMARY OF DESIGN RECOMMENDATIONS

Below is a summary of the major design and construction considerations for the proposed construction. Additional recommendations are provided in the following sections of this report.

- *Subsurface Conditions* for the Proposed Construction *(Section 3.0)*
  - Existing Fill was encountered in each of the borings to depths ranging from 1'6" to 2'6" below the existing ground surface (elevation +219.0 to +216.5).
  - An isolated of deeper existing fill was encountered in boring B-4 extending to a depth of 7'0" (elevation +214.0) below the existing ground surface.
  - Groundwater was not encountered above the bedrock surface in any of the borings.
  - Completely weathered rock was encountered throughout the site at depths ranging from 2'0" to 10'0" below the ground surface (elevations +218.0 to +209.75). This layer is soil like in state, however there are denser pockets that likely cannot be conventionally excavated.
  - Schist Bedrock was encountered throughout the site at depths ranging from 4'6" to 12'0" below the existing ground surface (elevation +217.0 to +206.5).

- *Building Subgrade Preparation (Section 5.1)*
  - Surface materials must be stripped, and stockpiles removed from the proposed construction area.
  - Due to the isolated deep existing fill, we recommend that a series of supplemental test pits be performed at the time of construction to further evaluate the existing fill (i.e. buried mulch) conditions in and around the planned building area.
  - Existing fill must be completely removed from the building area and replaced with new compacted fill.
  - The exposed subgrade shall be densified with several passes of a large vibratory roller prior to excavation of the new foundations.
  - New backfill shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557).

- *New Foundations Recommendations (Section 5.2)*
  - The existing fill is not suitable bearing material for the new building.
  - The existing fill shall be completely removed from building footprint and replaced with new compacted fill.
  - Special construction procedures must be employed if the building foundation bears on dissimilar material (i.e. soil and rock).
  - Use of hydraulic hammers may be required in order to achieve the bottom of footing excavations.
  - The new foundations may be designed as spread footing type foundations bearing on virgin soil, completely weathered rock or bedrock with the following net design bearing pressure:
    - Virgin Soil/ New Compacted Fill is 4,000 psf.
    - Schist Bedrock is 6,000 psf
  - Minimum depth for frost protection = 42 inches.
  - Seismic Site Class = C Very Dense Soil/Soft Rock.

- *Floor Slab Recommendations (Section 5.3)*
  - The existing fill is not suitable bearing material for the new building floor slab.
  - Virgin soil, new compacted fill, completely weathered rock, and intact bedrock are suitable for support of the floor slab.
  - The floor slab may be designed as slab on grade.
  - Modulus of subgrade reaction = 200 pci.

- *Stormwater Management System (Section 6.1):*
  - Boring B-7 was completed in the area of the proposed stormwater management system.
  - Soil condition at the infiltration depth consist of brown sand (Stratum 3).
  - Groundwater was not encountered above the bedrock surface.
  - Completely weathered rock was encountered at a depth of 8'3" below the existing ground surface (elevation +209.75).
  - Schist Bedrock was encountered at a depth of 12'0" below the existing ground surface (elevation +206.5).
  - One infiltration test was performed at the B-7 location at a depth of 5'0" below the existing ground surface. Test results can be found in Table 5 below.

5.0 BUILDING EVALUATION

The finished floor elevations and building loads are unknown. The following evaluation is based on information that has been provided to our office as of the date of this report. Once the construction plans have been further developed, a copy of the final plans should be forwarded to our office so that we can review them along with the recommendations in this report. At that time, any changes or additional recommendations can be provided, if required.

We understand that the planned construction will consist of a new building. Boring B-1 through B-6 were performed in the new building footprint. A summary of the boring observations performed in the proposed building areas is provided in Table 1 above.

Existing fill was encountered throughout the site at depths ranging from 1'6" to 2'6" (elevations +219.0 to +216.5) below the existing ground surface. Deeper existing fill was encountered in the area of boring B-4 extending to a depth of 7'0" (elevation +214.0) below the existing ground surface. The depth of the existing fill is expected to be variable and may be deeper in unexplored areas of the site.

We recommend that a series of supplemental test pits be performed at the time of construction to further evaluate the existing fill conditions in and around the planned building area. The test pits should be conducted under the fulltime observation of a Carlin-Simpson & Associates representative. These test pits will allow us to determine the horizontal and vertical limits of the unsuitable material within the proposed building area.

The existing fill is not an acceptable bearing material for the new building foundation. The consistency and density of the existing fill are not predictable. Certain areas may contain clean dense soils while other areas may contain loose material, void spaces, and/or debris. The existing soil fill creates the possibility of intolerable differential settlements under loading.

Provided the existing fill is completely removed and replaced from the building footprint as described in 5.1 below, the building foundation may be designed as a shallow spread foundation

bearing on engineered-approved compacted fill, virgin medium dense to dense Sand (Stratum 2), or schist bedrock. Recommendations for preparation of the building area is provided in Section 5.1. Foundation recommendations are provided in Section 5.2 below.

5.1 Building Subgrade Preparation

In order to prepare the site for construction, all surface materials such as asphalt, topsoil, and vegetation shall be removed from the planned building area, extending at least ten (10) feet beyond the new construction limits, where practical.

In the event that existing utilities are encountered within the planned building addition area, they should be either abandoned or rerouted around the new building. Once the utility has been rerouted or abandoned, the section of pipe and any associated structure within the building addition area should be completely removed. The removal of the pipe and structure must also include any loose fill around the pipe or structure. After the pipe, associated structure, and associated loose backfill have been removed, the resulting excavation shall be backfilled with new controlled fill as described below.

Due to the isolated deep existing fill consisting of mulch, we recommend that a series of supplemental test pits be performed at the time of construction to further evaluate the existing fill conditions in and around the planned building area. The test pits should be conducted under the fulltime observation of a Carlin-Simpson & Associates representative. These test pits will allow us to determine the horizontal and vertical limits of the unsuitable material within the proposed building area.

Removal of Existing Fill

The boring data indicates that existing fill is present throughout the building footprint. The existing fill extends to depths ranging from 1’6” to 2’6” (elevations +219.0 to +216.5) below the existing ground surface. Deeper existing fill was encountered in the area of boring B-4 extending to a depth of 7’0” (elevation +214.0) below the existing ground surface. As discussed above, the existing fill is not a suitable bearing material for the new building foundations and must be completely removed and replaced as described below.

Based on the boring observations, existing site grades, existing building finished floor elevation, and the proposed construction, we anticipate that an over-excavation of two to three feet below finished floor elevation will be required. The over-excavation shall extend through the existing fill, down to the virgin soil. At the bottom of the excavation, the removal of the unsuitable material shall extend horizontally beyond the building limits a minimum distance of 1’0” plus a distance equal to the depth of the excavation below the planned foundation bearing elevation. For example, if the removal of the existing fill extends vertically 3’0” below the planned foundation bearing elevation, the excavation must extend horizontally a minimum of 4’0” (1’0” plus 3’0”) beyond the new building limits at that location.

The removal of the existing fill from the proposed building area shall be performed under the full time inspection of Carlin-Simpson & Associates. The on-site representative from Carlin-Simpson & Associates shall direct the contractor during this operation to ensure that all of the unsuitable material has been removed from the proposed building area.

During the removal of the unsuitable material, the contractor should segregate the potentially re-usable existing soil/fill material from the non-reusable fill (i.e. ash, debris and topsoil). The on-site representative from Carlin-Simpson & Associates shall evaluate the suitability of the excavated materials for use as compacted fill during the excavation and prior to its re-use. Potentially usable fill should be stockpiled and covered with tarps or plastic sheeting for protection from excess moisture. Any fill material that is or becomes wet must be dried prior to its re-use.

After the surface materials and existing fill have been removed and prior to the placement of new structural fill, the exposed subgrade soil must be graded level and proofrolled by several passes of a vibratory drum roller. The proofrolling operation is necessary to densify the underlying soils. Carlin-Simpson & Associates shall be retained to observe the proofrolling of the subgrade. If any soft or otherwise unsuitable soils are noted, the unsuitable material shall be removed and replaced with new structural fill. Carlin-Simpson & Associates shall be responsible for determining what material, if any, is to be removed and will direct the contractor during this operation.

Construction Impacts on Adjacent Buildings

The northeast corner of the proposed building footprint is within five (5) feet of an existing 1-story building. When new footings are planned adjacent or in close proximity to an existing building foundations, the new footings shall bear at the same elevation as the existing footings. This is required to ensure that the new foundation does not surcharge the existing foundation walls and to ensure that the new foundation does not bear on fill placed around the existing foundations of foundation walls. In the event that new building foundation will bear at a lower elevation than the adjacent existing foundations, underpinning of the existing foundations will be required.

Installation of New Structural Fill

New fill required to achieve final grades shall consist of either engineer-approved on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. The new fill shall be placed in layers not exceeding one (1) foot in thickness and each layer shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D1557). Each layer must be compacted, tested, and approved the Carlin-Simpson & Associates field representative prior to placing subsequent layers. The suitability of the excavated soil for reuse as compacted structural fill is discussed in Section 6.5 below.

If imported structural fill will be required during construction, the imported structural fill shall meet the following specified gradation:

US Standard Sieve Size	Percent Finer By Weight
3 inch	100
No. 4	30-80
No. 40	10-50
No. 200	0-20

5.2 Building Foundation

Once the planned building subgrade has been prepared as described Section 5.1 above, the new foundations may be constructed on the virgin site soils, new structural fill, completely weathered

bedrock, or intact bedrock. The new building foundation may use a net design bearing pressure as listed in the Table 2 below.

Special Bedrock Procedures

Where rock is encountered in building excavations, "Special Construction Procedures" must be employed. When an footing bears on dissimilar material (i.e. rock and soil) the potential for differential movement exists. A footing bearing in rock will not move, whereas a footing bearing on soil will settle slightly due to the compressive nature of all soils when subjected to new loads. The area between movement and non-movement will develop a (shear) stress point. Cracks in foundation, floor slab, and walls will be the result from such movement. Therefore, the building foundation must bear either entirely on rock or entirely on soil for any individual structure. Alternatively, for larger structures, transition zones can be constructed to create a gradual transition from a soil to a rock bearing subgrade.

Where rock and soil both exist at the bearing elevation in an building foundation excavation, the foundation must either be lowered to bear entirely on rock, or a minimum of 18 inches of rock must be removed from below planned footing bottom. The over-excavated 18 inches must then be filled with a granular material having a maximum particle size of 1/2-inch and containing at least 10% but not more than 30% material by weight passing a No. 200 sieve. The fill shall be placed in six (6) inch layers and each layer shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557). This procedure will create a "cushion" atop the rock and reduce the potential for differential movement. For soft, rippable rock, this procedure will not be required.

If during the excavation for the proposed building foundations, the transition from soil to rock is gradual (i.e. from medium dense soil to dense weathered rock to very dense rock) over a distance of 20 feet or more, the "Special Construction Procedures" may not be required. This would have to be evaluated in the field on a case-by-case basis by the representative from Carlin-Simpson & Associates at the time of construction.

Prior to the placement of formwork, reinforcement steel, and concrete, the bearing subgrade soil shall be cleaned of all loose soil and where soil is encountered at the subgrade elevation, it shall be compacted with several passes of a small vibratory drum trench compactor (i.e. Wacker Model RT560), a heavy vibratory plate tamper (i.e. Wacker BPU 3545A or equivalent), or "jumping jack" style tamper (i.e. Wacker Model BS 600). This must be performed under the observation of Carlin-Simpson & Associates. If instability is observed during the compaction of the bearing subgrade, the soft soil shall be removed and replaced with new compacted fill.

Foundation Design Parameters

Once the planned building subgrade has been prepared as described Section 5.1 above, the new foundations may be constructed on the virgin site soils (Stratum 2), new compacted fill, completely weathered bedrock (Stratum 3), or Intact Bedrock (Stratum 4). The new building foundations may be designed as a shallow spread footing using a net design bearing pressure as listed in the Table 2 below.

The excavations for the new foundations shall be performed under the full-time inspection of Carlin-Simpson & Associates. The on-site representative shall confirm that the foundation bearing material is capable of supporting the design bearing pressure.

Table 2 – Building Foundation Design Parameters

Description	Value
Foundation Bearing Material	Virgin Soil, New Compacted Fill, Bedrock
Net Design Bearing Pressures: *Virgin Soil/New Compacted Fill* *Schist, Completely Weathered*	 4,000 psf 6,000 psf
Minimum Frost Depth	42 inches
Minimum Column Dimension	30 inches
Minimum Wall Dimension	18 inches

Prior to the installation of the reinforcement steel and concrete, the bottoms of the foundation excavations should be cleaned of all loose material. The foundation subgrade shall be compacted with a small vibratory drum trench compactor (i.e. Wacker Model RT560), a heavy vibratory plate tamper (i.e. Wacker BPU 3545A or equivalent), or a "jumping jack" style tamper (i.e. Wacker Model BS 600). The preparation of the footing bearing subgrade should be performed under the observation of a representative from Carlin-Simpson & Associates. If instability is observed during the compaction of the bearing subgrade, the soft soil shall be removed and replaced with new compacted fill.

5.3 Floor Slab on Grade

The floor may be designed as a slab on grade bearing on densified virgin soil, completely weathered rock, bedrock, or new engineer-approved structural fill. Floor slab design parameters are provided in Table 3 below. A layer of 3/4-inch crushed stone is recommended beneath the concrete slab for additional support and drainage. Provisions for sump pits and pumps are recommended for slabs that are bearing near bedrock.

Table 3 –Floor Slab Design Parameters

Description	Value
Slab Subgrade Material	Densified Virgin Soils/ Completely Weathered Rock / New Structural Fill
Modulus of Subgrade Reaction (k)	200 pci
Crushed Stone Cushion Thickness:	12 inches

New fill for the floor slabs shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% material by weight passing a No. 200 sieve. The new fill shall be placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D1557). Fill layers shall be compacted, tested, and approved before placing subsequent layers.

5.4 Building Settlement

Settlement of building, designed in accordance with recommendations presented in this report, is expected to be within tolerable limits for the proposed structure. For a floor slab placed on natural soils or new compacted fill approved by Carlin-Simpson & Associates and constructed in accordance with the requirements outlined in this report, maximum total settlement is expected to be

on the order of 1-inch or less. Maximum differential settlement between adjacent columns or load bearing walls is expected to be half the total settlement.

The above settlement values are based on our engineering experience with similar soil conditions and the anticipated structural loading, and are to guide the structural engineer with his design. To minimize difficulties during the floor slab installation phase, it is critical that Carlin-Simpson & Associates be retained to observe the floor slab bearing surfaces and to confirm the recommended bearing pressures and that unsuitable materials have been removed from beneath the new floor slab.

5.5 Seismic Design Considerations

From site-specific test boring data, the Site Class was determined from Section 1613.2.2 of the New York State Building Code. The site-specific data used to determine the Site Class typically includes soil test borings to determine Standard Penetration resistances (N-values). Based on estimated average N-values in the upper 100 feet of soil profile, the site can be classified as Site Class C – Very Dense Soil/Soft Rock Profile.

The new building should be designed to resist stress produced by lateral forces computed in accordance with Section 1613 of the New York State Building Code. The values in Table 4 shall be used for this project.

Table 4 – Seismic Design Values

Description	Value
Mapped Spectral Response Acceleration for Short Periods, [Fig 1613.2.1 (1)]	S_S=0.2923g
Mapped Spectral Response Acceleration at 1-Second Period, [Fig 1613.2.1 (2)]	S_1=0.061g
Site Coefficient [Table 1613.2.3 (1)]	F_a= 1.30
Site Coefficient [Table 1613.2.3 (2)]	F_v= 1.50
Max Considered Earthquake Spectral Response for Short Periods [Eq 16-36]	S_{MS}=0.380g
Max Considered Earthquake Spectral Response at 1-Second Period [Eq 16-37]	S_{M1}=0.091g
Design Spectral Response Acceleration for Short Periods [Eq 16-38]	S_{DS}=0.253g
Design Spectral Response Acceleration for 1-Second Period [Eq 16-39]	S_{D1}=0.061g

6.0 SITE EVALUATION

Our recommendations for the proposed site development including new stormwater management systems, new driveways and parking lot pavement, new utilities, temporary support of excavation, and the suitability of the existing site soils for reuse as structural fill are provided below.

6.1 Stormwater Management System

It is our understanding that a new stormwater management system will be constructed at the site. Boring B-7 was performed in the area of the proposed system. The soil condition at the test depth consisted of brown coarse to fine SAND, trace Silt, little coarse to fine Gravel (Stratum 3). Completely weathered rock was encountered at a depth of 8’3” below the existing ground surface (elevation +209.75). Schist Bedrock was encountered at a depth of 12’0” below the existing ground surface (elevation +206.5). Groundwater was not encountered above the bedrock surface.

During this study, one (1) infiltration tests was performed in the proposed subsurface detention stormwater management area. The infiltration test was performed in accordance with NYSDEC procedures. The result of permeability test that was performed is summarized in Table 5 below.

Table 5 – Summary of Stormwater Infiltration Boring and Test Results

Boring No.	Approx. Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth of Test* (Elevation)	Depth to Bedrock or Auger Refusal (Elevation)	Field Infiltration Rate	Calculated Vertical Permeability Rate, K_m
TP-7	+218.5	NE to 12'0"	5'0" (+213.5)	CWR @ 8'3" (+209.75) AR @ 12'0" (+206.5)	>24.0 in/hr	22.72 in/hr

*Soil Condition at test depth is Sand (Stratum 3)
AR –Auger Refusal on Probable Intact Schist Bedrock
CWR – Completely Weathered Rock
NE – Not Encountered

Should stormwater management areas be planned in other portions of the property, they should be evaluated on a case-by-case basis. The stormwater management systems must be designed in accordance with the applicable New York State Department of Environmental Conservation (NYSDEC) regulations and the New York State Stormwater Management Design Manual (January 2015). The testing requirements are outlined in Appendix D of the manual.

6.2 Pavement

We understand that the proposed construction may also include new asphalt paved parking areas and driveways. Densified virgin site soils, completely weathered rock, and new compacted fill may be used to support the pavement.

To prepare the new pavement areas, the existing surface materials (i.e. topsoil, vegetation, etc.) must be removed from the planned pavement areas. In the proposed pavement areas, the existing structures and debris resulting from the demolition of these structures must be completely removed from the new pavement area, extending at least five (5) feet beyond the new paving limits, where practical. The excavations resulting from the removal of existing structures shall be backfilled using controlled compacted fill. New fill shall consist of either suitable on-site soil or imported sand and gravel placed in one (1) foot loose layers and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557).

After all surface materials have been removed, the area can be excavated to the planned subgrade elevation. Where soil is encountered at the subgrade elevation, the subgrade shall be proofrolled with a large vibratory drum roller (i.e. Dynapac 250 or equivalent) to densify the underlying soils. The on-site representative from Carlin-Simpson & Associates shall witness the proofrolling operation. If any excessive movement is noted during the proofrolling, the soft or unsuitable soil shall be removed and replaced with new compacted fill.

Where new fill is required to achieve final grades, it shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. New fill shall be placed in layers not exceeding one (1) foot in loose

thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). After the planned subgrade has been proofrolled and new compacted fill has been placed as required, the new pavement subbase may be placed on the existing site soils, bedrock, and new compacted fill.

A minimum of six (6) inches of dense graded aggregate (DGA) or crushed stone is recommended for sub-pavement drainage and additional pavement support. We recommend that the following pavement sections be used for the parking lots and driveways. This pavement section is subject to local government approval.

Asphalt Pavement Section

The new pavement subbase may be placed on engineer-approved densified virgin soil, or new compacted fill. A minimum of six (6) inches of dense graded aggregate (DGA) is recommended for the subbase layer for drainage and additional pavement support. We recommend that the following pavement section be used for the parking lots and driveways. This pavement section is subject to local government approval.

2”	Asphalt Top Course	NYSDOT, Type 6F
4”	Asphalt Base Course	NYSDOT, Type 3
6”	Stone Subbase (DGA)	NYSDOT, Type 1
	Approved Compacted Subgrade (Minimum CBR = 10)	

6.3 Utilities

New utilities may bear in the virgin soil, completely weathered rock or new compacted fill. The bottom of all trenches shall be excavated clean so a hard bottom is provided for pipe support. If any soft areas or unsuitable existing fill and debris conditions are encountered during the construction operation, these materials must be removed and replaced with new compacted fill.

Trench blasting may be required to install the new utilities in portions of the site where rock is encountered above the planned utility invert elevation. Where rock is encountered in the utility excavations, it must be removed to at least six (6) inches below planned pipe invert. The over-excavated six (6) inches shall then be filled with new sandy fill and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557) to act as a cushion on the rock.

In the event that water is encountered within the utility trench excavation or if the trench bottom becomes soft due to the inflow of surface water or trapped water, a layer of geotextile filter fabric and a minimum of six (6) inches of crushed stone shall be placed on the bearing soil to provide a firm base for support of the pipe. Sump pits and pumps should be used to keep the excavations dry.

After the utility is installed, the trench must be backfilled with compacted fill. The fill shall consist of suitable on-site soil or imported sand and gravel. Imported fill shall contain less than 20% by weight passing a No. 200 sieve. Controlled compacted fill shall be placed in 12 inch loose layers and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D1557). The backfill must be free of topsoil and debris.

6.4 Temporary Construction Excavations and Excavation Protection

Temporary construction excavations should be conducted in accordance with the most recent OSHA guidelines or applicable federal, state or local codes. A qualified person should evaluate the excavations at the time of construction to determine the appropriate soil type and allowable slope configuration. Based on the boring data, we believe the site soils and rock would have the following classifications as defined by the OSHA guidelines.

Soil/Rock Type	Possible Classification	Maximum Slope or Bench
Existing Fill	Type "C"	1 1/2H:1V
Virgin Soil/ Completely Weathered Rock	Type "B" or "C"	1H:1V to 1½H:1V
Intact Bedrock	Type "A" or Stable Rock	3/4H:1V

Temporary support (i.e. trench boxes, sheeting and shoring, etc.) should be used for any excavation that cannot be sloped or benched in accordance with the applicable regulations, where necessary to protect adjacent utilities and structures, or where saturated soils or water seepage is encountered within the excavation.

Table 6 – Temporary Sheeting and Shoring Design Parameters

Description	Value
Moist Unit Weight (pcf)	130
Friction Angle (ϕ, deg)	30
Cohesion (c, psf)	0
Active Earth Pressure Coefficient (k_a)[1]	0.33
Equivalent Fluid Pressure (pcf)	43.3
Passive Earth Pressure Coefficient (k_p)[1]	3.0

A New York State licensed professional engineer must design all temporary and permanent support systems. The contractor will select the shoring type and submit design calculations for the proposed shoring method to Carlin-Simpson & Associates for review. The soil adjacent to the temporary support system will exert a horizontal pressure against the system. This pressure is based on the soil unit weight, coefficient of active earth pressure, and depth of the excavation. Support of Excavation design parameters are listed in Table 6 above.

6.5 Suitability of the In-Situ Soils for Use as Compacted Fill

The suitability of each soil stratum for use as compacted fill is discussed below.

Stratum 1 Existing Fill — The existing fill that generally consists of brown or dark brown coarse to fine SAND, some (-) (to some) Silt, trace (to little) coarse to fine Gravel. Copious amount of debris was encountered in this stratum consisting of glass, millings, wood and mulch. The existing fill is generally unsuitable for reuse.

Stratum 2 Sand

The Sand consists of brown coarse to fine SAND, trace Silt, little medium to fine Gravel. This stratum is acceptable to use as compacted fill. This stratum is suitable for use as compacted fill.

Strata 3/4 Completely Weathered Schist and Schist Bedrock

Excavated rock or completely weathered rock may be used as fill material provided that the material conforms to the required gradation, is well graded, and has been approved prior to use by Carlin-Simpson & Associates. All rock fill must be well blended with smaller rock fragments and/or soil. The maximum particle size for rock placed as fill in the building areas shall be three (3) inches in diameter. In other areas of the site, the maximum particle size shall be six (6) inches in diameter. Most of the excavated rock will be too large for use as compacted fill in structural areas. The excavated rock must therefore be processed through a crusher to provide suitable fill material. Rock fill should not be used where it will interfere with the installation of foundations, floor slabs or utilities. Also, it shall not be used as backfill directly against concrete walls or utilities.

The boring observations indicate that the on-site soils contain a low to moderate percentage of silt (12% to 30%). If the soil becomes too wet, it will be difficult to achieve adequate compaction. Proper moisture conditioning of the soil will be required. New compacted fill should be within 2% (+/-) of its optimum moisture content at the time of placement. In the event that the on-site material is too wet at the time of placement and cannot be adequately compacted, the soil should be aerated and allowed to dry or the material removed and a drier cleaner fill material used. In the event that the on-site material is too dry at the time of placement and cannot be adequately compacted, water may be needed to increase the soil moisture content for proper compaction.

The in-situ soils which exist throughout the site may become soft and weave if exposed to excessive moisture and construction traffic. The instability will occur quickly when exposed to these elements and it will be difficult to stabilize the subgrade. We recommend that adequate site drainage be implemented early in the construction schedule and if the subgrade becomes wet, the contractor should limit construction activity until the soil has dried. The minimum compaction requirements for the various areas of the site are summarized in Table 7 below.

Table 7 - Minimum Compaction Requirements

Area	Maximum Modified Dry Density (ASTM D-1557)
Building (below foundations)	95%
Building Slab (above foundations)	92%
Pavement Areas	92%
Exterior Slabs and Sidewalks	92%
Utility Trenches	92%
Landscape Areas	90%

7.0 GENERAL

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study and our past experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for Carlin-Simpson & Associates to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings and test pits will differ from those encountered at specific boring or test pit locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this geotechnical report are not final. Field observations and floor slab installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and floor slab construction, are an extension of this report. Therefore, Carlin-Simpson & Associates should be retained by the Owner to observe all earthwork, foundation, and floor slab construction, to document that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations Carlin-Simpson & Associates is not responsible or liable for the conclusions and recommendations presented in this report if Carlin-Simpson & Associates does not perform the observation and testing services.

Therefore, in order to preserve continuity in this project, the Owner must retain the services of Carlin-Simpson & Associates to provide full time geotechnical related monitoring and testing during construction. At a minimum, this shall include the observation and testing of the following: 1) the removal of existing fill and unsuitable soil, where required; 2) the proofrolling of the subgrade soil prior to the placement of new compacted fill; 3) the placement and compaction of controlled fill; 4) the excavation for the building; and 5) the preparation of the subgrade for the floor slabs.

This report has been prepared in accordance with generally accepted geotechnical engineering practice. No other warranty is expressed or implied. The evaluations and recommendations presented in this report are based on the available project information, as well as on the results of the exploration. Carlin-Simpson & Associates should be given the opportunity to review the final drawings and site plans for this project to determine if changes to the recommendations outlined in this report are needed. Should the nature of the project change, these recommendations should be re-evaluated?

This report is provided for the exclusive use of Iona Preparatory School and the project specific design team and may not be used or relied upon in connection with other projects or by other third parties. Carlin-Simpson & Associates disclaims liability for any such third party use or reliance without express written permission. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. Carlin-Simpson & Associates is not

responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

If the conditions encountered during construction vary significantly from those stated in this report, this office should be notified immediately so that additional recommendations can be made.

Thank you for allowing us to assist you with this project. Should you have any questions or comments, please contact this office.

Very truly yours,

CARLIN-SIMPSON & ASSOCIATES

CATHERINE SIMPSON, E.I.T.
Project Manager

ROBERT B. SIMPSON, P.E.

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-1
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +219.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM:	Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE:	07 Jul 20
No Groundwater Reading				DIA.	3 1/4"	1 3/8"			FINISH DATE:	07 Jul 20
				WGHT		140#			DRILLER:	TM
				FALL		30"			INSPECTOR:	JP

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sy r	IDENTIFICATION	REMARKS
1		S-1	12 10 10		**FILL (Dark brown coarse to fine SAND, some (-) Silt, little coarse to fine Gravel, with glass, debris)** 1'6"	Rec = 15" moist
2			7		Br cf S, t $, l cf G	
3		S-2	10 11		same	Rec = 14"
4			16 20		**Brown coarse to fine SAND, trace Silt, little coarse to fine Gravel**	moist
5						
6		S-3	21 46 50/3"		same 6'3"	Rec = 12" moist
7						
8					**Schist, Completely Weathered** 8'0"	
9						
10						
11		Run #1			**Gray Schist blocky and seamy, moderately weathered rock**	Run #1 8'0"-13'0" Run = 60"
12						Rec = 56" = 93%
13					13'0"	RQD = 45" = 75%
14					**End of Boring @ 13'0"**	
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-2
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +218.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 7/Jul/20
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			FINISH DATE: 7/Jul/20
				WGHT		140#			DRILLER: TM
				FALL		30"			INSPECTOR: JP

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			4			
1		S-1	4		FILL (Dk br cf S, l $, a cf G)	Rec = 4"
			4		**FILL (Dark brown coarse to fine SAND,**	moist
2			50/3"		**little Silt, and coarse to fine Gravel)** 2'0"	boulder moved 3' E
3						
		S-2	50/5"		Completely Weathered Schist	Rec = 1"
4						moist
					Schist, Completely Weathered	dense drilling
5						
		S-3	50/3"		same, gr	Rec = 2"
6						moist
7						
8					8'0"	Auger refusal 8'0"
					End of Boring @ 8'0"	on probable bedrock
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-3
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +221.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	DBL		START DATE: 07 Jul 20
No Groundwater Reading				DIA.	3 1/4"	1 3/8"	2"		FINISH DATE: 07 Jul 20
				WGHT		140#			DRILLER: TM
				FALL		30"			INSPECTOR: JP

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			3			
1		S-1	4		FILL (Dk br cf S, s $, l cf G, w/debris)	Rec = 18"
			4		**FILL (Dark brown coarse to fine SAND, some Silt, little coarse to fine Gravel, with debris)**	moist
2			7			
			5		2'6"	
3		S-2	8		Br cf S, t $, l cf G	Rec = 10"
			10			moist
4			12		**Brown coarse to fine SAND, trace Silt, little coarse to fine Gravel**	
5						
			36		same 5'6"	
6		S-3	50		Schist Completely Weathered	Rec = 6"
			64			moist
7			50/3"			
8					**Schist, Completely Weathered**	
			46			
9		S-4	50/1"		same, wh	Rec = 4"
						moist
10						
		S-5	50/6"		same, or	Rec = 3"
11					11'0"	moist
						Auger refusal @ 11'0"
12						
13						
		Run #1			**Gray Schist blocky and seamy, moderately weathered rock**	Run #1 11'0"-16'0" Run = 60" Rec = 60" = 100% RQD = 41" = 68%
14						
15						
16						
					End of Boring @ 16'0"	
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-4
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +221.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 8/Jul/20
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			FINISH DATE: 8/Jul/20
				WGHT		140#			DRILLER: TM
				FALL		30"			INSPECTOR: JP

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1			
1		S-1	1		FILL (Mulch)	Rec = 1"
			1			moist
2			4			
			13			
3		S-2	23		FILL (Mulch and millings)	Rec = 4"
			15			moist
4			14		**FILL (Mulch and millings)**	
5						
			2			
6		S-3	3		FILL (same)	Rec = 2"
			5			moist
7			6		7'0"	
			11			
8		S-4	14		Br cf S, l $, l cf G	Rec = 10"
			23		**Brown coarse to fine SAND, little Silt,**	moist
9			30		**little coarse to fine Gravel**	
10					10'0"	
		S-5	50/4"			Rec = 2"
11					**Schist, Completely Weathered**	moist
					11'6"	Auger refusal @ 11'6"
12					**End of Boring @ 11'6"**	
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN - SIMPSON & ASSOCIATES Sayreville, N.J.	TEST BORING LOG	BORING NUMBER B-5
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +221.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	DBL		START DATE: 08 Jul 20
No Groundwater Reading				DIA.	3 1/4"	1 3/8"	2"		FINISH DATE: 08 Jul 20
				WGHT		140#			DRILLER: TM
				FALL		30"			INSPECTOR: JP

Depth (ft.)	Casing Blows pre Foot	Sample Number	Blows on Sample Spoon per 6"	Sy r	IDENTIFICATION	REMARKS
			5		FILL (Br cf S, s (+) $, l cf G, w/wood)	
1		S-1	6		**FILL (Brown coarse to fine SAND,**	Rec = 11"
			5		**some (+) Silt, little coarse to fine Gravel,**	moist
2			6		**with wood)** 2'0"	
			8		**Brown coarse to fine SAND, trace Silt,**	
3		S-2	16		**little (+) coarse to fine Gravel** 3'0"	Rec = 8"
			50/5"			moist
4					**Schist, Completely Weathered** 4'0"	Auger refusal 4'0"
5						
6						
7		Run #1			**Gray Schist shattered, very block and seamy, highly weathered rock**	Run #1 4'0"-9'0" Run = 60" Rec = 60" = 100% RQD = 16" = 27%
8						
9					9'0"	
					End of Boring @ 9'0"	
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-6

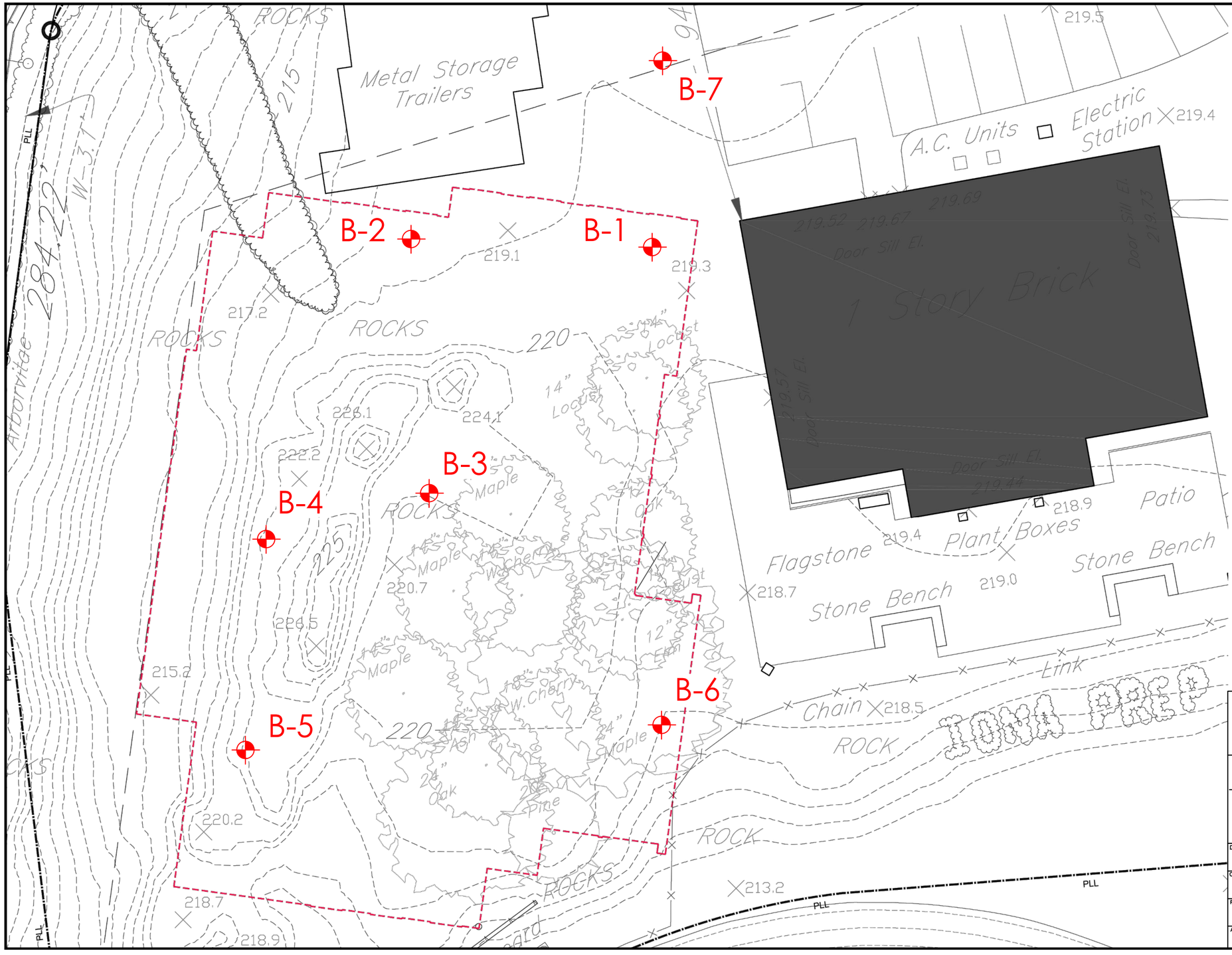
Project:	**Proposed Building, 255 Wilmot Rd, New Rochelle NY**								**SHEET NO.:**	1 of 1
Client:	**Iona Preparatory School**								**JOB NUMBER:**	20-116
Drilling Contractor:	**General Borings Inc.**								**ELEVATION:**	+218.5
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	8/Jul/20
No Groundwater Encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	8/Jul/20
				WGHT		**140#**			**DRILLER:**	TM
				FALL		**30"**			**INSPECTOR:**	JP

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
			3		FILL (Br cf S, s $, t cf G, w/sticks)		
1		S-1	7		**FILL (Brown coarse to fine SAND, some**		Rec = 12"
			9		**Silt, trace coarse to fine Gravel, with**		moist
2			8		**sticks)**	2'0"	
			13				
3		S-2	22		Br cf S, t (+) $, l (+) cf G		Rec = 15"
			21		**Brown coarse to fine SAND, trace (+) Silt,**		moist
4			42		**little (+) coarse to fine Gravel**	4'0"	
					Schist, Completely Weathered	4'6"	Auger refusal 4'6"
5					**End of Boring @ 4'6"**		on probable bedrock
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-7
Project: Proposed Building, 255 Wilmot Rd, New Rochelle NY		**SHEET NO.:** 1 of 1
Client: Iona Preparatory School		**JOB NUMBER:** 20-116
Drilling Contractor: General Borings Inc.		**ELEVATION:** +218.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 7/Jul/20
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			FINISH DATE: 7/Jul/20
				WGHT		140#			DRILLER: TM
				FALL		30"			INSPECTOR: JP

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			8		FILL (Dk br cf S, s $, l cf G, w/debris)	
1		S-1	10		**FILL (Dark brown coarse to fine SAND, some Silt, little coarse to fine Gravel, with debris)**	Rec = 14"
			7			moist
2			4		2'0"	
			4			
3		S-2	3		Br cf S, t $, l cf G	Rec = 10"
			7			moist
4			12			
5					**Brown coarse to fine SAND, trace Silt, little coarse to fine Gravel**	
			11			
6		S-3	21		same	Rec = 15"
			21			moist
7			23			
			27			
8		S-4	31		same	Rec = 11"
			50/3"		8'3"	moist
9						
					Schist, Completely Weathered	
10						
			20			
11		S-5	34		Schist, Completely Weathered	Rec = 7"
			50/3"			moist
12					12'0"	Auger refusal 12'0"
					End of Boring @ 12'0"	on probable bedrock
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						



GENERAL NOTES:

1. GENERAL LAYOUT WAS OBTAINED FROM A DRAWING THAT WAS PREPARED BY PETER GISOLFI ASSOCIATES., ENTITLED "IONA PREPARATORY SCHOOL, EXISTING SITE PLAN", DATED JUNE, 2020.
2. BORING LOCATIONS WERE LAID OUT IN THE FIELD BY CARLIN-SIMPSON & ASSOCIATES (CSA).
3. THE BORINGS WERE PERFORMED BY GENERAL BORINGS INC. ON 7 AND 8 JULY 2020 UNDER THE FULL TIME INSPECTION OF CSA.
4. LOCATIONS ARE APPROXIMATE.

LEGEND:

⊕ - BORING LOCATION

ROBERT B. SIMPSON, P.E.
PROFESSIONAL ENGINEER

LICENSE NO. | SIGNATURE | DATE

BORING LOCATION PLAN

PROPOSED BUILDING
IONA PREPARATORY SCHOOL
255 WILMOT ROAD
NEW ROCHELLE, NY

DRAWN	SCALE
MW	1" = 20'
CHECKED	DATE
RBS	4 AUG 20
PROJECT NO.	DWG NO.
20-116	FIG - 1
APPROVED	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872

Consulting Geotechnical and Environmental Engineers