Site Work Technical Specifications
For
Rockland Green
RFP 2024-01: Build-Out of a New Animal Shelter
(RG C.A.R.E.S.)
Haverstraw, New York

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CAST-IN-PLACE CONCRETE

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C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including equipment pads and equipment pits.

F. Concrete curing.

1.02 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2016.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

F. ACI 305R - Guide to Hot Weather Concreting; 2010.

G. ACI 306R - Guide to Cold Weather Concreting; 2016.

H. ACI 308R - Guide to External Curing of Concrete; 2016.

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).

J. ACI 347R - Guide to Formwork for Concrete; 2014, with Errata (2017).

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.

L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.

M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

N. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2020.

P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2020.

Q. ASTM C150/C150M - Standard Specification for Portland Cement; 2020.

R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.

T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

U. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2017a.

V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.

W. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.

X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2018.

Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

B. Mix Design: Submit proposed concrete mix design.

C. Test Reports: Submit a report for each test or series of tests specified.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

1. Maintain one copy of each document on site.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Proposer's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).

1. Type: Deformed billet-steel bars.

2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.

1. Form: Flat Sheets.

2. WWR Style: As indicated on drawings.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Provide galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type III – High Early Strength Cement.

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire aggregates for entire project from same source.

2. Coarse aggregates shall be strong, clean crushed limestone complying with ASTM C33/C33M, size no. 67 provided from one source.

3. Sand: Clean sharp, natural sand, graded in accordance with ASTM C33.

C. Fly Ash: ASTM C618, Class C or F.
D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

1. Manufacturers:

a. Euclid Chemical Company; PLASTOL 6420: www.euclidchemical.com/#sle.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

1. Manufacturers:

a. Euclid Chemical Company; ACCELGUARD 80: www.euclidchemical.com/#sle.

F. Accelerating Admixture: ASTM C494/C494M Type C.

1. Manufacturers:

a. W. R. Meadows, Inc; Hydraset: www.wrmeadows.com/#sle.

G. Retarding Admixture: ASTM C494/C494M Type B.

H. Water Reducing Admixture: ASTM C494/C494M Type A.

2.06 BONDING AND JOINTING PRODUCTS

A. Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.

2. Manufacturers:

a. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap: www.wrmeadows.com/#sle.

b. or approved equal.

B. Epoxy Bonding Adhesive with integrated Anti-Corrosion Primer: ASTMC 881, three-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2. Manufacturers:

a. Sika, Corp; Sika Armatec-110 EpoCem

b. or approved equal.

2.07 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.

1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.

2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

C. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days as follows:

a. All general uses not otherwise specified: 5,000 psi at 28 days

2. Water-Cement Ratio:

a. General Use: 0.42 max

3. Total Air Content: as determined in accordance with ASTM C173/C173M.

a. General Use: 6.0% (+/- 1.5%)

4. Maximum Slump: 5 inches (+/-1") inches.

5. Maximum Aggregate Size: 3/4 inch.

2.09 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

C. All concrete shall be mixed until there is uniform distribution of materials and shall be discharged completely before mixer is recharged.

D. If concrete is not placed within 90 minutes after batched or if the concrete has become partially set, the concrete will be rejected and shall be disposed of off-site.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent according to bonding agent manufacturer's instructions.

E. In locations where new concrete is doweled into hardened concrete, drill holes in existing concrete, and utilize chemical adhesive system.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is 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 not to 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 preceding 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.

G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

H. Deposit and consolidate concrete for slabs in a continuous operation 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.

I. 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. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

K. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, 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 Proposer's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.05 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

3.07 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. 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.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven days, or approved by Engineer.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:

1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days, or approved by Engineer, by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.

b. Spraying: Spray water over floor slab areas and maintain wet.

c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

2. Final Curing: Begin after initial curing but before surface is dry.

a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

A. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

B. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

C. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure (6) 6” diameter cylinders or (9) 4” diameter cylinders. Break, 1 set (2 cylinders if 6” or 3 cylinders if 4”) of cylinders at 7 days, 1 set at 28 days and remaining set for reserve. Obtain test samples for every 50 cubic yards or less of each class of concrete placed.

D. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

E. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

F. Perform one air content test for each set of test cylinders taken following procedures of ASTM C231 or ASTM C173.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Engineer and Rockland Green within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Proposer when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

E. Patching: Repair defective areas and fill form-tie holes and similar defects in accordance with Chapter 9 of ACI 301. Where, in the opinion of the Engineer, surface defects such as honeycomb occur, repair the defective areas as directed by the Engineer.

3.11 PROTECTION

A. Do not permit traffic or backfill over or against concrete surfaces until fully cured and cylinders indicate design strength has been achieved.

END OF SECTION

SECTION 312305

SUBGRADE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subgrade preparation, below either pavement system or gravel access roads.
2. Furnishing natural soils.
3. Furnishing select borrow material.
4. Temporary drainage.
5. Compaction.
6. Proof rolling.
7. Removal and replacement of unacceptable materials.
8. Grading.
9. Install geotextile fabric.

1.2 REFERENCES

A. ASTM D698 - Moisture/Density Relations of Soil/Aggregate Mixtures Using 5.5-Lb. Rammer and 12-Inch Drop

B. ASTM D1557 - Moisture/Density Relations of Soils and Soil/Aggregate Mixtures Using 10-Lb. Rammer and 18-Inch Drop

C. NYSDOT - Manual of Uniform Traffic Control Devices

1.3 DEFINITIONS

A. “Subgrade” shall be defined as the foundation layer of natural soils or select material that supports the pavement or gravel access road layers.

1.4 PERFORMANCE AND TESTING REQUIREMENTS

A. Compaction of subgrade shall meet the requirements for compaction as stated in Table 1 of Section 312330 - Compaction.

1. Compaction curves shall be developed for each type of subgrade material when “in-place density” tests are required by the Engineer.

2. The cost of failed compaction tests will be reimbursed by the Proposer to Rockland Green.

1.5 SUBMITTALS

A. Submit under Contract Provisions – Submittal Procedures.

B. Granular Materials - Refer to Section 312325 - Backfilling.

1.6 REGULATORY REQUIREMENTS

A. Conform to regulatory agencies having jurisdiction over the work.

B. Occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations or to the New York State Industrial Code Rule 23 entitled, “Protection in Construction, Demolition and Excavation Operations” as issued by New York State Department of Labor, Board of Standards and Appeals.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Provide erosion and sediment controls in accordance with NY State Guidance and the Erosion and Sediment Control Drawing to prevent debris, stones, and silt from entering drainage systems.

1.8 FIELD MEASUREMENTS

A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings, notify Engineer of specific differences.

B. Prior to start of construction, where required, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the Underground Utility Protection Organization applicable to the project location and protect utilities in accordance with requirements of this contract.

1.9 COORDINATION

A. Coordinate field work under provisions of Section 013100 and the terms and conditions of this Request for Proposal.

B. Coordinate work with local utility companies (private and municipal), as applicable.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Natural on-site soil, if suitable, shall be utilized if approved by the Engineer.

B. Granular materials, if required, shall be as specified in Section 312325 – Backfill or shown on the drawings. The type, size and quantity of granular material shall be that required to prepare a compacted subgrade approved by the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.

B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris.

C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.

D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

E. All underground utility installations, including pipes, shall be completed, backfilled and compacted prior to completion of subgrade.

F. Verify that traffic controls and erosion and sediment controls are in place.

3.2 PREPARATION

A. Temporary erosion and sediment controls shall be installed prior to start of construction.

B. Temporary surface diversion and ditches shall be constructed as necessary to remove water from the subgrade area.

1. Proposer to prevent the entrance of debris, stones, and silt from entering existing drainage systems, including the use of filter socks, screens, and other desilting methods as shown on the Erosion and Sedimentation Control Plan details.

C. Backfilled areas shall be retested at the discretion of the Engineer.

3.3 INSTALLATION

A. Construct the subgrade by cutting or filling with material as required.

1. The final subgrade surface below the roadway surface shall be fine graded, rolled and compacted to form a smooth, even surface.

B. The subgrade in fill section shall be placed in maximum 12-inch layers before compaction and compacted before the next layer is spread.

C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.

1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select on-site material acceptable to the Engineer.

2. Where no suitable on-site material is available, granular materials shall be installed and compacted at no cost to the Rockland Green.

3.4 FIELD QUALITY CONTROL

A. For compaction requirements, refer to Section 312330, Table 1.

B. Tolerances - The final subgrade surface shall not vary more than +1/2 inch from the design grade elevation at any location, parallel to the final road surface as defined by the total roadway thickness.

C. Proof Rolled - Prior to the placement of the next pavement course, the subgrade surface shall be proof rolled to locate areas of inadequate compaction or defections or soft or rutting areas requiring undercutting, with 8- to 10-ton pneumatic tire compactors.

1. Areas of inadequate compaction to be re-compacted.

2. If additional rolling does not correct an area of unstable condition, then this area and soft or rutted areas shall be removed and replaced with select material and compacted.

3. Where no suitable on-site material is available, granular materials shall be installed and compacted; areas inaccessible to rollers to be compacted by mechanical methods.

3.5 DUST CONTROL

A. Dust control shall be accomplished by using water, brooming, and cleaning methods.

1. Dust control shall be carried out daily.

END OF SECTION

SECTION 312310

EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation for site structures.
2. Excavating trenches for utilities.
3. Pipe foundations and bedding.

1.2 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EXECUTION

A. Identify required lines, levels, contours, and datum.

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify utility companies.

D. Protect above- and below-grade utilities which are to remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

F. Protect benchmarks, right-of-way markers, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

G. Excavations shall be in completed in accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards.

3.2 CLASSIFICATION OF EXCAVATED MATERIALS

A. Classifications of excavated materials are as follows:

1. Unclassified Excavation - “Unclassified excavation” shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include “rock excavation” as well as “common excavation” as defined herein.

2. Common Excavation - “Common excavation” shall include all excavation except “rock excavation.” All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered “common excavation.” All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as “common excavation.”

3. Rock Excavation - “Rock excavation” shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment.

3.3 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.

B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving, and site structures.

C. Machine-slope banks to angle of repose or less, until shored.

D. Excavation cut not to interfere with normal 45-degree bearing splay of foundation. Undercutting of excavation faces will not be permitted.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Hand trim excavation to required undisturbed subgrade. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with Mix “C” concrete or compacted gravel/crushed stone.

H. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.

I. Should the Proposer, through negligence or otherwise carry his excavation below the designated subgrade, granular material used for backfilling shall be spread and compacted in conformance with the requirements of Sections 312325 - Backfilling and 312330 - Compaction. The cost of this refilling operation, including any tests associated therewith, shall be borne by Proposer.

J. Stockpile excavated material to be re-used in area designated by Rockland Green on site and remove excess material not being reused from site.

3.4 DISPOSAL OF MATERIAL

A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site unless Rockland Green designates an on-site location.

B. Reuse of excavated material as on-site fill shall conform with Section 312325 - Backfilling.

3.5 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 014000 - Quality Requirements.

B. Provide for visual inspection of bearing surfaces.

3.6 PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building, structure or new underground pipe.

END OF SECTION

SECTION 312315 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities.

2. Pipe foundations and bedding.

3. Backfilling and compaction.

4. Materials

1.2 REFERENCES

A. Standard Material Specifications for gravel, sand, crushed stone and gravel-cement mixtures published by the New York State Department of Transportation (DOT).

B. Occupational Safety and Health Administration (OSHA).

1.3 SUBMITTALS

A. Submittals for granular material shall be in accordance with Section 312325 – Backfilling.

1.4 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 - PRODUCTS

2.1 ON-SITE MATERIALS

A. On-site material shall be in accordance with Section 312325 - Backfilling.

2.2 OFF-SITE MATERIALS

A. Off-site material shall be in accordance with Section 312325 - Backfilling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be used are approved.

B. Verify that all subsurface excavations for the project have been compacted, approved, and are ready for backfilling (including installation of geotextiles where required).

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Prior to start of construction, notify utility and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the Engineer with the results of the exploratory excavations for his review. Allow the Engineer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.

C. Abandoned pipes and laterals shall be plugged per Contract Documents.

D. Conduct the operations such that no interruptions to the existing utility system shall occur.

E. Protect plant life, lawns, rock outcropping, and other features remaining as a portion of final landscaping.

F. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Preserve the control points as provided throughout the life of the project, and accurately replace any such point, which is damaged or moved, at Proposer's expense.

G. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with specified pipe foundation and compact to density equal to or greater than requirements for subsequent backfill material.

H. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.

I. Maintain a stable, dry backfill area.

J. Remove all water, snow, ice and debris from surfaces to accept fill materials and from the backfill material. No calcium chloride or other chemicals shall be used to prevent freezing.

K. Areas to receive compacted fill shall be graded to prevent ponding and to provide surface runoff.

L. Only approved backfill material shall be used.

M. Only approved geotextile fabrics shall be used.

N. Backfill operations shall be started at the lowest elevation in the area to be backfilled, and continue, in horizontal layers, upward to the limits specified.

O. Any crushed gravel stockpiles which have undergone excessive particle segregation shall be remixed.

3.3 TRENCH EXCAVATION

A. Trench widths shall be held to minimize restoration. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in trenches, the bottom of the shield shall be positioned so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward.

B. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and compacted. Installation of sheeting and bracing and use of mobile shields shall be in accordance with details of applicable safety codes, rules and regulations including applicable local, state, federal, and OSHA.

C. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.

D. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special backfill installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.

E. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.

F. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. Trenches left open overnight shall be protected as specified within this section and to the satisfaction of Rockland Green. Trenches shall not be left open overnight unless prior approval is granted from Rockland Green.

3.4 EXCAVATION CLASSIFICATION

A. All material excavation shall be classified in accordance with Section 312310 - Excavation.

3.5 UNAUTHORIZED EXCAVATION

A. The Proposer shall not be entitled to additional compensation for unauthorized excavations carried beyond or below the lines and subgrades prescribed in the Contract Documents. The Proposer shall refill such unauthorized excavations at his own expense, and in conformance with the following provisions:

B. Should the Proposer, through negligence or for reasons of his own, carry excavations below the designated subgrade, backfill in accordance with Section 31 2325 - Backfilling, in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted. The cost of tests associated with this refilling operation shall be borne by the Proposer.

C. If the maximum widths of pipe trenches are exceeded, the installed pipes shall be fully cradled using the specified bedding material at the Proposer's expense.

D. Excavation below subgrade which is ordered by the Engineer because the normal subgrade has been disturbed by the Proposer's operations shall be considered as unauthorized excavation.

3.6 MAINTENANCE OF EXCAVATIONS

A. All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition. All signs, markers, barricades shall conform to the requirements of the Manual of Uniform Traffic Control Devices. All barricades, signs and markers shall be reflectorized.

B. To maintain traffic and safety, temporary plating over trenches consisting of steel plates shall be used to temporarily bridge trench excavations. Plates shall be of size and positioned to provide adequate bearing at plate edges, shall be securely anchored, and shall be fitted in place in a manner to minimize noise when crossed by traffic. Plates shall be of sufficient thickness to safely carry heavy traffic without detrimental deflection; however, unless otherwise specified, the minimum thickness of plates shall be 1-inch.

C. Plate edges exposed to traffic shall be feathered with asphalt mix as part of trench excavation work. Work includes surveillance and adjustment of plating over trenches which shall be provided by the Proposer during non-working hours, weekends, and holidays.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.

B. Tests and analysis of fill material will be performed in accordance with Section 312325 - Backfilling.

C. Compaction testing will be performed in accordance with Section 312330 - Compaction.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished work.

B. Re-grade and re-compact disturbed fill areas subjected to vehicular traffic.

END OF SECTION

SECTION 312325

BACKFILL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Granular materials for backfilling.

2. Classification of materials.

3. Backfilling trenches for utilities.

4. Consolidation and compaction.

1.2 REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates

B. ASTM D1556 - Density of Soil in Place by Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.3 SUBMITTALS

A. Granular Materials

1. Granular materials required for filling, backfilling, subbase, and other purposes shall be as shown on the Drawings. Prior to bidding, prospective Proposers shall familiarize themselves with the available quantities of approved on-site and off-site materials.

2. For each on-site and off-site material proposed, notify the Engineer of the source of the material and furnish to the Engineer for approval a certified gradation analysis (ASTM C136) and a Modified Compaction Test (ASTM D1557) at least 15 days prior to date of anticipated use of such material that has been tested within the last 6 months.

3. The Engineer reserves the right to inspect proposed source of off-site granular material and to order such tests of the materials as he deems necessary to ascertain its quality and graduation of particle size. The Proposer shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Engineer. If similar tests of the material

from a particular source were performed previously (within 6 months), submit results of these tests to the Engineer for consideration.

4. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer, and only material from approved sources shall be used.

PART 2 - PRODUCTS

2.1 GENERAL

A. Approvals- All materials to be utilized on the project shall be subject to testing, examination, and the approval of the Engineer. The Engineer and Rockland Green shall determine whether a material is suitable or unsuitable for the use intended. It is the intent of these Specifications that use shall be made of existing material excavated during the construction work, provided it meets the requirements for backfill included in this section, or unless otherwise specified or indicated on the Contract Drawings. Rockland Green makes no guarantee that the existing material will meet the requirements of the specifications for use as backfill. Only when sufficient on-site suitable material does not exist, shall the Proposer import suitable material from off-site. Costs of importing off-site material for normal backfilling purposes shall be the responsibility of the Proposer.

B. Suitable Material- In general, mineral (inorganic) soil, blasted or broken rock (if it meets backfill specifications) and similar materials of natural or manmade origin, including mixtures thereof, are considered as suitable materials, as determined by the Engineer to be suitable for filling, backfilling, as a base for placement of pipe, structures, or fill, or other uses.

C. Unsuitable Material- Any material containing chunks of cinders, earth or clay, vegetable or organic matter, such as muck, peat, organic silt, roots, stumps, topsoil or sod, shale or other soft, poor durability particles that is not satisfactory for the use intended, as determined by the Engineer, is designated as an unsuitable material.

2.2 ON-SITE MATERIALS

A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If the Proposer so elects, the Proposer may, at their own expense, substitute other types of material in place of Type A material, provided such substitution is approved in advance by the Engineer. All replaced or surplus material shall be disposed of per Specification Section 312310.

B. Type A material shall not have any larger aggregate larger than 4-inches in any dimension and shall meet the specified compaction requirement per Specification 312330. The material shall be screened to meet these requirements and any remaining material which does not shall be removed and disposed of off-site at the Proposer's expense. In no case the top 12-inches nearest the final subgrade below the topsoil layer or pavement in local roads shall contain any aggregate larger than 2-inches.

2.3 OFF-SITE MATERIALS

A. Within the following specifications where grain size distribution requires a maximum of 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM D1140. It is the intent of the specifications to allow the use of granular materials from local suppliers. Material specifications shall conform to the requirements of the New York State Department of Transportation, (NYSDOT) and shall conform to the latest NYSDOT Standard Specification.

B. No crushed stone or run-of-crusher material shall be used for this project until approval is obtained from the Engineer, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Engineer's approval prior to the use of any materials specified in this specification section.

C. Required Materials

1. Trench backfill (Green Areas Only) Above Pipe Backfill Material– Type A

2. Pavement subbase - NYSDOT subbase course 733-0402, Type 2.

3. Trench special bedding - NYSDOT 733-0201, Type 3A stone.

4. Pipe Bedding - NYSDOT subbase course 733-0402, Type 2.

5. Backfill adjacent to, and under, structures - NYSDOT subbase course 733-0402, Type 2.

6. Impervious Fill: Naturally occurring or manufactured mixture of clayey gravel and sand capable of compacting to a dense state.

a. Maximum Particle Size: 1 inch

Sieve Size	Percent Passing by Weight
¾ inch	50-100
No. 4	40-90
No. 40	30-85
No. 200	25-75

b. Plasticity index of portion finer than #200 sieve greater than 15 and less than 20.

PART 3 - EXECUTION

3.1 PIPE FOUNDATIONS

A. All pipes, fittings, or specials which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the various types as specified and shown on the Drawings. Flat-bottom trenches of required width shall be excavated to the necessary depth shown on the Drawings and maintained in accordance with this section prior to installing the foundation. Trenches shall be dewatered and all work performed in a dry trench and free of rocks.

B. Bedding material shall be spread in maximum of 8-inch layers to the midpoint (spring line) of the pipe and each layer shall be compacted until the required total depth of the bedding has been built up. The

Proposer shall perform his bedding operations with care to maintain line and grade. Compaction shall achieve a modified proctor value of 95%.

C. The pipe foundation above the midpoint of the pipe shall be spread and then compacted after foundation is 24-inches above the top of the pipe.

D. Type I - Normal Soil Conditions - Unless shown otherwise in the Drawings, all pipe shall be supported on Type I foundation. The trench shall be excavated 4 inches deeper than the bottom of the pipe. Acceptable bedding as described in the Contract Specifications shall be furnished, placed and compacted in the trench for its full width such that, after the pipe has been uniformly bedded in this material, the required minimum depth of material remains between pipe and undisturbed trench bottom. Suitable depressions shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections. The bedding shall extend upward to be 24-inches over the top of the pipe. Minimum width of pipe foundation shall be outside diameter of pipe plus 2 feet 0 inches. The pipe centerline shall be longitudinally centered within the pipe bedding per the detail.

E. Type II - Moderately Unstable Soil Conditions - When specifically called for on the Drawings, or when ordered by the Engineer as existing conditions dictate, and as approved by the Engineer, the pipe shall be supported on Type II foundation. The foundation shall be installed where a suitable supporting soil or rock stratum occurs within 2 feet, more or less of the bottom of the pipe. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Install a reinforcing geotextile in accordance with Section 02420 - Backfilling, followed by trench special bedding which is then furnished and placed in the trench for its full width. The material shall be spread in 12-inch layers and each layer shall be compacted to achieve a modified proctor value of 95%. Trench special bedding shall extend from the supporting stratum up to the bottom of the Type I pipe foundation.

F. Type III – Unstable Soil Conditions – As conditions dictate, and as determined by the Engineer, the pipe bedding shall be supported on a Type III foundation. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Backfilling with a loosely compacted NYSDOT 703-0201 Type 3A stone bedding material shall be provided. This shall be followed by the bedding material as shown in the Type II and Type I pipe foundations.

3.2 GENERAL BACKFILLING REQUIREMENTS

A. Follow requirements of 312330 - Compaction.

B. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, and concrete has acquired a suitable degree of strength. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.

C. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. No backfill shall be placed against foundation walls on structural members unless they are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.

D. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Proposer's expense.

E. If the Proposer fails to stockpile and protect on-site excavated material acceptable for backfill, then the Proposer shall provide an equal quantity of acceptable off-site material at no expense to Rockland Green.

F. Remove surplus backfill material from site.

G. Backfill areas to contours, grades, and elevations shown on the drawings, using unfrozen materials.

H. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

I. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed.

J. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.

K. Hydraulic compaction by ponding or jetting is not permitted.

L. Employ a placement and compaction method consistent with Section 312330 - Compaction, that does not disturb or damage adjacent walls, drainage systems, damp proofing, waterproofing, protective coverings, utilities in trenches, underground conduits, or tanks.

M. Maintain optimum moisture content of backfill materials to attain required compaction density.

N. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradually. Blend slopes into level areas.

O. Remove surplus backfill materials from site.

3.3 PERIODIC CLEAN-UP AND BASIC RESTORATION

A. Perform clean-up work on a regular basis and as frequently as required. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished if partially completed facilities must remain incomplete for some time due to unforeseen circumstances.

B. Upon failure of the Proposer to perform periodic clean-up and basic restoration of the site, Rockland Green may, upon five days prior written notice to the Proposer, without prejudice to any other rights to remedies of the Rockland Green, cause such work for which the Proposer is responsible to be accomplished to the extent deemed necessary by the Contract Documents, and all costs resulting therefrom shall be charged to the Proposer and deducted from the amounts of money that may be due him.

3.4 EXAMINATION

A. Verify fill materials to be used are acceptable.

B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.

3.5 PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of in situ compaction. Compact soil to a density equal to or greater than the requirements for subsequent backfill material.

3.6 TOLERANCES

A. Top Surface of Backfilling Under Pavement Subgrade - ±1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas- ±1/2 inch from required elevations.

C. Top Surface of General Backfilling - ±1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.

B. Tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 312330 - Compaction.

C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 014000 - Quality Requirements.

D. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Rockland Green.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished work.

B. Regrade and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 312327

GEOTEXTILES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cushion geotextile.

2. Reinforcement geotextile.

1.2 REFERENCES

A. Quality Control Testing Standards

B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

C. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles

D. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

E. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

F. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

G. ASTM D6241 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

H. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

I. ASTM D-5261 - Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data:

1. Submit product data sheet for each geotextile proposed for use on this project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Geotextiles labeling, shipment, and storage shall follow ASTM D4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

C. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Cushion Geotextile

1. Shall be needle-punched, nonwoven geotextile specifically designed for cushion applications.

2. Shall be composed of polyester and/or polypropylene polymers.

3. Documentation shall be provided by the manufacturer indicating that each roll was inspected at the point of manufacturing for the presence of broken needles using an in-line metal detector

4. Shall meet the criteria listed in Table 312327-1.

B. Reinforcement Geotextile

1. Shall be a woven geotextile specifically designed for reinforcement applications.

2. Shall be composed of polyester and/or polypropylene polymers.

C. Shall meet the criteria listed in Table 312327-1.

TABLE 312327-1

MINIMUM ACCEPTANCE CRITERIA GEOTEXTILE

Test Description	Test Method	Criteria
Separation		
Mass per unit area	ASTM D5261	≥8 oz/SY
Apparent opening size	ASTM D4751	≤No. 70 sieve
Puncture resistance	ASTM D6241	≥110 lb.*
Tensile strength	ASTM D4632	≥160 lb.*
Trapezoid tearing strength	ASTM D4533	≥80 lb*
Permittivity	ASTM D4491	≥1.1 cm/sec
Reinforcement		
Mass per unit area	ASTM D5261	≥8 oz/SY
Puncture resistance	ASTM D4833	≥150 lb.
Tensile strength	ASTM D4595	≥160 lb.*
Trapezoid tearing strength	ASTM D4533	≥120 lb.*
Apparent opening size	ASTM D4751	≤40 sieve
Cushion		
Mass per unit area	ASTM D5261	24 oz/SY
Puncture Resistance	ASTM D4833	225 lb.

*Minimum acceptance criteria shall apply to both the machine direction (MD) and the cross machine direction (XMD).

2.2 PRODUCTS

A. Separation Geotextile - The following is a list of materials that meet the specifications in this section:

1. Carthage Mills FX-80 HS.

2. Propex Geotex 861.

3. Skaps GE 180.

4. Or equal.

B. Reinforcement Geotextile - The following is a list of materials that meet the specifications in this section:

1. TenCate Mirafi FW 403.

2. Propex Geotex 4x4.

3. Carthage Mills FX-400MF.

4. Or equal.

C. Cushion Geotextile - The following is a list of materials that meet the specifications in this section:

1. TenCate Mirafi S2400

2. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall inspect all geotextile upon delivery and verify that the proper materials and quantities have been supplied.

B. The Contractor shall inspect the subgrade for protrusions or other unacceptable conditions prior to installation of geotextiles.

C. The Contractor shall continuously inspect needle-punched geotextiles during deployment for broken needles remaining from needle-punching operations.

3.2 PREPARATION

A. Subgrade shall be prepared as indicated in the specifications.

3.3 PROTECTION

A. Protect all geotextile materials from damage due to exposure to sunlight, dirt, dust and other hazards.

B. Maintain the protective wrapping on geotextile rolls at all times.

C. The geotextiles shall be covered after installation within a 10-day period.

D. During spreading operations of backfill, a minimum depth of 12 inches of aggregate shall be maintained over the geotextiles when possible. Construction equipment shall not operate directly on the geotextile.

3.4 INSTALLATION

A. Geotextile rolls shall be positioned as required and unrolled.

B. When placed on prepared subgrades, geotextile shall be overlapped a minimum of 1.0 feet on all edges.

C. When geotextile is placed in trenches, the material shall be overlapped a minimum of 1 foot over the top of the trench. Longitudinal seams between adjacent rolls of material shall be overlapped a minimum of 2 feet.

D. Geotextile rolls shall be cut and laid flat such that buckling of the roll does not occur.

E. If geotextiles are damaged during any phase of construction or installation, a new piece of the same type shall be cut and placed over the damaged area with a 2-foot minimum overlap and sewn.

F. Aggregate shall be spread in the direction of overlap wherever possible.

3.5 MAINTENANCE

3.6 Maintain geotextile rolls until backfilling operations have completed one lift.

END OF SECTION

SECTION 312230

COMPACTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Compaction requirements and test methods.

2. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.2 REFERENCES

A. ASTM D698 - Laboratory Compaction of Soil Using Standard Effort

B. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.3 SUBMITTAL

A. Submit compaction plan including the specific equipment and detailed methods proposed to be used for compaction in accordance with Section 013300- Submittals.

B. Rockland Green will use an independent testing firm for compaction tests.

1.4 QUALITY ASSURANCE

A. The Proposer shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure, and piping to be placed thereon, or therein, without damage to the new or existing facilities.

B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.

C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.

D. This compaction shall be limited to that required to compact loose surface material and shall be terminated if it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.

E. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials to be compacted shall be as specified in Section 312325 - Backfilling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.

B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris.

C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.

D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

3.2 PREPARATION

A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.

B. Proof-roll all subgrade surfaces to accept fill material.

C. Each layer of fill shall be compacted to the specified density the same day it is placed.

1. The moisture content of backfill or fill material shall be adjusted, if necessary, to achieve the required degree of compaction.

D. Compact each lift in accordance with Table 1.

E. Match compaction equipment and methods to the material and location being compacted to obtain specified compaction, with consideration of the following guidelines:

1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.

2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.

3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 lbs. per linear inch (PLI).

4. Vibratory compaction is preferred for dry, granular materials.

5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.

6. Hydraulic compaction by ponding or jetting will not be permitted.

7. Backhoe-mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.

TABLE 1
COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	ASTM	Minimum Compaction
I. STRUCTURES*			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
b. Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
c. Fill around structures and above footings	12	D1557	95%
II. TRENCHES**			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	95%
c. Backfill below 4 feet under pavement	12	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	12	D1557	90%
III. EMBANKMENTS AND FILLS			
a. Fill under streets, parking lots, and other paved areas	12	D1557	95%
b. Embankments not supporting pavement or structures	12	D1557	90%
c. Rough site grading	12	D698	85%
IV. TRENCH PLUGS	6	D1557	93% or 95%

*Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.

**The first foot above non-plastic pipelines shall have a compacted thickness of 12 inches.

*** Compact impervious soil to at least 95% of standard Proctor maximum density. If more than 50% passes the 200 sieve, compact to at least 93% of the modified Proctor density if less than 50% passes the #200 sieve.

3.3 FIELD QUALITY CONTROL

A. Material Testing
   1. Testing will be done by a qualified, independent testing laboratory in accordance with this section and Section 014000 - Quality Requirements.
   2. The Proposer shall aid the third-party testing company in obtaining representative material samples to be used in testing.
   3. For each material which does not meet specifications, the Proposer shall reimburse Rockland Green for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
   4. The Proposer shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

   1. Rockland Green reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts at any time and at any location to confirm that specified compaction is being met..

   2. Testing shall be conducted for every 200 cubic yards of fill or backfill, or every 100 linear feet of trench backfill is placed, whichever is less. Tests are required for each lift of fill or backfill placed.

   3. The Proposer shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer.

   4. For each test which does not meet specifications, the Proposer shall retest at his cost. If the retest does not meet specifications, the Proposer shall replace and recompact material to the specifications at no additional cost to Rockland Green.

   5. The Proposer shall anticipate these tests and incorporate the time and effort into procedures.

   6. Nuclear moisture density testing by “probe” methods will be acceptable for compacted layers not exceeding 12 inches in thickness.

      a. Nuclear “backscatter” methods will be acceptable only for testing asphalt paving layers not less than 3 inches in thickness.

      b. Only certified personnel will conduct nuclear testing.

      c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to material testing materials.

D. Alternate Methods of Compaction - The Proposer may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer’s satisfaction.

E. Select Material - On-Site

   1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.

2. No on-site material shall be used without prior review and approval of Rockland Green.

F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.4 PROTECTION

A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.

B. As backfill progresses, the surface shall be graded to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.

C. The Proposer shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes;
   1. Compliance with the Storm Water Pollution Prevention Plan (SWPPP) developed for this work, if applicable and included with this Project manual.
   2. Temporary filter fabric
   3. Temporary silt fence
   4. Temporary compost filter sock
   5. Temporary drainage inlet protection
   6. Temporary stabilized construction entrance
   7. Temporary dust control
   8. Submittals as required
   9. Cleanup and repair

B. Related Requirements:
   1. Section 015000 “Temporary Facilities and Control”.
   2. Section 329200 “Turf and Grasses”.
   3. Section 334200 “Stormwater Conveyance”.

1.3 DEFINITIONS

A. Temporary erosion and sediment control practices shall be understood to mean temporary structures and practices designed to minimize the changes in the quality and quantity of water discharged from a location during construction activities.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all items listed in the section 1.2 SUMMARY above .

1.6 QUALITY ASSURANCE

A. All construction materials specified with NYSDOT Item numbers shall appear on the current NYSDOT approved List.

B. Comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess and waste materials.

C. Obtain and pay for all required inspections, permits, and fees. Provide timely notices required by governing authorities.

D. Codes and standards: This work shall conform to all rules, regulations, specifications and requirements that pertain to soil and water conservation practices of all agencies of government having jurisdiction.

E. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction, and in accordance with the current Occupational Safety and Health Administration (OSHA) Standards of Excavation.

F. The Proposer shall refer to the Stormwater Pollution Prevention Plan (SWPPP) for the required Standards and Specifications for the approved stormwater management practices

G. Erosion and sediment control practices as may be required must meet the requirements of the New York State Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual, and the Contract Documents.

H. Wheels of construction vehicles shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, the Proposer shall provide an area stabilized with stone, which drains into a sediment-trapping device. The Proposer shall be required to maintain public and private roadways adjacent to the project site in a clean condition.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials properly to prevent damage, deterioration and contamination.

B. Aggregates shall be stockpiled in well-drained locations.

C. Packaged materials shall be delivered in their original unopened containers that identify the material name and type and stored in a weatherproof enclosure.

D. Aggregates, earth fill, and topsoil that are muddy or frozen shall not be handled, delivered to the site, stockpiled or spread.

1.8 FIELD CONDITIONS

A. Utility Locator Service: Notify Dig Safely New York at **1-800-962-7962** for area where Project is located before site clearing.

B. Prior to performing any topsoil stripping or other earthwork activities on the site, the Proposer shall mark out with surveyor's flagging the limits of all areas to be disturbed and install all required temporary erosion and sediment control measures.
   1. The Proposer shall adhere to all erosion and sediment control policies of the agencies of government having jurisdiction.

C. Coordinate with Section 015000 – Temporary Facilities and Controls for timely installation of the site enclosure fence.

D. Discrepancies: Prior to the start of any construction work, immediately report to Rockland Green's Representative any discrepancies found on the site between actual conditions and those indicated in the Contract Drawings and confirm in writing. Where applicable, provide field information specific to the discrepancy to expedite resolution.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Temporary filter fabric: Non-woven, continuous-filament fibers of polypropylene with apparent opening size meeting ASTM D4751; Mirafi 140N as manufactured by TenCate Geosynthetics of Pendergrass, GA, or equal. Material shall have a needle-punched non-woven structure, appear on the current NYSDOT Approved List, Geosynthetics for Highway Construction, and be approved for drainage, separation and turbidity curtain applications.

B. Temporary silt fence:
   1. Silt fence fabric and posts: NYSDOT 209-2.08 Silt Fence, Item No. 209.13.
   2. Fabric shall meet the following requirements.
      a. Grab tensile strength 110 lbs.
      b. Elongation at failure 20%
      c. Mullen Burst Strength 300 PSI
      d. Puncture Strength 60 lbs
      e. Slurry Flow Rate 8 gal/min/sf
      f. Trapezoidal Tear Strength 50 lbs
      g. Equivalent opening size 40-80
      h. Ultraviolet radiation stability 70%

   3. Prefabricated units may be used providing the units are installed in accordance with New York Guidelines for Urban Erosion and Sediment Control; Mirafi® Envirofence by TenCate Geosynthetics of Pendergrass, GA, BioFence by ERC/Biomass Farms of Lakeville, MA, Geofab or equal.
   4. Fence posts for prefabricated units. Size as recommended by manufacturer of units. If no recommendation, material and size as necessary to support the units for the duration of project construction.
   5. Fence Posts for fabricated units. Wood posts shall be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. The length of the posts shall be a minimum of 36" long.
   6. Wire fence for fabricated units. Wire fencing shall be a minimum of 14 gage with a maximum of 6 inch mesh opening.

C. Temporary Compost Filter Sock

   1. Fabric
      a. Multi-filament polypropolyene
      b. Photodegradable
      c. 12" Diameter
      d. Mesh opening = 3/8"
      e. Tensile strength = 44 psi
      f. Ultraviolet stability% original strength (ASTM G-155)= 100% at 1,000 Hr.
      g. Minimum functional longevity= 1 year

2. Compost filter media
    a. Organic matter content = 25%-100% Dry weight
    b. Organic portion= Fibrous and elongated
    c. PH=6.0-8.0
    d. Moisture content= 30%-60%
    e. Partcile size= 100% passing a 1” screen and 10-15% passing a 3/8” screen.
    f. Soluble salt concentration= 5.0 ds/m (mmhos/cm) Maximum

3. Compost infill.
    a. The compost infill shall be well decomposed (matured at least 3 months), weed-free, organic matter. it shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed above. Note all biosolids compost produced in New York State (or approved for importation) must meet NYSDEC’s 6 NYCRR Part 363 (organics recycling) requirements. The NY State requirements are equal to, or more stringent than 40 CFR Part 503 regulations for pathogen reduction and heavy metals content. When using compost filter socks adjacent to surface water, the compost shall have a low nutrient level.

D. Temporary drainage inlet protection:
1. Paved areas
    a. Snake Bag manufactured by Sacramento Bag Manufacturing Company of Sacramento, California, or equal.
    b. Fiber roll – field constructed rolled tube of erosion control blanket, or BioD-Watl™ coir wattle as manufactured by RoLanka International, Inc. 55 Andrew Drive, Stockbridge, GA 30281, (800) 760-3215, or equal.
    c. Ultra DrainGuard™ oil and sediment model – Part No. 9217, as manufactured by P.E.P. Products, Branchburg, NJ, 1 (800) 407-3726, or equal.
2. Non paved areas
    a. Silt fence as indicated in “Temporary Silt Fence” above.
    b. Stake material shall be standard 2 x 4 pressure treated wood or equivalent metal with a minimum length of 3 feet.

E. Temporary stabilized construction entrance:
1. Geotextile fabric: Fabric woven from monofilaments of polypropylene: Mirafi 600X as manufactured by TenCate Geosynthetics, Pendergrass, GA, or equal. Material shall have a woven structure, appear on the current NYSDOT Approved List, Geosynthetics for Highway Construction, and be approved for stabilization and separation applications.
2. Crushed stone: Clean 1” and/or 2” crushed stone.
    a. Crushed stone meeting NYSDOT 703-0201, #2 stone and or #1 stone.

F. Dust control
1. Non-driving areas
    a. Vegetative cover see section 32 9200 TURF AND GRASSES
    b. Mulch
        1) Wood mulch, see section 32 9300 PLANTS
        2) Gravel mulch, Clean 2” crushed stone, meeting NYSDOT 703-0201, #2 stone
    c. Spray adhesives
        1) Earthbind™ 100, manufactured by Enviroad http://www.enviroad.com/index.shtml or equal.
2. Driving areas
    a. Water
    b. Polymer additives.
        1) Earthbind™, Stabilizer, manufactured by Enviroad http://www.enviroad.com/index.shtml or equal.

c. Barriers
    1) Woven geotextiles - see Temporary stabilized construction area in this section
    2) Stone - see Temporary stabilized construction area in this section

d. Wind breaks - see temporary silt fence in this section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. The Proposer shall contact Rockland Green's Representative immediately if clarification or interpretation of the Contract Documents, or any other aspect of the project, is required.

B. Before commencing with other site operations including demolition, site clearing and earthwork – related activities, the Proposer shall erect site perimeter erosion control measures.
    1. Coordinate with installation of temporary construction fencing and Temporary vegetation protection fencing

3.3 GENERAL INSTALLATION

A. In the event of conflict between these specification requirements and regulations by governmental agencies having jurisdiction, the more restrictive laws, rules or regulations apply.

B. The Proposer's schedules and methods shall be consistent with the project erosion and sediment control plan as shown on the drawings and in the Contract Documents.

C. To control erosion and sedimentation on the project site and to protect adjoining sites and watercourses, the Proposer shall take all necessary precautions including, but not limited to, the following:
    1. The Proposer shall erect the site perimeter erosion control measures before commencing the demolition operation, site clearing or earthwork.
    2. The Proposer shall limit the area of clearing and grubbing, excavation, borrow and embankment operations commensurate with their capability and progress in keeping the finish grading, mulching, seeding and other temporary and/or permanent control measures installed and maintained to the satisfaction of Rockland Green's Representative.
    3. In areas where soil disturbance has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within 7 days from the date the soil disturbance ceased.
    4. Control dust by standard water spray methods. Road dust shall be controlled by the use of water or other allowed materials.
    5. Keep paved roads adjacent to the project site clean. Sweep frequently and do not allow soil and debris to accumulate.

6. Refer to the Erosion and Sediment Control Plan(s) and/or the project Stormwater Pollution Prevention Plan (SWPPP) for additional requirements.
7. All mulch placed atop permanent seeding on slopes steeper than 3:1 (run:rise) shall be anchored with a biodegradable rolled erosion control product installed according to manufacturer's directions.

3.4 INSTALLATION

A. Install all temporary sediment control practices as per the current edition of the New York State Department of Environmental Conservation, New York State Standards and Specifications for Erosion and Sediment Control unless otherwise modified by the site specific SWPPP.

3.5 FIELD QUALITY CONTROL

A. Refer to section 014000 – QUALITY REQUIREMENTS for special inspection requirements.

3.6 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at start of construction, maintenance service shall include full maintenance by skilled employees of erosion and sediment controls Installer. Include weekly preventive maintenance, repair or replacement of worn or defective components, as required for proper operation.

B. Maintain all temporary erosion control measures in proper working order at all times during the construction period. They shall remain in place until the permanent surface treatments have been sufficiently established to prevent soil erosion and the Rockland Green's Representative has authorized removal.
1. Check all erosion and sediment control practices for stability and operation following every ½ inch rainfall but in all cases at least once every week. Immediately make repairs as needed.
2. The Proposer shall be responsible for maintenance and inspection of erosion and sediment control and stormwater quality facilities for the duration of the project, including winter or other shutdowns.
3. Remove sediment from behind silt fences when the capacity has been reduced by 50%. Repair silt fences as necessary to maintain an effective barrier.
4. Clean out sediment traps when the capacity has been reduced by 50%.
5. Inspect check dams for stability and operation following every ½ inch rainfall, but in all cases at least once every week, remove accumulated sediment when capacity has been reduced by 50%.
    a. If erosion has occurred between structures, install a temporary layer of a rolled erosion control product, stone or other suitable material to stabilize that portion of the channel until permanent surface treatments are established and the stormwater collection system is in place.
6. Remove sediment from inlet protection devices when the storage capacity is reduced to 50% of the inlet protection device capacity.

3.7 CLEANUP & RESTORATION

A. Promptly remove soil and debris created by work described in this Section. Clean wheels of vehicles before leaving the site to avoid tracking soil and asphalt material onto adjacent pavements.

B. At the completion of the site work described in this Section, the site shall be left in a neat and orderly condition. Remove all resultant miscellaneous materials and debris from the site.

C. Turf areas, pavements and all other site amenities that were damaged during the work described in this Section shall be restored to their original condition prior to this construction at the Proposer's expense, and to the Rockland Green's satisfaction.

D. When temporary erosion and sediment control practices are no longer needed as determined by the Rockland Green's Representative and the agency of government having jurisdiction, the Proposer shall remove and return the area to a condition similar to that which existed before construction. Areas where temporary erosion and sediment control practices were located shall be graded with no obstruction to natural surface water flows or the proper functioning and access to the works of improvement installed. The Proposer shall exercise extreme care during the removal stages to minimize the loss of soil sediment and debris that was trapped during construction.

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Asphalt paving; top course, binder, and base course.

2. Driveways and parking areas.

3. Compaction.

4. Tolerances.

5. Field quality control.

B. REFERENCES

1. New York State Department of Transportation (NYSDOT) Standard Specifications, dated May 1, 2018.

2. NYSDOT - Manual of Uniform Traffic Control Devices.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 PERFORMANCE REQUIREMENTS

A. Where pavement replacement is being accomplished, match the sectional profiles of the existing pavement unless otherwise stated herein or shown on the Drawings.

B. All thicknesses of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300 – Submittals, including asphalt materials, equipment and paving methods.

B. Submit certification of plant job mix formulas that have been approved by the NYSDOT.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with the NYSDOT Standard Specifications, dated May 1, 2028, as amended to date and as they apply to the following:

1. Materials and batch plant requirements.

2. Construction procedures except as modified herein.

3. Weather and seasonal limitations except as modified herein.

B. Paving work shall be performed by a qualified paving contractor or subcontractor with minimum 10 years of documented experience acceptable to Rockland Green and Engineer. Supporting documentation for the paving contractor or subcontractor stating years in service with three references shall be submitted to the Engineer for review and approval prior to start of work.

1.7 ENVIRONMENTAL LIMITATIONS

A. Weather and Seasonal Limitations - Asphalt concrete and bituminous surface treatments shall not be placed on wet surfaces or when it is raining or when conditions prevent the proper handling, compacting or finishing of the asphalt concrete or when the surface temperature is less than specified in the following table:

Nominal Compacted Lift Thickness	**Surface Temperature Minimum** (Note 1)	**Seasonal Lim-its**
3" or Greater	40°F	None
Greater than 1" but less than 3"	45°F	Notes 2 and 3
0.1" or less	50°F	Notes 2 and 3
Bituminous Surface Treatments (Note 3)	70°F or greater	Note 4

NOTES:

1. All temperatures shall be measured on the surfaces (lay glass thermometer on surface and read after temperature has stabilized) where the paving is to be placed and the controlling temperature shall be the average of three temperature readings taken at locations +25 feet apart.

2. Top course shall be placed only during the period of April 1 to November 15. In addition, when top course is placed between September 15 and November 15, not less than two rollers shall be furnished and operated by the Contractor.

3. Surface treatments shall be placed during the period of May 1 up to and including the first Saturday after Labor Day.

4. The ambient temperature shall be not less than 50 degrees F in the shade and not more than 95 degrees F.

5. Bituminous paving mixtures for curbs, driveways, sidewalks, gutters and other incidental construction shall be placed on surfaces having a temperature of 45 degrees F or greater. Installation of these items is not subject to seasonal limitations.

6. When work is halted because of weather conditions, limited tonnage enroute to the project may be placed, if permitted, and the mixture is within the temperature requirements.

1.8 COORDINATION

A. Coordinate field work including maintenance of traffic, access to private driveways, and emergency vehicle access.

1.9 SCHEDULING

A. Schedule the paving operations such that all paving necessary to provide safe and adequate maintenance and protection of traffic or for protection of previously laid courses is completed within the weather and seasonal limitations.

1. Such scheduling shall include expediting construction operations to permit paving before the seasonal limitations or by limiting the length of work to that which can be completed before the seasonal shutdown.

2. The cost of scheduling and sequencing of work to conform with the seasonal limitations shall be reflected in the bid prices for the related contract items.

1.10 MAINTENANCE

A. The Proposer shall maintain driving surfaces, free of ruts and potholes, for maintenance of traffic until temporary paving or permanent paving is installed.

1. All temporary paving and pavement replacement shall be maintained in a safe, drivable condition until the pavement wearing course is installed.

2. All subgrade, subbase and base courses shall also be maintained in their specific finish condition prior to placement of the next course.

B. If the Proposer fails to complete the necessary paving operations prior to weather and seasonal limitations, all temporary materials and work which become necessary as a result of such failure, such as the lowering or shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate maintenance and

protection of traffic until paving operations can be completed the following paving season, shall be at the Proposer's expense.

C. For a period of one year after issuance of the Certificate of Substantial Completion, the Proposer shall promptly patch, maintain, repair, and/or replace any pavement that settles or becomes damaged due to settlement or defective materials or workmanship.

1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.

2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.

3. If more than top course depth of 1-1/2-inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.

4. The finished grade, in any case, shall be as shown on the Contract Drawings.

PART 2 - PRODUCTS

2.1 ASPHALT

A. All asphalt pavement courses shall be hot mix asphalt pavement conforming to material requirements of the following:

1. Top Course – NYSDOT 9.5 F1, Top Course HMA 80 series compaction.

2. Binder Course – NYSDOT 19 F9, Binder Course HMA 80 series compaction.

3. Pavement Subbase - NYSDOT Type 1 F9, Asphalt-Treated Permeable Base Course.

4. Tack Coat - New York State Item No. 407.0103, tack coat, emulsified asphalt.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Permanent restoration of pavements shall not begin until 30 days after trench or structure backfill has been completed in accordance with the applicable specifications or until testing of the installed utility has been completed in accordance with the specifications (whichever is the longest period after completion of trench or structural backfill).

1. Completion of backfill shall include compaction tests to ascertain compliance with degree of compaction required as described in Section 312330 - Compaction.

a. Verify base conditions

b. Verify that compacted subgrade is dry and ready to support paving.

c. Verify gradients and elevations of base are correct.

B. If painted traffic markings on the pavement are to be interrupted by the new pavement replacement, they are to be restored using an approved traffic paint.

C. Driveway and Parking Areas

1. Driveways and parking areas that are disturbed or damaged by the Proposer's operations shall be restored equal to a new condition.

2. Driveway or parking area aprons which do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1 inch per foot with top course material of the new pavement, so that the apron conforms to the elevation of the road pavement at each location.

3. New driveways or parking areas shall be constructed as described herein and as shown on the Drawings.

3.2 PREPARATION

A. Where project consists of reconstructing existing streets, lower valve boxes and existing manholes to subgrade level by removing frame and cover and brick masonry.

1. Cover valve boxes and manholes with steel plates and locate with measured ties.

2. After constructing the subbases and pavement courses, and prior to placing the final top course, recover valve boxes and manholes and raise to finished grade.

B. All existing and new manholes, frames and covers, valve boxes, curb boxes, etc., shall be raised or lowered to be 1/2 inch below the new pavement grade.

1. No manhole covers or valve box covers shall be covered with paving material or be exposed in a depression in the pavement greater than 1/2 inch.

C. Catch basin frames and grates shall be raised or lowered to be 1 inch below the new pavement finished grade.

D. Pavement Cuts

1. Pavement cuts for final pavement replacement shall be made as described herein.

2. Pavement cuts shall be made parallel to the centerline of the trench, shall be located a minimum of 12 inches outside the backfilled trench on undisturbed subgrade in a straight line between those stations where changes in direction of the installed piping were made.

3. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the Proposer's expense and match the proposed permanent paving.

4. Pavement cuts in driveways shall be cut back 12 inches and made in a straight alignment perpendicular or parallel to the driveway and for its full width.

5. Pavement cuts in parking areas shall be cut back 12 inches and made in a straight alignment parallel to the centerline of trench.

E. Preparation of Existing Surfaces

1. Prior to placing of asphalt concrete, the existing pavement surfaces shall be cleaned including brooming, mechanical sweeping, and flushing with water such that no dust or foreign material remains on the existing surface and in accordance with NYSDOT Specification Section 633 “Conditioning Existing Pavement Prior to Hot Mix Asphalt (HMA) Overlay”.

2. After cleaning of surface, all unsealed or inadequately sealed cracks and joints shall be cleaned with compressed air and then sealed as required under NYSDOT Specification “633-3.02 Cleaning, Sealing and Filling Joints and Cracks.”

3. Prior to placing of asphalt concrete, vertical faces of existing pavement, structures, curbs and gutters shall receive a tack coat as described in NYSDOT Specification “407 Tack Coat.” Curbs and gutter faces to be sprayed only to the extent to be covered by the asphalt concrete.

F. All new pavement where meeting existing pavement shall be butted up against a vertical face in the existing pavement.

1. This vertical face to be cut to the depth of the new pavement.

2. Where the new pavement is an overlay, the beginning and end of the top course shall be similarly butted against a vertical face.

3. The existing pavement shall be removed for a minimum length of 2 feet, as measured parallel to the direction of paving, or greater if required to eliminate any noticeable bump or to provide adequate drainage away from structures, and to the width of new pavement.

G. Removal of Existing Pavement

1. Where shown on the Contract Drawings, the Proposer shall remove a portion of an existing pavement to the limits and profile specified.

3.3 PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions

1. Tack coat temperature to be not less than 120 degrees F.

2. The tack coat shall be applied no more than four hours prior to paving of the asphalt concrete course.

a. No traffic will be allowed on the freshly applied tack coat.

B. Apply tack coat to contact surfaces of curbs, gutters, and existing vertical surfaces.

3.4 PREPARATION - RESET MANHOLE FRAMES

A. Prior to placing wearing (top) course, make final adjustments of manhole frames, catch basin frames, valve boxes and any other utility structures located in the pavement in relation to finished grade.

1. Manhole frames, valve boxes, etc. to set 1/2 inch below finished grade and parallel to finished crown.

2. Catch basin frames to set 1 inch below finished grade and parallel to finished crown.

    a. Bevel slope of wearing course (for 6-inch width) around catch basin frame.

3.5 INSTALLATION

A. Install work in accordance with NYSDOT standards.

B. Place asphalt within four hours of applying tack coat.

C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact with vibratory pans and hand tamps in area inaccessible to rolling equipment.

D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.6 PLACING AND COMPACTING

A. Placing mix in an appropriate ambient temperature and on a surface sufficiently warm to minimize the risk of excessive cooling before completion of rolling is of paramount importance. Holding the aggregate particles in place is solely the function of the film of asphalt. The asphalt cannot perform this function properly if the mix is too cool when rolled.

1. A thin course compresses very little under the roller and, as it cools quickly, it must be rolled as soon as possible.

2. The Proposer shall supply sufficient number of rollers to perform the required compaction while asphalt concrete is still hot and in a workable condition and coordinate speed of paver with rollers such that the degree of compaction required is obtained.

3. A high degree of densification is not the goal with this type of mix -- the aim is firm seating and contact of the aggregate particles.

4. One or two coverages (see Table 1) with a steel-wheeled roller weighing 8 to 10 tons is sufficient. Additional rolling may be excessive, causing a break in the bond of asphalt between aggregate particles, particularly after the mix has cooled.

5. When overtaken by sudden storms, the Engineer may permit work to continue up to the amount which may be in transit from the plant at the time, provided the mixture is within temperature limits specified.

B. Paving - All asphalt concrete shall be installed using self-powered units in accordance with the NYSDOT Specification “402-3.02 HMA Pavers and 402-3.06 Spreading and Finishing".

1. A self-powered paving unit shall be provided except where hand methods are permitted by the Engineer in small areas or areas inaccessible to a paving unit. For such areas, the mixture shall be dumped, spread, screened and compacted to give the required section and compaction thickness.

C. Compaction - Asphalt concrete shall be compacted in accordance with NYSDOT Specification “402-3.07 Compaction and 402-3.09 Joints” using either option as follows:

1. Option A - Tandem roller (static or vibratory) 8 to 10 ton size.

2. Option B - Vibratory compaction.

D. The required number of passes for either vibratory or static rollers, listed in Table 1, are minimum and may be increased by the Engineer. One pass shall be defined as one movement of the roller over any point of the pavement in either direction. Static roller passes shall continue until all ruts, ridges, roller marks or other irregularities are removed from the surface. The Engineer may alter the compaction procedures for small areas where the specified procedures are not practical.

TABLE 1

REQUIRED NUMBER OF PASSES (MINIMUM)

Pavement Courses	Vibratory Roller		Steel-Wheel Tandem Finish Roller
	Vibrating Passes*	Static Passes**	Static Passes
Base (open graded each lift)	4	2	5
Base (dense graded)	4	2	5
Binder (dense graded)	4	Not required	5
Top (dense graded all types)	2	Not required	2

*The required number of vibrating passes shall be reduced by one half (1/2) for dual vibrating drum rollers when the drums are tandem and are both in the vibrating mode.

**The required number of static passes may be completed by the vibratory roller operating in the static mode.

E. Unless otherwise directed by the Engineer, vibratory rollers having pneumatic drive wheels shall compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two passes with the drum operating static. Unless otherwise directed by the Engineer, dual vibrating drum rollers shall compact the joint by overlapping the joints in two passes with both drums operating static.

F. To prevent adhesion of the mixture to the drum(s), the drum(s) shall be kept properly moistened with water, or water mixed with small quantities of detergent. If required to prevent pneumatic tire pickup, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar material. In all instances, the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in paving, compaction or cleaning operations.

G. If the Engineer determines that unsatisfactory compaction is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Proposer shall immediately cease using this equipment and proceed with the work in accordance with the conventional static compaction procedures at no additional cost.

H. The Proposer should note that if he elects to use vibratory compaction equipment, he assumes full responsibility for the cost of repairing all damage that may occur to highway components and adjacent property or underground utilities.

3.7 DRIVEWAYS AND PARKING REAS

A. Paving materials, type of paving, depth of various courses, etc., shall be as shown on the Drawings.

1. The driveways and parking areas shall be cut back 12 inches from outside disturbed or damaged areas as described above.

2. The work shall include proper compaction of any necessary subbase, base course and paving courses, in accordance with Section 312330 - Compaction.

3.8 TOLERANCES

A. Surface Tolerance - The pavement surface shall be constructed to a 1/4-inch tolerance. If, in the opinion of the Engineer, the pavement surface is not being constructed or has not been constructed to this tolerance based upon visual observation or upon riding quality, he may test the surface with a 16-foot straight edge (furnished by the Proposer) or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement.

1. Variations exceeding 1/4-inch shall be satisfactorily corrected or the pavement relayed at no additional cost as ordered by the Engineer.

B. Thickness Tolerance - The thickness indicated for each of the various courses of bituminous pavement is the nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.

1. Material which is part of a trueing or leveling course or shim course will not be considered in pavement thickness determinations.

2. A tolerance not to exceed 1/4-inch from the nominal thickness required for the course specified under one pay item will be acceptable where the required nominal thickness is 4 inches or less. A tolerance not to exceed 1/2-inch from the nominal thickness required for the course or courses specified under one pay item will be acceptable where the required nominal thickness is over 4 inches. In addition, the sum total thickness of all bituminous mixture courses shall not vary from the total of the nominal thickness indicated on the plans by more than 1/4 inch where the total nominal thickness is 4 inches or less; or more than 1/2-inch where the total nominal thickness is over 4 inches but not more than 8 inches; and by not more than 5/8-inch where the total nominal thickness is more than 8 inches.

3.9 FIELD QUALITY CONTROL

A. The required degree of compaction for wearing or top courses and shim course is a finished product having not more than 7 percent air voids.

B. Rockland Green reserves the right to order testing of materials at any time during the work. The Proposer shall provide testing at no additional cost to Rockland Green.

3.10 PROTECTION

A. Any pavement, constructed or reconstructed, which is subsequently damaged due to activity of work under this contract, shall be removed and replaced by the Proposer at no additional cost to Rockland Green.

B. Protect pavement from vehicular traffic until compaction is completed.

END OF SECTION 32 1216

SECTION 321313

CONCRETE PAVING

1.1 SUMMARY

A. Section includes the following:
   1. Parking lots.
   2. Curbs.
   3. Walks.

B. Related Requirements:

   1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
   2. Section 321713 "Parking Bumpers."
   3. Section 321723 "Pavement Markings."
   4. Section 321726 "Tactile Warning Surfacing"

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For the following, from manufacturer:

   1. Cementitious materials.
   2. Steel reinforcement and reinforcement accessories.
   3. Fiber reinforcement.
   4. Admixtures.
   5. Curing compounds.
   6. Applied finish materials.
   7. Bonding agent or epoxy adhesive.
   8. Joint fillers.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

2. Personnel conducting field tests must be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.7 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less.Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

C. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884/A884M, Class A, plain steel.

D. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420); deformed.

E. Galvanized Reinforcing Bars: ASTM A767/A767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A615/A615M, Grade 60 (Grade 420) deformed bars.

F. Epoxy-Coated Reinforcing Bars: ASTM A775/A775M or ASTM A934/A934M; with ASTM A615/A615M, Grade 60 (Grade 420) deformed bars.

G. Steel Bar Mats: ASTM A184/A184M; with ASTM A615/A615M, Grade 60 (Grade 420) deformed bars; assembled with clips.

H. Plain-Steel Wire: ASTM A1064/A1064M, as drawn.

I. Deformed-Steel Wire: ASTM A1064/A1064M.

J. Epoxy-Coated-Steel Wire: ASTM A884/A884M, Class A; coated.

K. Epoxy-Coated, Joint Dowel Bars: ASTM A775/A775M; with ASTM A615/A615M, Grade 60 (Grade 420) plain-steel bars.

Retain "Tie Bars" or "Hook Bolts" Paragraph below. Tie bars or hook bolts may be used for connection between new and existing paving and between paving and gutters.

L. Tie Bars: ASTM A615/A615M, Grade 60 (Grade 420); deformed.

M. Hook Bolts: ASTM A307, Grade A (ASTM F568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

N. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

O. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

P. Zinc Repair Material: ASTM A780/A780M.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, gray portland cement Type II.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S, uniformly graded. Provide aggregates from a single source

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water: Potable and complying with ASTM C94/C94M.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ChemMasters, Inc.
b. Sika Corporation.
c. SpecChem, LLC.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ChemMasters, Inc.
b. SpecChem, LLC.
c. W. R. Meadows, Inc.

2.6 RELATED MATERIALS

A. Expansion joint fillers: ½ inch thick Sonolastic® polyethylene closed-cell joint filler as manufactured by Sonneborn Building Products Division, ChemRex, Inc., or equal.

B. Expansion joint sealant for all concrete pavement: Pour grade one-part elastomeric self-leveling polyurethane sealant, light gray in color to match concrete color, meeting ASTM C920, Type S, Grade P, Class 25; Sonolastic® SL 1 as manufactured by Sonneborn Building Products Division, ChemRex, Inc., or equal. Use compatible primer if sealant manufacturer recommends.

C. Expansion joint sealant primer: Material recommended by the joint sealant manufacturer for adhesion to joint substrates indicated.

D. Surface sealer: Transparent penetrating silane, water repellent and anti-spalling sealer specifically formulated to protect the concrete from moisture, salts and deicing chemicals; Provide sealer by one of the following manufacturers;
1. Certi-Vex ® Penseal 244 100% as manufactured by Vexcon Chemicals, Inc.,
2. ChemMasters, AquanilTM Plus 55
3. Sealkrete, SS-10 Clear Silane-Siloxane waterproofer.

E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ChemMasters, Inc.
b. Euclid Chemical Company (The); an RPM company.
c. Sika Corporation.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

Optional percentages in three subparagraphs below are based on ACI 301 (ACI 301M) for exposure severity and aggregate size. Retain first option in each subparagraph for severe exposure, second option for moderate exposure, and third option for mild exposure. See the Evaluations for exposure definitions.

1. Air Content, 1-inch Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.

Retain first option in first paragraph below if reinforced concrete paving will be exposed to chlorides in service; retain second option for reinforced concrete paving that will not be exposed to chlorides but will be exposed to moisture in service. Percentages are derived from ACI 301 (ACI 301M).

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

Retain both subparagraphs below if required; revise to suit Project.

1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

Synthetic-fiber dosage rates in "Synthetic Fiber" Paragraph below reflect typical recommendations of manufacturers. Retain first option below for synthetic fiber used for reducing plastic shrinkage cracking; retain second option for synthetic fiber used for improving hardened concrete properties. Revise dosage if required.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash or Pozzolan: 25 percent

E. Color Pigment: If shown on the drawings, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

F. Concrete Mixtures: Normal-weight concrete.

Higher strengths than those in options in "Compressive Strength (28 Days)" Subparagraph below may be needed for durability in severe exposure conditions. Consult concrete paving contractors for regional practices.

A. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

Optional percentages in three subparagraphs below are based on ACI 301 (ACI 301M) for exposure severity and aggregate size. Retain first option in each subparagraph for severe exposure, second option for moderate exposure, and third option for mild exposure. See the Evaluations for exposure definitions.

1. Air Content, 1-inch Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.

Retain first option in first paragraph below if reinforced concrete paving will be exposed to chlorides in service; retain second option for reinforced concrete paving that will not be exposed to chlorides but will be exposed to moisture in service. Percentages are derived from ACI 301 (ACI 301M).

B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

Retain both subparagraphs below if required; revise to suit Project.

1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

Synthetic-fiber dosage rates in "Synthetic Fiber" Paragraph below reflect typical recommendations of manufacturers. Retain first option below for synthetic fiber used for reducing plastic shrinkage cracking; retain second option for synthetic fiber used for improving hardened concrete properties. Revise dosage if required.

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash or Pozzolan: 25 percent

D. Color Pigment: If shown on the drawings, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

E. Concrete Mixtures: Normal-weight concrete.

   1. Compressive Strength (28 Days): 5,000 psi.
   2. Maximum W/C Ratio at Point of Placement: 0.40.
   3. Slump Limit: 4 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

Retain this article if steel-reinforced concrete paving is required; revise to suit Project.

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of **50 feet** unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

    a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation[**, steel reinforcement,**] and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface[**and steel reinforcement**] before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies**,** reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to 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.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

Retain one or more options in "Curing Methods" Paragraph below. Do not use curing compound on surfaces to be covered by unit pavers, tiles, or other materials set in mortar.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing or curing compound as follows:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
2. Curing Compound: 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.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 (ACI 117M) and as follows:

ACI 117 (ACI 117M) establishes few paving tolerances; those in subparagraphs below are based on ACI 330.1. Revise to suit Project.

1. Elevation: 3/4 inch
2. Thickness: Plus 3/8 inch minus, 1/4 inch
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Rockland Green will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M will be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each **50 cu. yd.** or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; 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 C231/C231M, pressure method; 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 C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if 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.

D. Test results to be reported in writing to Architect, concrete manufacturer, and Proposer within 48 hours of testing. Reports of compressive-strength tests to contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. 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.

F. Additional Tests: Testing and inspecting agency will 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.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Proposer's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 321723

PAVEMENT MARKINGS

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. Painted markings applied to asphalt paving.
2. Painted markings applied to concrete surfaces.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to marking asphalt paving or concrete surfaces including, but not limited to, the following:

a. Asphalt-paving or concrete-surface aging period before application of pavement markings.
b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

A. Product Data: Include technical data and tested physical and performance properties.

1. Pavement-marking paint, latex.

B. Shop Drawings:

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with NYS Dynamic symbol of accessibility, spaces allocated for people with disabilities.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NYSDOT for pavement-marking work.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ennis-Flint, Inc.
2. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
3. Sherwin-Williams Company (The).

B. Source Limitations: Obtain pavement-marking paints from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.3 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than ten minutes.
   1. Color: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow asphalt paving or concrete surfaces to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to asphalt paving or concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 32 1726

TACTILE WARNING SURFACING

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. Cast-in-place detectable warning plates.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of exposed finish requiring color selection.

C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS

A. Cold-Weather Protection: 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 unit paver work damaged by frost or freezing.

1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

B. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.

a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering and wear.
b. Separation or delamination of materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

2.2 DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles with replaceable surface configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ADA Solutions, LLC.
    b. EJ.
    c. Neenah Foundry Company.

2. Material:
    a. Cast Iron: Gray iron, ASTM A 48/A 48M, CL 35.

3. Shapes and Sizes:
    a. 24 inches deep by width shown in drawings

4. Dome Spacing and Configuration: Manufacturer's standard compliant spacing, in pattern.

5. Mounting:
    a. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:

1. Furnish Type 304 stainless-steel fasteners for exterior use.
2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.

C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.

B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

3.3 INSTALLATION OF DETECTABLE WARNING TILES

A. Cast-in-Place Detectable Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.

2. Set each detectable warning tile accurately and firmly in place and completely set tile back and embedments in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.

3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8 inch from flush.

4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.

5. Clean tiles using methods recommended in writing by manufacturer.

3.4 CLEANING AND PROTECTION

A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Engineer. Replace using tactile warning surfacing installation methods acceptable to Engineer.

B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION

SECTION 329200

TURF AND GRASSES

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. Hydroseeding.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 9113 "Soil Preparation” and drawing designations for planting soils.

E. CU Soil: See Section 31 2000 – “Earth Moving” specification.

F. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil/reinforced turf soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and

percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals.
2. Experience: Five years' experience in turf installation.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's shall have certification in one of the following categories from the National Association of Landscape Professionals (NSNLA):

    a. Landscape Industry Certified Technician - Exterior.
    b. Landscape Industry Certified Lawn Care Manager.
    c. Landscape Industry Certified Lawn Care Technician.

5. Pesticide Applicator: State licensed, commercial.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Spring Planting: April 1 – May 30.
2. Fall Planting: August 16 – October 15.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species:

1. Quality, State Certified: State-certified seed of grass species as listed below.
2. Sun and Partial Shade, Cool-Season Grass: Proportioned by weight as follows:

a. 50 percent Kentucky bluegrass (Poa pratensis).
b. 30 percent chewings red fescue (Festuca rubra variety).
c. 10 percent perennial ryegrass (Lolium perenne).
d. 10 percent redtop (Agrostis alba).

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

a. 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition:

a. 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

A. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install 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.

3.3 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 32 9113 "Soil Preparation."

B. Placing Planting Soil: Place and mix planting soil a in place over exposed subgrade

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 HYDROSEEDING

A. Hydroseeding: Mix specified seed, commercial fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.5 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. 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.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third 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. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass annual ryegrass chewings red fescue to a height of 1-1/2 to 2 inches.

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.6 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Engineer:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.8 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION

SECTION 334200
STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Stormwater pipe and fittings.
   2. Catch basins, including frames and grates.
   3. Refer to drawings for details and specifications for new storwater chambers and specifications (ADS Stormtech system or approved equal).

1.2 REFERENCES

A. Abbreviations & Acronyms
   1. AASHTO - American Association of State Highway and Transportation Officials
   2. ACI – American Concrete Institute
   3. ASTM – American Society for Testing and Materials
   4. HDPE – High Density Polyethylene
   5. NYSDOT – New York State Department of Transportation
   6. PVC – Polyvinyl Chloride

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings:
   1. Catch basins:
      a. Include plans, elevations, sections, and details.
   2. Storm sewer pipe and fittings:
      a. Include product data fro each type of product.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements.
B. Store pipes, fittings and accessories out of the way of active work areas.
C. Protect pipe from construction traffic and machinery.

PART 2 - PRODUCTS

2.1 STORM SEWER PIPE AND FITTINGS

A. Corrugated HDPE:
   1. Pipe: Dual wall, smooth interior, integral bell, corrugated HDPE, AASHTO M252 or M294, Type S
   2. Joints: soil tight, bell and spigot, AASHTO M252 or M294, Type S

3. Fittings: soil tight, bell and spigot, AASHTO M252 or M294, Type S

B. Type (PP) Polypropylene Pipe:

1. ASTM F2881, bell and spigot style with rubber gasket conforming to ASTM F477. Structural strength to support HS-25 loads with 15 inches of cover, minimum pipe stiffness of 46 psi. “HP Storm” pipe by ADS or approved equal.

2.2 END SECTIONS

A. Galvanized Steel: conforming to AASHTO M218

2.3 CATCH BASINS

A. Precast Concrete Catch Basins: ASTM C913, precast, reinforced concrete; designed in accordance with ASTM C890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated on Drawings, with provision for joint sealants. Minimum wall thickness – 5 inches.
   1. Joint Sealants: ASTM C990, bitumen or butyl rubber.
   2. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
   3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match frame and grate.
   4. Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section and suited for the type of pipe being installed.
   5. Structures shall be manfucatured by an approved NYSDOT facility.
B. Frames and Grates: ASTM A536, Grade 60-40-18, ductile iron designed for A-16 (AASHTO HS20-44), structural loading. Include flat grate with small square or short-slotted drainage openings.
   1. Frame Size: Full bearing on minimum 5” catch basin wall thickness. Refer to drawings for catch basin sizes.
   2. Grate Size: 24 by 24 inches minimum unless otherwise indicated on Drawings.
   3. Grate Free Area: Approximately 50 percent unless otherwise indicated on Drawings.

2.4 MORTAR

A. General: Portland cement mortar for use in frame adjustment, ASTM C270
   1. Type M, Mortar for unit masonry

2.5 BRICK

A. General: first quality, sound, hard-burned common brick, culled of all irregular, unsound or damaged brick, ASTM C32
   1. Grade MS, for frame adjustment
   2. Grade SS, for pipe connections

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine delivered materials, structures, pipes and castings for damage. Remove defective products from site.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Perform trenching and backfilling in accordance with Specification Section 312000.

B. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Rockland Green or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Rockland Green no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Rockland Green’s written permission.

3.3 PIPE HANDLING

A. Follow all applicable safety regulations when handling pipe.

B. During cold weather, extra care should be used in handling to avoid any type of impact to the pipe to prevent damage.

C. Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used.

D. Care should be taken when moving pipes

1. Avoid dragging or striking the pipe against another pipe or object.

2. Avoid dragging the pipe across the ground.

3. Do not drive over the pipe prior to installation.

E. In staging pipe along a trench, place pipe as near to the trench as possible to avoid excessive handling. Where practicable, stage pipe on opposite side of trench spoils pile, so that the pipe can be moved easily to the edge of the trench for lowering into position.

3.4 PIPE INSTALLATION

A. General

B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

D. Install manholes/catch basins for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

G. Install gravity-flow, nonpressure drainage piping in accordance with the following:

1. Install piping pitched down in direction of flow.

2. Install PE corrugated sewer piping in accordance with ASTM D2321.

3.5 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping in accordance with the following:

1. Join corrugated-PE piping in accordance with ASTM D3212 for push-on joints.

2. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.6 CONNECTIONS

A. Make connections to existing piping and underground manholes.

3.7 IDENTIFICATION

A. Materials and their installation are specified in Section 31 2000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.

2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 95 percent of piping diameter.

c. Damage: Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

3.9 CLEANING

A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION