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AFTON CENTRAL SCHOOL DISTRICT

Afton, New York

2024 CAPITAL PROJECT – PHASE 2
CENTRAL SED#: 08-01-01-04-0-001-020
BUS GARAGE SED#: 08-01-01-04-5-015-003

HA PN: 2025-005P

VOLUME 2 TECHNICAL SPECIFICATIONS BID DOCUMENTS

"The design of this project conforms to all applicable provisions of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Code, and the building standards of the New York State Education Department."

November 3, 2026

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SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish and install aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section.

1. All exterior aluminum windows shall be provided with integral venetian blinds.

1.2 DEFINITIONS

A. Combination Assemblies: An assembly formed by a combination of two or more separate fenestration products whose frames are mulled together utilizing a combination mullion or reinforcing mullion.

B. Combination Mullions: A horizontal or vertical member formed by joining two or more individual fenestration units together without a mullion stiffener.

C. Reinforcing Mullions: A horizontal or vertical member with an added continuous mullion stiffener and joining two or more individual fenestration units along the sides of the mullion stiffener.

1.3 COORDINATION

A. Finish Matching: Coordinate all exposed exterior aluminum components and trim to ensure uniform and consistent color and appearance. Use products specified in this Section as a benchmark. Architect's decision will be final as to whether a proposed product matches.

1.4 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units

1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440 – 08 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
2. Thermal test unit sizes:

a. Double Hung: Unit shall consist of a double hung window.

B. Test Procedures and Performances

1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440–08 requirements for the window types specified hereinafter. In addition, the following specific performance requirements shall be met.

2. Life Cycle Testing

    a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.

3. Air Infiltration Test

    a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
    b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•m^2) of unit.

4. Water Resistance Test

    a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 15.0 psf (718 Pa).
    b. There shall be no uncontrolled water leakage.

5. Uniform Load Deflection Test

    a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 70 psf (3351 Pa), positive and negative pressure.
    b. No member shall deflect over L/175 of its span.

6. Uniform Load Structural Test

    a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 105.0 psf (5027 pa), both positive and negative.
    b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.

7. Forced Entry Resistance

    a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.

8. Condensation Resistance Test – (CRF)

    a. Test unit in accordance with AAMA 1503.1.
    b. Condensation Resistance Factor (CRF) shall not be less than 81 (slider frame), 73 (fixed frame), and 66 (single hung frame) when glazed with .24 center of glass U-Factor.

9. Condensation Resistance (CR)

    a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
    b. Condensation Resistance (CR) shall not be less than 60 (slider frame), 54 (fixed frame), and 52 (single hung frame) when glazed with .24 center of glass U-Factor.

10. Thermal Transmittance Test (Conductive U-Factor)

    a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
    b. Conductive thermal transmittance (U-Factor) shall not be more than .34 (slider), .35 (hung), and .36 (fixed) BTU/hr•ft^2•°F when glazed with .24 center of glass U-Factor.

C. Project Wind Loads

1. The system shall be designed to withstand the following loads normal to the plane of the wall:

    a. Positive pressure of 20 psf at non-corner zones.
    b. Negative pressure of 20 psf at non-corner zones.
    c. Negative pressure of 20 psf at corner zones.

1.5 FIELD TESTING AND PERFORMANCE REQUIREMENTS

A. Windows shall be field tested in accordance with AAMA 502, "Voluntary Specification for Field Testing of Windows and Sliding Glass Doors," using Test Method B.

1. Test one additional window or two percent of the window installation, whichever is greater, for air infiltration and water penetration as specified.
2. Cost for all successful tests, both original and retest shall be paid by the General Contractor. All unsuccessful tests, both original and retest, shall be paid by the General Contractor.
3. Testing shall be by an AAMA accredited testing agency selected by the architect and window manufacturer and employed by the responsible contractor.
4. Air infiltration field tests shall be conducted at the same uniform static test pressure as the laboratory test unit. The Maximum allowable rate of air leakage shall not exceed 1.5 times the laboratory test unit for hardware and glazing types consistent with the laboratory test unit. Performance values may be reduced due to deviations from the laboratory test unit such as product size, configuration, hardware selected, and glazing configuration. The field test air leakage rate shall not exceed 1.5 times the maximum allowable laboratory performance specified in the testing criteria listed in Section 1.4.A.1 for any configuration.
5. Water penetration field tests shall be conducted at a static test pressure of 2/3 of the laboratory test performance values for hardware and glazing types consistent with the laboratory test unit. Performance values may be reduced due to deviations from the laboratory test unit such as product size, configuration, hardware selected, and glazing variations. The field test water test pressure shall not be less than 2/3 of the minimum allowable laboratory performance specified in the testing criteria listed in Section 1.4.A.1 for any configuration.

1.6 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in Section 1.4.

B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate window type listed.

1.7 SUBMITTALS

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.

1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

C. Delegated Design Submittals: For reinforcing mullions, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.8 WARRANTIES

A. Total Window Installation

1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.

B. Window Material and Workmanship

1. Provide written guarantee against defects in material and workmanship for 10 years from the date of final shipment.

C. Glass

1. Provide written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
2. Warranty period shall be for 10 (ten) years.

D. Finish

1. Warranty period shall be for 10 years from the date of final shipment.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain aluminum windows from single source from single manufacturer.

B. All products listed in Section 2.3 shall be by the same manufacturer.

2.2 MANUFACTURER

A. EFCO HX45 with integral blinds.

B. Test reports documenting compliance with requirements of Section 1.05.

C. Acceptable additional manufacturers:

1. Graham
2. Wausau
3. Kawneer

2.3 MATERIALS

A. Aluminum

1. Extruded aluminum shall be 6063-T6 alloy and tempered.

B. Hardware – Double Hung Window

1. Sweep latches shall be of die cast metal with a painted finish.

C. Balances – Double Hung Window

1. Balances shall be of appropriate size and capacity to hold sash in position in accordance with AAMA 101, Section 2.2.1.3.2, and AAMA 902, Section 8.1.
2. Balances shall be high performance sash balances that are tested in accordance with AAMA 902 “Voluntary Specification for Sash Balances”.
3. Balances shall meet all minimum AAMA 902 Class 5 requirements with a minimum .30 Manually Applied Force ratio (MAF).
4. Balances shall be attached to a locking carrier system that slides in the jamb channel. Sash shall be field removable for installation and maintenance. Mounting brackets that are screw attached to the sash will not be allowed.

D. Weather-Strip – Double Hung Window

1. All primary weather-strip shall be FIN-SEAL® or equal.

E. Glass and Glazing

1. Insulated glass shall be 1" thick with a center of glass U-Factor of .24 constructed as follows:

   a. Exterior lite – 1/4" thick, Gray color, Temp glass
   b. Air space of 1/2" inch argon filled.
   c. Interior lite – 1/4" thick, clear color, Temp glass, with a surface coating of Solarban60 or equal on the number #3 surface.

2. All units shall be factory glazed.

F. Thermal Barrier

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. Operable windows shall have factory installed extruded foam inserts between the thermal struts and areas as detailed.
3. Poured and debridged urethane thermal barriers shall not be permitted.

2.4 FABRICATION

A. General

1. All aluminum frame and sash extrusions shall have a minimum wall thickness of .062" for operable windows and .125 for fixed windows. Frame sill members shall have a minimum wall thickness of .094".
2. Depth of frame:

   a. Double Hung Window: not less than 3-1/4".

3. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
4. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.

B. Frame – Double Hung Windows

1. Frame components shall be mechanically fastened.

C. Sash – Double Hung Windows

1. All sash extrusions shall have a minimum wall thickness of .062” (1.5 mm).
2. All horizontal sash extrusions shall be tubular.
3. Corner connections shall be mechanically fastened.

D. Screens

1. Half screens only shall be permitted. The screen shall not be surface mounted.
2. Screen frames shall be extruded aluminum.
3. Screen mesh shall be aluminum.
4. Provide Hinge Screens on egress window.

E. Glazing

1. All lites (both sash and fixed) of the horizontal sliding window shall be inside glazed and weeped.
2. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.
3. All units shall be glazed with a minimum of 1/2” glass bite.

F. Integral Venetian Blinds.

1. 5/8" wide aluminum slat blinds. Blind color shall be specified from standard color chart.
2. Blind to be integrally mounted between the existing glass and interior glazing.
3. Removable tilt-control knob will be located on the operable face and incorporate a "slip clutch" feature.
4. Raise and lower pull cords will be located between glass for access only when glazed access panel is opened.

2.5 FINISH

A. Anodic: Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation AA-M10-C22A41 Color shall be Clear.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, air and weather barriers, and other built-in components to ensure weathertight window installation.

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

3.2 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

C. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

D. Mullions: Install combination and reinforcing mullions for combination assemblies in accordance with manufacturer's written instructions.

E. Install windows and components to drain water passing joints and condensation to the exterior.

F. Separate aluminum from sources of corrosion or electrolytic action at points of contact with other materials.

G. Provide egress tags on rescue windows as indicated on the Drawings. See Drawings for egress tag detail.

3.3 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 ADJUSTING

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

3.5 CLEANING AND PROTECTION

A. Clean exposed surfaces immediately after installing windows using manufacturer's written instructions. Avoid damaging finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately in accordance with manufacturer's written instructions.

END OF SECTION 085113

SECTION 31 12 01 - SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in Division 31, 32 and 33.

1.2 DESCRIPTION OF WORK

A. The extent of site preparation is shown on the drawings.

B. Site preparation work includes, but is not limited to, the following:
   1. Site investigation and underground utility identification (GPR)
   2. Topsoil stripping and stockpiling on site (See Section 329201)
   3. Site clearing and removals
   4. Asphalt milling
   5. Saw cutting
   6. Relocations/salvaged materials
   7. Clean up

C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 015000 - Temporary Facilities and Controls

B. Section 312201 - Site Earthwork

C. Section 329201 - Lawns

D. Section 334001 - Storm Drainage

1.4 SITE INVESTIGATION

A. The Contractor shall visit the site before bidding, inform and familiarize themselves of all site conditions, including but not limited to, site topsoil, sub-soil, rock, subsurface and groundwater conditions affecting proposed work. No allowance or additional cost will be made in the work of this contract for failing to determine overall project site conditions.

B. Verify locations and protect utilities and structures, whether or not shown on the drawings. Existing utilities and structures shown on the drawings are for the Contractor's convenience and locations are not guaranteed.

C. Verify survey information given on drawings. Walk the site with the Owner's Representative to discuss approximate locations of reputed utilities shown and not shown on the survey, prior to performing work. The Contractor shall provide and perform Ground Penetrating Radar (GPR) utility location within an area of approximately 30,000 sf, as directed by the Architect and Owner, prior to performing any excavation. Notify the Architect and Owner of any and all discrepancies prior to ordering materials and commencing any work. Commencement of any work will be construed as complete acceptance of survey information.

D. Contractor shall provide Test Pits at all connection points at existing utilities and at all utility crossings to verify utility locations, size, type, invert, and elevations PRIOR to ordering and taking delivery of materials for construction. Notify the Architect and Owner of finding immediately. Contractor shall furnish all labor and materials to accomplish at no additional cost to the Owner.

E. Locate and protect from disturbance existing survey monuments, pins, markers, and benchmarks whether or not shown on drawings. When any disturbance or damage occurs, notify Architect in writing within 24 hours. Describe nature of disturbance or damage and date first occurred. Provide copies to applicable government and municipal agencies. Pay costs for restoring monuments to satisfaction of said agencies, at no additional expense to the Owner.

F. Contractor to model, coordinate, and verify all survey control points. If necessary, provide new or additional survey control points to synchronize any site model with real world coordinates at no additional cost to the Owner.

1.5 JOB CONDITIONS

A. The terms "Architect" and "Landscape Architect" for Divisions 31, 32 and 33 work shall mean Appel Osborne Landscape Architecture, 102 West Division St., Suite 100, Syracuse, NY 13204, Tel. (315) 476-1022; or other representative(s) that Highland Associates may determine.

B. Examine site drawings and specifications for the entire project. Become familiar with the scope and sequencing of work required. Coordinate and cooperate with other Contractors and trades working in and adjacent to the project.

C. Examine work prepared prior to this contract. Commencement of work will be construed as complete acceptance of all preparatory work by others.

D. Obtain and pay for permits required by authorities. Perform the work in compliance with applicable standards, codes and requirements of governing authorities having jurisdiction.

E. Safety is the sole responsibility of the Contractor.

F. Burning on site and use of explosives are not permitted.

G. Responsibility for existing utilities:
   1. Contact Dig Safely New York at least two (2) full working days, and not more than ten (10) working days, before digging begins or as required by latest state law. Locate by hand excavation and provide protection from damage to existing utilities to remain in the area. (Tel. 811)
   2. Existing utilities encountered within excavated areas shall be supported, blocked and/or braced in a manner approved by the owner of the utility. Leave supports in place to the extent required by the owner of the utility.
   3. Should uncharted or incorrectly charted utilities be encountered, notify the Architect immediately for directions as to procedure.
   4. Do not break utility connections without providing temporary services as acceptable to the Architect and the owner of the utility.
   5. Repair and pay for damages to existing utilities as directed by utility Owner at no additional cost to the Owner.
   6. Cap ends of utilities to be abandoned or removed in accordance with regulatory agencies and as directed by the Architect.

H. Provide protections and conduct operations to prevent injury and damage to persons, work of other Contractors, existing items to remain, structures, pavements, lawns, and adjacent properties.

I. Restore work damaged by this Contractor inside and outside the contract limits to the condition existing prior to the start of work, unless otherwise directed, to the satisfaction of the Architect at no additional cost to the Owner.

J. Vehicular and pedestrian traffic control:
   1. Maintain vehicular and pedestrian traffic during construction activities.
   2. Provide alternate routes and traffic control around closed and obstructed traffic ways as required by governing regulations or the Owner.
   3. Provide temporary fencing, flagpersons, barricades, warning signs, and warning lights or other measures to protect the public and cause the least interruption of work.

K. Field Measurements: Take necessary field horizontal and vertical measurements required in order to perform the work and design intent shown on the drawings, and outlined in the specifications. Assume complete responsibility for accuracy of such measurements and dimensions.

L. Removal of spoils, dust control, debris, and clean up:
   1. Control air pollution caused by dust and dirt; comply with governing regulations. Water to control dust when necessary and as directed by the Architect or Certified Erosion Control Specialist. Provide water sprinkling materials, equipment and labor to prevent the nuisance of dust to the surrounding areas.
   2. Legally dispose of removed and demolished items, including trash and debris, off the Owner's property, at a licensed disposal facility having adequate capacity to accept the project's waste.
   3. Burning of combustible materials on the site is not permitted.

4. During the contract and at intervals as directed by the Architect, clear the site of extraneous materials, rubbish, construction waste, and debris. Leave the site in a clean, safe, neat, well-draining condition.
5. Soil Removal: Sweep roads, access ways, paved areas, and parking areas where soil, mud and debris have dropped or tracked from construction and delivery vehicles on a daily basis and as directed by the Architect or Certified Erosion Control Specialist.
6. Spoils: Remove from site and dispose when not required for fill or determined to be unsatisfactory soil material per Section 312201 - Site Earthwork.

M. Construction Review - General: Site visits will be made by the Architect to observe construction conformance to drawings and specifications. The occasional site visits by the Architect shall not be construed as supervision of construction or make them responsible for the safety programs and precautions, including but not limited to: the safe access, visit, use, work travel, or occupancy of any person. Site visits shall not make the Architect responsible for means, methods, techniques, sequences or procedures of construction selected by the Construction Manager, Contractor or his Sub-contractors.

N. Site Complexity: The existing site will be intensively developed. Because of the construction and resulting graphic complexity, it is impractical to show every detail. However, the general design intent is clearly shown and shall be applied to individual conditions not specifically shown as directed by the Architect and at no additional cost to the Owner.

O. Asbestos, Toxic and Hazardous Materials: The Division 31, 32 and 33 site work contract does not include testing for, handling or removal of hazardous materials such as, but not limited to: asbestos, fuel, oil, PCB's, or other toxic or hazardous waste materials as identified by the EPA and/or NYSDEC. If any such materials are encountered during any part of the site work, the Contractor is responsible for identifying potential hazardous material and immediately notify all governing agencies having jurisdiction as required by law. Also, within one (1) hour of discovery notify the Architect, Landscape Architect, Consultants, and Owner. The Owner shall provide testing and removal by others, under separate contract. The Contractor shall recommence work under this contract when the Owner provides written certification that remediation is complete per governing agency. The Contractor shall not be penalized for any delays caused by the hazardous testing and removal, unless such hazardous material incident was a result of Contractor's operations. The Contractor shall indemnify and hold harmless the Architect, Landscape Architect, Consultants and Owner, agents, and employees from and against all claims, damages, losses and expenses, direct and indirect or consequential damages, including but not limited to fees and charges of attorneys and court and arbitration costs, arising out of or resulting from the performance of the work by the Architect, Landscape Architect, Consultants and Owner, or claims against the Architect, Landscape Architect, Consultants and Owner arising from the work of others, related to hazardous waste.

The above indemnification provision extends to claims against the Architect, Landscape Architect, Consultants and Owner which arise out of, are related to, or are based upon, the dispersal, discharge, escape, release or saturation of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, or pollutant in or into the atmosphere, or on, onto, upon, in or into the surface or subsurface soil, water or water courses, objects, or any tangible or intangible matter, whether sudden or not.

Should the hazardous material incident be the result of the Contractor's operations, the Contractor shall be responsible for all costs associated with the discovery and remediation of such hazardous material such as, but not limited to: testing, consultant fees, damage, loss, fees and charges of attorneys, court and arbitration costs, claims by other contractors, direct and indirect or consequential damages.

P. Salvageable Items: Remove at any time after work starts. Storage or sale on site of salvageable and removed items is not permitted. Do not remove topsoil from site without written permission from the Owner.

1.6 SUBMITTALS

A. Provide photographic documentation. Photographically document existing features which, may be affected by the construction, inside and outside the contract limit line. Existing features include, but are not limited to: structures, pavements, curbs, utilities, lawns and vegetation, especially individual trees which are over six (6") inches in diameter and noted to remain on the drawings. Also, particular attention shall be paid to the construction access, stockpile and haul road areas. Distribute a copy of the photographic documentation (digital format) to the Owner and Architect prior to the start of construction.

B. Ground Penetrating Radar (GPR) Mapping and Report.

C. Provide material certificate showing content/mechanical analysis for staging area/construction road stone.

D. Temporary Chain Link Fence And Gates Manufacturer's Product Data (MPD).

PART 2 - PRODUCTS

3.1 PLASTIC FENCE

A. Shall be new or good quality used 4’-0” high heavy duty orange plastic fence NC450.

B. Posts shall be new or good quality U-channel posts to hold plastic fence.

3.2 OTHER PROTECTIVE DEVICES

A. Shall include, but not be limited to; wood planks, rubber mats, barriers, lights, barricades, coverings, traffic controls, steel plates, and other temporary protections.

B. Contractor to provide all necessary protections required by Occupational Safety and Health Administration (OSHA).

PART 3 - EXECUTION

3.1 PROTECT EXISTING VEGETATION TO REMAIN

A. Prior to commencing site preparation work, notify Architect, and meet on site to locate existing trees, lawns and vegetation which are to remain.

B. Protect and keep existing vegetation to remain free from physical damage. Keep in a healthy, vigorous growing condition for the entire construction period as follows:
   1. Keep site disturbance and staging limits to a minimum. Obtain approval from Owner for material and equipment storage areas. Limit access points and routes to the project site. Coordinate site access with other trades and contractors on the work site.
   2. Groups of Trees and Vegetation: Place orange plastic construction fencing around drip line(s) of trees and plant beds as detailed or directed by the Architect. Do not store materials, run equipment, park vehicles, or otherwise disturb area within the drip line (full canopy of tree) or in plant beds.
   3. Specimen and Individual Trees: Protect each as noted and detailed. Do not store materials, run equipment, park vehicles or otherwise disturb area within the drip line (full canopy of tree).

C. Rejuvenate damaged vegetation by pruning watering, fertilizing, staking and other methods as directed by the Architect. Replace trees and other vegetation that cannot be restored to full growth with comparable size, quantity, quality and species as determined by the Architect.

D. Repair lawns disturbed due to construction operations outside the grading limits, as specified and directed by the Architect. Provide screened topsoil, seed, and mulch over damaged lawn areas, access ways or where tire rutting occurred.

3.2 TOPSOIL STRIPPING AND STOCKPILING ON SITE

A. Strip full depth of existing topsoil from areas to be regraded, paved, or otherwise built upon. When amount of available topsoil exceeds what is indicated in geo-tech/boring report, on site test pits, or Contractor assumed depth, continue to remove all topsoil and lower the paved or built element subgrade. Place additional satisfactory earth fill in uniform depths as indicated in the Site Earthwork Section 312201. Maintain finished grades as shown on the drawings. This work shall be done at no additional cost to the Owner.

B. Minimum quantity of topsoil shall be as needed to provide four (4") or six (6") inches settled depth on lawn areas. Verify quality and quantity. Supply imported topsoil when amount of available topsoil meeting above requirements is less than what is required for the proposed lawn areas. See Section 329201 for imported topsoil requirements.

C. When amount of available topsoil meeting above requirements exceeds what is required for the proposed lawn areas, lower the lawn subgrade and place additional topsoil in a uniform depth as directed by the Architect. Maintain finish grades as shown on the drawings. This work shall be performed and supplied at no additional cost to the Owner.

D. Topsoil shall be well drained, homogeneous texture soil of uniform grade, without the admixture of subsoil material. Topsoil shall be free of dense material, hardpan, and stone over three-quarters (3/4") inch in diameter, and other objectionable foreign material including, but not limited to, brick, concrete, asphalt, glass, nails, screws, toxins, hazardous wastes and chemicals (such as, but not limited to, atrizene and muriatic acid) that may be injurious to humans, animals and plant materials.

E. Excess topsoil, not needed for proposed lawns, as specified, shall be loaded and hauled offsite at no additional cost to the Owner. Should existing topsoil onsite not be in sufficient quantities to provide for proposed lawns and planting area depths as indicated on the plans and as specified, contractor shall furnish and install the required amount of topsoil at no additional cost to the Owner.

3.3 SITE CLEARING AND REMOVALS

A. Items and materials noted to be removed shall become the property of the Contractor, unless otherwise noted. Obtain Owner's approval prior to removal off site or for relocation of salvaged material on site. Remove material off site and legally dispose of it. Backfill voids with imported granular backfill, placed in eight (8") inch layers compacted to 95% maximum density.

B. Remove physical elements above and below grade as shown and which interfere with proposed construction. Physical elements include but are not limited to: trees, root systems, shrubs, vines, grass, vegetation, pavements, walks, curbs, gutters, foundations, previous construction materials, glass, headwalls, flared end sections, catch basins, manholes, inlets, drywells, septic tanks, unused utilities, pipes, cisterns, walls, rocks, and other debris.

C. Trees, shrubs and roots shall be completely removed and disposed of legally off site.

D. Maintain existing utilities shown to remain and protect from damage during demolition and construction operations. Do not interrupt existing utilities; provide temporary services when required, as acceptable to the Architect.

E. Research with Owner possible locations of existing subsurface utilities prior to excavating.

3.4 ASPHALT MILLING

A. The Contractor has the option to mill existing asphalt and dispose off site, Or;

B. The Contractor shall retain ownership of the asphalt millings. Asphalt millings may be used as satisfactory earth fill when meeting gradation for imported granular fill in Section 312201. Provide a mechanical analysis based on ASTM C136 for approval prior to installation.

B. The Contractor shall use equipment with automatic grade and slope controls, capable of cold milling existing asphalt pavement to an accurate depth of cut, profile and cross slope and shall be capable of loading the milled material directly into trucks.

C. Cold milling asphalt pavement shall be performed in a manner which prevents the tearing and breaking of underlying and adjacent pavement and the contamination of the millings with granular subbase material, subgrade or deleterious materials. All millings shall be loaded directly to trucks from the milling machine and hauled to stockpile or disposed of.

D. The milled surface shall be swept and jet washed clean prior to installation of new surface material. The Contractor shall sweep the surface in a manner which minimizes dust.

E. The Contractor shall promptly repair any and all localized areas of distress in the milled surface that may present a hazard to traffic, the finished surface, the stability of the new asphalt, or deemed unsuitable by the Architect, at no additional cost to the Owner.

F. Contractor shall apply NYSDOT approved tack coat to the cleaned, milled surface in preparation to received new top course asphalt as specified in Section 321201 - Asphalt Paving.

3.5 SAW CUTTING

A. The Work consists of vertical saw cutting of the existing asphalt or concrete pavement structure to facilitate the removal of the asphalt or concrete bound material.

B. The equipment shall be capable of producing a smooth vertical saw cut without causing damage to the adjacent pavements or related site features.

C. The Contractor shall saw cut the asphalt/concrete pavement to a depth which will allow removal of the material without causing damage to the adjacent pavement. Rough, jagged or cracked edges will not be acceptable. Concrete pavement shall be removed at the nearest contraction joint.

3.6 RELOCATIONS

A. Any item noted to be relocated shall be removed by the Contractor from its existing position without damaging it, stored, protected from theft, fire, vandalism and damage for the project duration. Reset in the location(s) and in the manner detailed, noted on the drawings or specified.

B. Backfill voids with imported granular fill material, placed in eight (8") inch layers compacted to 95% maximum density when located in proposed pavement areas or 90% maximum density when located in proposed non-paved areas.

C. Salvaged items shall be returned to the Owner as noted on the drawings. Move items to Owner designated areas.

3.7 CLEAN UP

During the contract and at intervals as directed by the Architect and as site preparation is completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 31 12 01

SECTION 312201 - SITE EARTHWORK

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of site earthwork and site grading is shown on the drawings.

B. Site earthwork includes, but is not limited to, the following:
1. Fill Materials
2. Source Quality Control
3. Shoring, Bracing and Supporting
4. Horizontal and Vertical Layout
5. Grading and Excavation
6. Compacted Backfill and Fill
7. Field Quality Control Testing and Inspection Services
8. As-Built Survey
9. Guarantee
10. Clean Up

C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation

B. Section 312501 - Erosion, Sediment and Pollution Control

C. Section 334001 - Storm Drainage

1.3 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials

B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D 75 - Practice for Sampling Aggregates

D. ASTM D 422 - Particle-Size Analysis of Soils (without Hydrometer Analysis)

E. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)

F. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)

G. ASTM D 2434 - Standard Test Method for Permeability of Granular Soils (Constant Head)

H. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

I. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

J. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

K. ASTM D 6938 - In Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods

L. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

M. ASTM D 5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

N. Occupational Health and Safety Administration Regulations and Standards

O. Deep Ripping and Decompaction shall be per NYSDEC recommendations, latest edition

P. American Sports Builders Association (ASBA): Sports Fields - A Construction and Maintenance Manual, latest edition.

Q. ASTM F2898-11 – Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-Confined Area Flood Test Method

R. EN 12616 – Permeability of Synthetic Turf Sports Field Base Stone by Double Ring Infiltrometer, Method A.

1.4 SUBMITTALS

A. Furnish name of experienced layout foreman meeting experience requirements in 1.5 "Quality Assurance" to perform layout and obtain Architect's approval prior to performing work.

B. Submit written report on Contractor's letterhead verifying the layout foreman's involvement with the project layout. The report shall briefly state the scope of services performed for the project, the dates work was accomplished, and an explanation of any adjustments required, specifically

listing as-built and FIELD VERIFY requirements as noted in 3.2 of this specification section.

C. Provide Earthwork Contractor's experience requirements as indicated in 1.5, "Quality Assurance". Obtain Architect's approval prior to performing work.

D. Samples: 10 lb. samples of each type of fill; submit in airtight containers to testing laboratory.

E. Materials Sources: Submit name of imported materials source for each type of fill material.

F. Fill Composition Test Reports (Imported and Onsite): Provide results of laboratory tests (less than 2 months old) on proposed and actual materials used to determine acceptability. This shall include:
   1. One optimum moisture-maximum density curve (Modified Proctor) for each soil/imported fill type as determined by ASTM D1557, Method A, latest issue.
   2. Sieve Analysis - ASTM D422
   3. Moisture Density Relationship - ASTM D1557, Method C / ASTM D698
   4. Plasticity Index - ASTM D4318
   5. Soundness Test - ASTM C88
   6. Soil Classification - AASHTO and ASTM D2487

G. Compaction Density Test Report(s) required in Field Quality Control of this specification.

H. Contractor's NYS Licensed Professional Engineer's layout and design calculations of sheet piling and shoring required.

I. As-Built Survey: The Contractor shall have NYS Licensed Land Surveyor provide an updated AutoCAD file .dwg site survey, version 2024, or newer, and stamped pdf electronic copies of fully completed proposed site work (including but not limited to: spot elevations, contours, drainage structures and pipes with inverts, utilities, asphalt, concrete, and all site elements) at ALL proposed site work, to a minimum of 15’-0” beyond the proposed site work into existing conditions.

1.5 QUALITY ASSURANCE

A. Perform all site earthwork, site grading and excavation in compliance with requirements of governing authorities having jurisdiction, OSHA Standards, and "References" in this project specification.

B. The Owner will employ a licensed soil testing and inspection service for Field Quality Control Testing of materials. This Contractor will coordinate day to day scheduling with the Owner's testing agency for conformance with "Field Quality Control Testing and Inspection Services" in this project specification.

C. Earthwork Contractor Experience Requirements: Submit business name, business Owner(s) name(s), business address, telephone number, website and/or email address signed by the

Contractor/Subcontractor who meets the qualifications set forth in this specification and is proposed by the Contractor to perform the Earthwork for this Project. Provide a list of at least four (4) Earthwork projects of comparable size, scope and quality completed successfully by the proposed Contractor/Subcontractor within the past three (3) years that includes the date completed, project Owner's name and current contact information, including telephone numbers and email addresses.

D. Layout Foreman Experience: The Earthwork Contractor must provide a competent layout foreman skilled in this specific type of layout/earthwork project. The layout/earthwork foreman shall have a minimum of four (4) similar projects completed within the last three (3) years. Provide a list of projects layout/earthwork foremen has completed including project name, address, Owner contact information and project scope of work.

1.6 JOB CONDITIONS

A. Job conditions in Section 311201 apply.

B. Provide sufficient quantities of fill materials to meet project schedule and requirements. When necessary, store materials on site in advance of need.

C. When fill materials need to be stored on site, locate stockpiles where directed by Owner.
1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination of material types.
3. Protect all stockpiles from erosion and deterioration of materials by covering with plastic sheets, tarps or as directed by the Architect.

D. Moisten or dry, fill or backfill materials, to the proper moisture content as determined in accordance with ASTM D1557, Method C in order to obtain proper compaction as indicated.

1.7 SUB-SURFACE SOIL INFORMATION

A. Geo-technical Report/Data has not been provided by the Owner. Test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner, provided such operations are acceptable to the Architect and Owner. Coordinate test locations with Owner prior to starting work. Backfill immediately when completed and repair to satisfactory conditions as determined by the Architect. It is expressly understood that the Owner, Architect, Landscape Architect, and Consulting Engineers are not responsible for interpretations or conclusions drawn therefrom by the Contractor.

1.8 UNUSUAL SUBSURFACE CONDITIONS

A. Notify the Architect immediately in writing via email when unusual conditions are encountered during excavation, including, but not limited to: excessive flooding, miscellaneous structures, uncharted or unlocated utilities, foundations, bed rock, toxic and hazardous materials and chemicals (such as muriatic acid and atrizene), suspected archaeological artifacts, and

unsatisfactory soil materials. Request clarification from the Owner's Representative or Architect before proceeding. Refer to paragraph 3.4 of this specification.

PART 2 -PRODUCTS

2.1 FILL MATERIALS

A. Satisfactory General Earth Fill:

1. To be used at least 5'-0" outside of structural elements.
2. Satisfactory general earth fill shall be satisfactory on-site subsoil, or hauled in off-site subsoil free of toxics, hazardous wastes and chemicals (such as, but not limited to, atrizene and muriatic acid) that may be injurious to humans, animals and plant materials. Satisfactory earth fill shall also be free of rubbish, debris, wood, masonry, metal, frost, vegetation, organics or other deleterious material, which cannot be properly compacted. Use satisfactory general earth fill that is dry and free of clay. Rocks, gravel or soil shall not be larger than 3" in any dimension/direction.
3. Satisfactory earth fill materials are also defined as those complying with the American Association of State Highway Transportation Officials (AASHTO), M-145 soil classification Groups A-1, A-2-4, A-2-5, A-3 and Unified Soil Classification System GW, GP, GM, GC, SW, SP, SM, and SC (or a combination of these group symbols) as determined by ASTM D2487.

B. Imported Granular Backfill:

1. Imported granular backfill to be used for asphalt pavement subbase, concrete subbase, storm structures, storm pipes, water pipes, sanitary manholes, sanitary pipes, other structures, and where indicated on the drawings.

2. Backfill shall be run of crusher limestone meeting the following gradation as determined by ASTM-C136:

Standard Sieve Sizes	Percent Passing By Weight
2" or 50 mm	100%
3/4" or 19 mm	75 - 90%
1/4" or 6.3 mm	25 - 60%
#40 or 0.425 mm	5 - 40%
#200 or 0.075 mm	0 - 8%

3. Backfill shall be free of debris and deleterious materials. In no case shall the plasticity index exceed 5.0 or the percentage passing the 200 mesh sieve exceed 8%. The quality of the imported granular backfill shall be determined by the magnesium sulfate soundness test, if considered suspect by the Architect or Geotechnical Engineer. The maximum percent loss at four cycles by weight shall be 20.

C. Stormwater Management Trench (SMT) Backfill:

1. Shall be No. 1 clean, washed, crushed stone or crushed gravel meeting the following gradation as determined by ASTM C136:

Standard Sieve Size	Percent Passing By Weight
1" or 25.0 mm	100%
1/2" or 12.5 mm	90-100%
1/4" or 6.3 mm	0-15%

2.2 UNSATISFACTORY SOIL MATERIALS

A. Shall be defined as soil with high percentage of decomposed rock, sand, organic matter or moisture laden clay to prevent adequate compaction. Also, soil with toxics, hazardous wastes and chemicals (such as atrizene and muriatic acid) that may be injurious to humans, animals and plant materials. Also, soil with significant quantities of rubbish, debris, wood, masonry, metal, frost or other deleterious material which, in the opinion of the Geotechnical Engineer, Owner's Representative, and Architect, cannot be properly compacted shall be classified as unsatisfactory.

B. Unsatisfactory soil materials are defined as those described in AASHTO M-145, soil classification, Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 with CBR value less than 7.0. Also Unified Soil Classification System ML, CL, OL, MH, CH, OH as determined by ASTM D2487 (or a combination of these group symbols) with CBR value less than 7.0 in addition to peat (PT) and other highly organic soils, cobbles, boulders; and soil materials, of any classifications that have a moisture content at the time of compaction beyond the range of 1% below and 3% above the optimum moisture content of the soil material/backfill material, as determined by the Moisture Density Relationship test.

C. When unsatisfactory soil materials are encountered at proposed subgrades and other design elevations, proceed as described in Part 3 (Execution) of this Section.

D. When excavated materials become unsatisfactory as a direct result of the Contractor's work, this shall result in the rejection of the unsatisfactory soil materials by the Architect.

E. The use of slag (a byproduct of metal processing) or recycled/crushed concrete is unacceptable for any use on this project site.

2.3 SOURCE QUALITY CONTROL

A. See "Submittals" and "Quality Assurance" of this specification section for general requirements for testing and analysis of soil and fill materials.

B. Where fill materials are specified by reference to a specific standard, Contractor is responsible to test and analyze all samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest until approved.

2.4 SHORING, BRACING AND SUPPORTING

A. Shoring and bracing shall conform to the requirements of the Occupational Health and Safety Act.

B. Shoring and bracing shall be provided, placed and maintained at the locations and elevation that are necessary or required to: support and protect the sides and bottom of the excavation; prevent undue disturbance or weakening of the supporting materials below or beside the works; prevent movement of ground which may disturb or damage the work, adjacent pavements, property, structures or other works.

C. Provide materials for shoring, bracing, and supporting, such as sheet piling, uprights, sheathing, stringers, and cross-braces, in good serviceable condition. Use timbers that are sound and free of large or loose knots.

D. Provide design by Contractor's NYS Licensed Engineer, when shoring is required to perform work as shown on the drawings. Submit to Architect for approval.

E. Installation: Shoring and bracing shall be driven and placed so that it can be removed as backfilling takes place without damage to the pipeline or its appurtenances, structures, and without settlement of or damage to adjacent pavements and structures.

F. Removal: The Contractor shall remove all shoring and bracing as the excavation is backfilled, unless directed by the Architect to be left in place. The procedure for extracting shoring and bracing and placing backfill shall ensure the backfill load is applied gradually, and disturbance of the works or foundation material is avoided.

G. Support all utilities as required by the municipality/utility owner.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify field conditions such as bench marks, monuments, topography, inverts, locations of utilities and property lines before proceeding. Notify the Architect immediately, in writing, of discrepancies prior to commencing work. Commencement of work will be construed as complete acceptance of survey and layout information. Additional costs resulting from failure to verify field conditions prior to commencing work shall be borne by this Contractor and at no additional cost to the Owner.

3.2 LAYOUT

A. Stake layout up to and including those elevations and dimensions specifically noted on drawings as "FIELD VERIFY" (FV). Ensure that the field elevation and dimension agrees with the elevation and dimension on the drawings before continuing. Notify the Architect immediately, in writing, of any discrepancies prior to commencing work. Additional costs resulting from failure to verify dimensions as noted on drawings shall be borne by this Contractor and at no additional cost to the Owner.

1. Assume sole responsibility for the accuracy of the layout work.
2. Run from point(s) of beginning (POB), base lines, property monuments, benchmarks, iron survey pins, or other points given on the drawings.
3. Roads, Parking Areas, and Walks: Accurately locate and stake curb lines, center line, swales, point of curve and tangency as necessary to accurately build.
4. Buildings and Site Features: Accurately locate and stake corners, offset corners, slopes, and center lines as necessary to accurately build.
5. Pipe Work: Accurately locate with laser.

3.3 GRADING

A. Cut and Fill: Presume the earthwork does **NOT** balance on site. Meet the grades shown on the drawings. Haul in or haul away as may be necessary. Provide earthwork calculations and provide for imported or exported material as part of bid. No additional costs will be allowed.

B. Grade areas as indicated, including transition areas, with uniform levels and slopes between finish elevations.

C. Cut to grades and profiles indicated.

D. Set grade stakes at fifty-foot (50') intervals, at corners, and breaks in grade.

E. Conduct operations to avoid ponding of water. Provide all pumping equipment, sump pits, and temporary diversion swales where and when necessary to continue work performance on schedule and as specified.

F. Shape subgrade surface of site elements to within 0.10' above or below required subgrade elevation, compacted as required and sloped to provide drainage as shown on the drawings. Notify Architect and Geo-Technical Engineer for subgrade review prior to continuing work.

G. Shape subgrade surface of athletic fields and track/tennis courts areas using laser plane control system for grading of subgrade elevation to ensure accuracy in grade tolerances of +0" to - ¼" in 10' any direction. Compact as required and sloped to provide drainage as shown on the drawings. Notify Architect and Geo-Technical Engineer for review prior to continuing work.

H. Refer to Section 311201 for topsoil requirements.

3.4 EXCAVATION

A. Remove and legally dispose of material encountered to obtain required subgrade elevations, including pavement, obstructions visible on ground surface, underground structures and utilities indicated to be removed.

B. Sloping and Benching: Follow OSHA recommendations based on soil type to determine slope configurations. Slope the sides of excavations five (5') feet deep and over to the angle of repose of the material excavated; otherwise, shore, and brace where sloping is not possible either because of space restrictions or stability of material excavated.

C. Bracing and Shoring:

1. Provide bracing and shoring as required in excavations, to maintain sides and to protect structures from settlement.
2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.
3. Remove shoring and bracing before completion of backfilling except where required for structural support or slope stability.
4. The design, installation, and maintenance of such shoring and bracing required to accomplish the above purpose are the sole responsibility of the Contractor.
5. Follow OSHA recommendations for bracing and shoring.
6. Indemnify the Owner, the Landscape Architect, Architect, and the Consulting Engineers against any action arising from damage to existing structures, utilities or injury to persons resulting from the Contractor's actions or failure to act, in carrying out the intent of this section.

D. Protections: Protect structures, vegetation, utilities, sidewalks, pavements, and other facilities in areas of work. Barricade and secure open excavations and provide warning lights/signage from dusk to dawn each day.

E. Extent of Excavations: Excavate for structures to elevations and dimensions shown, extending excavation a sufficient distance to permit placing and removal of other work and for review. Trim bottom to required lines and grades to provide solid base to receive concrete or imported granular backfill material.

F. Unsatisfactory Soil Materials: When unsatisfactory soil materials, as defined in this specification, are encountered at design elevations, immediately notify the Architect in writing by email or other equally expeditious means. Continue as directed by the Architect and Geo-Technical Engineer. When, in the sole opinion of the Architect, conditions are not a result of Contractor's negligence, additional excavation may be directed by the Architect and paid for as a Change Order on a unit price or negotiated price basis in accordance with Contract Documents. This additional excavation shall be measured each day and verified by the Owner's representative and the Contractor's Superintendent. A daily written accounting, attested by both parties, shall be maintained with copies daily to the Architect. No claim for extra compensation will be considered except through the procedure outlined above. **Assume 250 cy of undercutting and removals, placement of soil stabilization fabric (SSF) and providing and compacting to 95% density imported granular backfill material in Base Bid**. Unit price provided shall be utilized to add to or delete from this assumed quantity to account for actual quantity encountered.

G. Unauthorized and Over Excavation: Consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Architect or Geotechnical Engineer. Unauthorized or over excavation, as well as remedial work directed by the Architect or Geotechnical Engineer, shall be at Contractor's expense. Fill of unauthorized excavations shall be as follows (all at no additional cost to the Owner):

1. Fill the voids created by the removal of materials beyond indicated subgrade elevations with lean concrete (2000 psi). Or;
2. Extending the indicated bottom elevation of the concrete footing to the lower elevation. Or;
3. Adding imported granular backfill material compacted to 95% density to proper design elevation and layout as directed by the Architect. Testing agency to perform compaction testing prior to proceeding.

H. Dewatering:

1. Contractor shall anticipate seasonal variations of soil moisture content and groundwater in the Base Bid as verified by site investigation indicated in Section 311201.
2. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
    a. Surface and ground water shall be intercepted and removed before entering excavations. All necessary measures shall be taken. Earth dikes, ditches, or other devices, if required, shall be constructed to prevent such flows.
3. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
    a. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
    b. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.
    c. Provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
4. The Contractor shall at all times provide and maintain proper and satisfactory means and devices (i.e. ditches, temporary pipes, pumps, and/or other temporary construction) for the removal of all water entering the excavations. Water shall be removed as fast as it may collect, in such manner that shall not interfere with the execution of the work or in the proper placing of pipe, structures or other work.
5. Provide and operate sufficient pumping machinery to keep excavated parts free of water. Dig sump pits when necessary into which the excavation shall be drained. Take care and proper precautions in the use of pumps so that in no case will foundations, footings and utilities already in place or existing foundations, footings of adjacent structures or utilities be undermined or disturbed, and erosion occur due to pumping.
6. Do not discharge pumped materials into any body of water, wetland, adjacent property, roadside swales, subsurface storm systems, or any infiltration practices as determined by the Architect. Provide temporary sediment basins, traps, and filter bags for pumped water.
7. Adjust, repair, replace, or clean all work, surfaces, and property, which may have been affected as a result of any dewatering operation.

I. Prepare subgrade and twelve (12") inches of existing sub-soils below subgrade elevations in excavated areas to minimum density of 95% in structure, pavement, utility areas, trenches, and 90% under lawn non-paved areas.

J. Rock and Rock Excavation:

1. Rock Definition: Shall be defined as solid hard material located in ledges, bedded aggregate deposits and unstratified masses, and all-natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock, which must be removed by pneumatic hammers. Rock does not include shale, slate, soft sandstone, hardpan, masonry or concrete rubble, boulders less than three (3) cubic yards, such other rock material which is decomposed, stratified, weathered or shattered, or any material capable of being removed by a well maintained Caterpillar 225 power shovel, D8 Dozer with Ripper, or Architect approved equivalent.
2. Rock Excavation Administrative Procedures: When encountered, shall be stockpiled for measurement before removal and paid for on a unit price basis in accordance with Contract Documents. Notify Architect immediately of rock discovery prior to performing any rock removal or continued excavation. Rock excavations as defined shall be measured each day and verified by the Owner's designated representative and the Contractor's on-site Superintendent. A daily written accounting, attested to by both parties, shall be maintained with copies daily to the Architect. No claim for extra compensation will be considered except through the procedure outlined above. **Contractor to assume 25 c.y. of rock excavation and removal in Base Bid. Unit price provided shall be utilized to add to or deduct from this assumed quantity to account for actual quantity encountered.**
3. Rock Excavation Removal Procedures: Includes removal and disposal of rock. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions.
   a. 24 inches outside of concrete forms other than at footings.
   b. 12 inches outside of concrete forms at footings.
   c. 6 inches outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 8 inches beneath bottom of concrete slabs-on-grade.
   f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
   g. Any over excavation due to rock excavation and removal shall be handled as directed under "Over Excavation" in this Section.
4. Contractor has the option to remove existing rock and dispose off-site or crush existing rock and use as satisfactory general earth fill when it meets gradation noted in 312201 for imported granular backfill material.

3.5 BACKFILL AND FILL

A. Preparation of Ground Surface to Receive Fill: Remove vegetation, organic materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Break up and remove existing foundations, concrete slabs, abandoned utilities, and site features. Plow,

strip, roughen, or break up slopes steeper than 1 vertical to 4 horizontal so that fill material will bond to existing surface.

B. Execute these steps when the existing ground surface, after removal of the above unsatisfactory soil materials, has a density less than that specified under "Compaction" for the particular area classification: Break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.

C. In no case shall fill be placed on a subgrade that is wet, muddy, rutted, spongy, frozen or that contains frost or that has not been tested and approved to achieve satisfactory results.

D. Areas to receive any fill or backfill should be properly prepared, proof rolled, tested per "Field Quality Control" within this specification, inspected and approved by the Architect and Geo-Technical Engineer prior to the placement of fill.

E. Following grade approval by the Architect and Geo-Technical Engineer, place imported granular backfill, imported structural fill and satisfactory general earth fill material in layers not more than eight (8") inches in loose depth in a manner to minimize segregation. The fill shall be placed in nearly horizontal lifts commencing at the lowest fill area elevation and proceeding with each lift upward and outward from the lower lift.

F. Moisture Content: Contractor shall anticipate seasonal variations of all soils (on site or imported) and imported fills moisture content in the Base Bid and timing required for such shall be included in the project schedule. The moisture content of the materials shall be adjusted prior to application of compaction such that it is no more than 1% below or 3% above the optimum moisture content of the material. Apply water to surface, subgrade or layers of soil material when required to achieve compaction densities stated below. Remove and replace, or scarify and air dry, soils or imported materials that is too wet to permit compaction to specified density.

G. Compaction:

1. Compact each eight (8") inch layer of fill and backfill materials.
2. Compact fill and backfill material below subgrade for structures, slabs, pavements, and utilities to minimum 95% of optimum in place density as determined by ASTM D1557, Modified Proctor.
3. Compact fill material below subgrade for lawns or unpaved areas to minimum 90% of optimum in place density as determined by ASTM D1557, Modified Proctor.

H. Equipment:

1. Use sheepsfoot rollers, pneumatic tired rollers, drum rollers, vibrating tampers, and other compaction equipment capable of obtaining the required density throughout the entire layer being compacted.
2. Use power-driven hand tampers for compacting materials adjacent to site structures.
3. For utility trenches or other confined areas, small compaction equipment may be necessary such as a vibratory plate, jumping jack or walk-behind vibratory roller. In these cases, lift heights no greater than six (6") inches should be maintained.

I. Reconditioning Compacted Areas: Where previously completed compacted areas are disturbed by subsequent construction operations (by any Contractor), traffic or adverse weather, scarify and dry out the surface, regrade, and recompact to the required density prior to further construction at no additional cost to the Owner. Use hand tamping for recompaction over underground utilities and trenches.

a. of the S pattern curves back along the edge areas skipped by the second series.

3.6 FIELD QUALITY CONTROL TESTING AND INSPECTION SERVICES

A. Soil Testing Service/Geo-Technical Engineer must inspect and approve density tests, retesting, and proof rolling of subgrades, as described in this section, before further construction work is performed thereon.

B. Perform compaction density testing on compacted fill and imported granular base course in accordance with ASTM D1556, ASTM D1557, ASTM D2922, and D3017.

C. In place density testing should be performed at a frequency of one (1) test per 500 square feet per lift in smaller open areas, one (1) test per 2,500 square feet per lift in larger open areas, and one (1) test per 25 feet per lift in confined areas and utility trenches.

D. When the test results indicate that insufficient compaction has been obtained in any layer, the Contractor shall take action to modify or alter the moisture content in the soil, to provide additional compaction and testing or otherwise to increase the in-place soil density. If the Contractor cannot obtain satisfactory compaction due to material properties, the Contractor shall remove the unsatisfactory material and replace with new material at no additional cost to the Owner.

E. Materials contaminated by mud, debris, organics, frost, and/or other deleterious materials shall be removed and replaced with uncontaminated specified material.

F. No fill or backfill shall be placed over an area or lift of fill that has not be tested and achieved satisfactory results.

G. Proof Rolling: On pavement subgrades, in cut areas only, unless otherwise directed by the Architect, the only testing required will be the proof rolling as described below:

1. Provide Soil Testing Service/Geo-Technical Engineer with 48-hour advance notification when subgrades are ready to proof roll.
2. Proof Roll the prepared pavement subgrade surface with fully loaded ten (10 c.y.) cubic yard earth moving truck or, in the opinion of the Architect/Geo-Technical Engineer, using a 5-ton smooth drum roller making at least 3 overlapping passes, in each of 2 perpendicular directions, on static mode at a speed of 1 to 4 feet/second. Check for unstable areas. Subgrades that rut, pump or deflect under the truck's tires may be judged unstable by the Architect/Geo-Technical Engineer. These areas may require further compaction or undercutting as directed by the Soil Testing Service/Geo-Technical Engineer.

3.7 AS-BUILT SURVEY

A. Provide full as-built survey in AutoCAD .dwg format with stamped .pdf electronic files to the Architect for approvals. Survey shall include: spot elevations, contours, drainage pipes and structures with installed inverts, utilities, and all site pavements and elements)

B. Survey shall be conducted by a NYS Licensed Surveyor.

C. Areas to be surveyed include ALL completed proposed site work to a minimum of 15’-0” beyond

3.8 GUARANTEE

A. Guarantee concrete slabs, pavements, curbs, retaining walls, trenches, utilities, lawns, and plant materials free from settlement for a period of one (1) year from the date given on the certificate of substantial completion or final punch list when satisfactorily completed and accepted by the Architect, whichever is later.

B. Repair to proper grade and alignment any and all settlement of concrete slabs, pavements, curbs, retaining walls, trenches, utilities, lawns, and and plant materials adversely affected by settlement within one (1) year after date given on the certificate of substantial completion or final punch list when satisfactorily completed and accepted by the Architect, whichever is later, at no additional expense to the Owner. In damaged compacted areas, scarify the surface, re-shape, and compact to required density prior to further construction.

C. All repairs/corrections shall be completed to the satisfaction of the Owner within seven (7) days of written notice by the Owner.

3.9 CLEAN UP

During the contract and at intervals as directed by the Architect and as earthwork is completed, clear the site of surplus earth, large surface stones, debris, tools and equipment. Leave the site in a clean, safe, well draining, and neat condition.

END OF SECTION 31 22 01

SECTION 312501 - EROSION, SEDIMENT AND POLLUTION CONTROL

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide erosion, sediment and pollution controls as shown on the drawings and as directed by the Architect to significantly reduce runoff on downstream and neighboring properties. This includes temporary control measures to mitigate land disruption by other Contractors during construction of this project.

B. Erosion, sediment and pollution control includes, but is not limited to, the following:

1. Storm structure protection
2. Silt fence
3. Off site sediment tracking controls
4. Temporary concrete washout facility
5. Temporary seeding
6. Permanent sodding
7. Compost filter sock
8. Construction site dust control
9. Spill prevention, reporting and documentation
10. Clean up

C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation

B. Section 312201 - Site Earthwork

C. Section 329201 –Sodded Lawns

D. Section 334001 - Storm Drainage

1.3 REFERENCES

A. Spill Guidelines Manual (SGM) New York State Dept. of Environmental Conservation.

B. New York State Standards and Specifications for Erosion and Sediment Control, dated July 2016 or latest edition.

1.4 SUBMITTALS

A. Manufacturer's Data (MPD) are required for:
   1. Storm Structure Protection
   2. Silt Fence with Net Backing
   3. Soil Stabilization Fabric for Off Site Sediment Tracking Control
   4. Sediment Filter Bag
   5. Compost Filter Sock
   6. Spill Response Equipment

B. Material Certificates (MC) showing content/mechanical analysis and Samples are required for:
   1. No. 3 Stone for Off Site Sediment Tracking Control
   2. Temporary Seeding: Submit seed mix species and source
   3. Permanent Sodding: (See Section 329201)

C. Listing of emergency contract numbers. This list shall include the name of an Emergency Response Contractor that may be used in certain situations.

1.5 QUALITY ASSURANCE

A. Perform erosion, sediment and pollution control in compliance with applicable requirements of the New York Standards and Specifications Erosion and Sediment Control Manual, dated July 2016 (or latest edition) or other governing authorities having jurisdiction.

B. It is this Contractor's responsibility to prevent stormwater pollution from running offsite. All pollution control work related to the site contract shall be included in the Base Bid. All pollution control work related to other contracts shall be on a time and material basis and back-charged to the responsible party.

C. In the event of a chemical or hazardous spill or release, the individual(s) who caused the spill is responsible for prompt and proper clean-up. If the spill requires cleanup procedures beyond the means of the Contractor, an emergency spill cleanup Subcontractor shall be hired by the Contractor. They shall be utilized when the Contractor does not have the appropriate training, equipment or materials to cleanup the area safely and effectively. This shall be done at no additional cost to the Owner. Any testing and cleanup required post cleanup shall be provided by the Contractor at no additional cost to the Owner.

1.6 JOB CONDITIONS

A. Job conditions in Sections 311201, 312201, 329201 and 334001 apply.

B. Contractor will take all necessary precautions to avoid allowing dust generation that violates NYSDEC regulations and compromises compliance with governing authorities air monitoring plan.

1.7 INSPECTIONS AND MAINTENANCE

A. The Architect or qualified personnel of the Operator shall inspect disturbed areas of the construction site at least once per week. Special attention will be focused on areas not finally stabilized, structural control measures, point discharge (outlets) and locations where vehicles enter or exit the site. Disturbed areas will be inspected for pollutants entering the drainage system. Structural control measures will be reviewed for effectiveness in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site will be inspected for evidence of off site sediment tracking.

B. The Contractor shall provide timely maintenance of vegetation erosion and sediment control measures, and other protective measures, during construction. Corrective measures must be performed within one (1) calendar day of the Architect's or Operator's (Owner's) report. Failure by the Contractor to perform corrective work within this schedule automatically authorizes the Operator to hire others and backcharge this Contractor. The Architect or Operator will send a letter or email correspondence one (1) calendar day before hiring others and backcharging this Contractor.

C. The Contractor shall conduct daily inspections of the equipment staging and maintenance, fueling, hazardous waste staging and waste storage areas to ensure that spill control measures are in place. Stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored on site.

D. The Operator (Owner) shall provide long term maintenance of the storm water facilities after the site is finally stabilized.

1.8 SPILL PREVENTION, REPORTING AND DOCUMENTATION

A. To minimize the potential for discharge to the environment of oils, petroleum, or other hazardous substances, the following requirements shall apply:
   1. All oil, petroleum, or hazardous materials stored or temporarily relocated on site during the construction process shall be stored in a way to provide protection from vehicular damage and to provide containment of leaks or spills. Temporary berms, dikes, storage basins, or similar methods shall be employed as appropriate on site.
   2. Maintain file of Material Safety Data Sheets (MSDSs) or other references for recommended spill clean-up methods and materials.
   3. Keep spill response equipment readily accessible.

B. In the event of a spill contact the Construction Manager, Owner (Operator), and Architect. The Contractor shall also notify all other Contractors working around the area of the spill.

C. If spilled material has entered any sanitary/storm sewer system then contact the municipality or agency with jurisdiction over the system, in addition to those listed in this section.

D. The contractor shall be responsible for the initiation of spill reporting and documentation procedures. All petroleum spills must be reported to NYSDEC Spill Hotline at 1-800-457-7362, less than two (2) hours following discovery. All petroleum spills must be reported to NYSDEC unless all of the following apply:

Criteria	Description
Quantity	Must be known to be less than 5 gallons.
Containment	Must be contained on an impervious surface or within an impervious structure. No access to the environment.
Control	Must be under control and not reach a drain or leave the impervious surface.
Cleanup	Must be cleaned-up within two (2) hours of occurrence.
Environment	Must not have already entered into soil or groundwater or onto surface water.

E. A release of a "reportable quantity"[1] or unknown amount of a hazardous substance must also be immediately reported to the NYSDEC Spill Hotline. Spills of reportable quantities of chemicals or "harmful quantities"[2] of oil to navigable waters must be reported to the federal National Response Center, 1-800-424-8802 or 1-202-426-2675.

[1] *Reportable Quantity*: Refers to the quantity of a hazardous substance or oil that triggers reporting requirements under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) (USEPA, September 1992).

[2] *Harmful Quantity*: Includes discharges that violate applicable water quality standards, cause a film, sheen, or discoloration on a water surface or adjoining shoreline; or cause a sludge or emulsion to be deposited beneath the water surface or shoreline (40 CFR 110.3).

PART 2 – PRODUCTS

2.1 STORM STRUCTURE PROTECTION

A. Shall be a pre-manufactured cylindrical log 12" – 32" in diameter, composed of degradable geotextile mush tube filled with compost filter media to filter sediment and other pollutants. Filter socks may be filled after placement by blowing compost into the tube pneumatically or filled at a staging location and moved into its designated location. Both ends of the filter socks shall be secured to prevent opening.

B. The flat dimension of the sock shall be at least 1.5 times the nominal diameter of the sock.

C. Compost infill shall be a well decomposed (matured at least 3 months), weed-free, organic matter. Shall be aerobically composted, possess no objectionable odors, and contain less than 1% by dry weight, or manmade foreign matter.

D. All biosolids compost must meet NYS DEC's 6NYCRR Part 360 (Solid Waste Management Facilities) requirements.

E. When using compost filter socks adjacent to surface water, the compost should have a low nutrient value.

F. Wood stakes shall be a minimum of 2" x 2" in size. Shall be untreated fir, redwood, cedar or pine and shall be cut from sound timbers. Shall be straight and free of loose and unsound knots or other defects which would render them as unfit for the intended use. Metal stakes may not be used as an alternate. Tops of stakes shall not extend above the top of the fiber roll.

G. Standard of quality shall be: Diamond SOCK® pre-filled compost filter sock as manufactured by MKB Stormwater Innovation, 888-578-0777; or Architect Approved Equal

2.2 SILT FENCE

A. Shall be a woven polypropylene geotextile comprised of UV stabilized polypropylene slit film and 1.25" square, non pressure treated, pointed, hardwood posts and net mesh backing for additional support. Standard of quality for silt fence shall be IVI-3611MW as manufactured by Indian Valley Industries, Inc., www.iviindustries.com, (607) 729-5111, or Architect approved equal.

2.3 OFF SITE SEDIMENT TRACKING CONTROLS

A. No. 3 stone shall meet the following requirements:

Standard ASTM Sieve Size	Percent Passing by Weight
3"	100
2"	0-15
Passing No. 50	5-10
Passing No. 100	2-5

B. Soil Stabilization Fabric: Shall be a commercially manufactured, UV stabilized low clogging, high flow, woven geotextile. Standard of quality shall be Mirafi 600X, as manufactured by NICOLON/MIRAFI GROUP, 3500 Parkway Lane, Norcross, Georgia (Tel. 1-800-234-0484) or Architect approved equal.

C. Granular Base Course Material (for Type 2 only): Shall be as specified in Section 312201.

2.4 TEMPORARY SEDIMENT FILTER BAG FOR PUMPED WATER

A. Provide prefabricated bags/pouches with nonwoven geotextile fabric. The standard of quality shall be Dirtbag as manufactured by ACF Environmental, 800-448-3636 or Architect approved equal.

B. Provide wooden pallet to set filter bag on for ease of disposal.

2.5 TEMPORARY CONCRETE WASHOUT FACILITY

A. Concrete washout facility to fully contain all concrete washout needs of the entire project and all contracts.

B. Concrete washout facility shall be temporary straw bales that are lined with a single sheet of a minimum of 10 mil polyethylene sheeting that extends over the entire basin to prevent escape of discharge. Place a secure, non-collapsing, non-water collecting cover over the concrete washout facility prior to inclement weather to prevent accumulation and overflow of precipitation.

C. Provide concrete washout to prevent discharge from concrete trucks or equipment cleaning to inlets, surface or groundwater.

D. Concrete washout facility shall be no closer than 50 feet from environmentally sensitive areas such as waterbodies, wetlands, and open drainage facilities and watercourses. Signs shall designate concrete washout facilities.

E. Ensure that the concrete washout facility complies with all Federal, State and local laws, rules, and regulations. Ensure that the concrete washout facility is in place before delivery of concrete to site.

F. Provide a sign identifying area as "Concrete Washout" acceptable to the Architect. Maintain throughout the project duration.

2.6 TEMPORARY SEEDING

A. Seeding shall be 100% Perennial Ryegrass with no more than 30% of any one cultivar and always at least 2 different cultivars and a 90% germination rate or more.

B. All seed mixtures to contain 0.5% weed seed or less.

C. All seed must be fresh seed, not seed that is left over from last year and beyond the sell by date.

2.7 PERMANENT SODDING

Sodding shall be as specified in Section 329201.

2.8 COMPOST FILTER SOCKS

A. Shall be a pre-manufactured cylindrical log 12” – 32” in diameter, composed of degradable geotextile mush tube filled with compost filter media to filter sediment and other pollutants. Filter socks may be filled after placement by blowing compost into the tube pneumatically or filled at a staging location and moved into its designated location. Both ends of the filter socks shall be secured to prevent opening.

B. The flat dimension of the sock shall be at least 1.5 times the nominal diameter of the sock.

C. Compost infill shall be a well decomposed (matured at least 3 months), weed-free, organic matter. Shall be aerobically composted, possess no objectionable odors, and contain less that 1% by dry weight, or manmade foreign matter.

D. All biosolids compost must meet NYS DEC’s 6NYCRR Part 360 (Solid Waste Management Facilities) requirements.

E. When using compost filter socks adjacent to surface water, the compost should have a low nutrient value.

F. Wood stakes shall be a minimum of 2" x 2" in size. Shall be untreated fir, redwood, cedar or pine and shall be cut from sound timbers. Shall be straight and free of loose and unsound knots or other defects which would render them as unfit for the intended use. Metal stakes may not be used as an alternate. Tops of stakes shall not extend above the top of the fiber roll.

G. Standard of quality shall be: Diamond SOCK® pre-filled compost filter sock as manufactured by MKB Stormwater Innovation, 888-578-0777; or Architect Approved Equal

2.9 SPILL RESPONSE EQUIPMENT

A. The following is a list of recommended spill control material. The contractor is responsible to have spill control and personnel protective equipment readily available for the materials being used. Acquire sufficient quantities and types of appropriate spill control materials needed to contain any spills that can be reasonably anticipated. The need for equipment to disperse, collect and contain spill control materials should be on site at all times.

1. Personal Protective Equipment
   a. Chemical Splash Goggles
   b. Gloves
   c. Boot Covers
   d. Tyvek Aprons or Suits
2. Absorption Materials
   a. Spill Pillows and Socks
   b. Absorbent Booms and Pads
   c. Dikes for use on rough surfaces
   d. Storm Structure Covers
   e. “Loose” Absorbents
3. Tools
   a. Shovel, Broom, Brush
   b. Disposal Bags
   c. Sealing Tape
   d. Hazardous Waste Stickers
   e. “Danger” and “Keep Away” Signs
   f. Five gallon pails or 20 gallon drums with polyethylene liners

B. Basis of Design shall be provided by: 3M, 888-364-3577; New Pig Corporation, 800-468-4647; SpillKits911, 800-474-5911; Dawg, Inc., 800-935-3294; or Architect approved equal.

A. Place spill response equipment in a readily assessable location within or immediately adjacent to the project site.

PART 3 – EXECUTION

3.1 REQUIREMENTS

A. Between the Pre-Construction Meeting and starting site work, the Contractor shall:

1. Review inspection and maintenance procedures.

2. Designate specific Owner and Contractor personnel responsible for daily inspection and maintenance.

3.2 GENERAL EROSION CONTROL

A. Install initial construction erosion control features, as indicated on drawings and specifications or as directed by the Architect, prior to topsoil stripping, earthwork, and removal of existing vegetation. Keep the disturbance to a minimum and shall not exceed five (5) acres, unless directed by the Architect. Install other features as described in the sequence of erosion, sediment and pollution control on the drawings.

B. Start permanent seeding within seven (7) calendar days of rough grading. When this is not possible, provide temporary seeding of 100% perennial rye grass at the rate of six pounds (6#) seed per one thousand (1,000 sf) square feet. Provide temporary seeding within seven (7) days on non-roof, non-paved areas. When adverse weather conditions prevent good germination, repeat seeding as directed by the Architect until the area is stabilized. Till under temporary grass and fine grade when preparing for final permanent lawn stabilization.

C. Until a disturbed area is stabilized, trap runoff sediment by the use of sediment debris basins, diversion swales, sediment traps, or other methods acceptable to the Architect and governing authorities. Provide temporary dry mulch (straw) to stabilize exposed soils as directed by the Architect.

D. Provide erosion controls on slopes and swales traversing, bordering, or leaving the site. Limit the water flow to a nonerosive velocity.

E. Do not store fill materials within one hundred (100) feet of the banks of any streams or waterbodies, intermittent or perennial.

F. Inspect erosion and sediment control measures immediately after each rainfall and at least daily during prolonged rainfall. Make required repairs immediately.

G. Remove sediment deposits when they reach approximately one-half of the height of the barrier. Dispose sediment in a manner that does not result in additional erosion or pollution.

H. Provide prompt (weekly) removal and disposal of rubbish and debris in accordance with the governing authorities, Owner policies, and good housekeeping measures.

3.3 MUNICIPAL SEWER, SWALES AND WETLAND EROSION CONTROL

Control erosion, siltation and pollution to municipal sewers, swales and wetlands by taking appropriate measures such as, but not limited to, the following:

A. Do not disturb the bed and banks of waterbodies unless specifically shown on drawings. When bed and bank work is shown, obtain permits and proceed with work creating the minimum disturbance necessary to complete the project.

B. Prevent petroleum products and excessive amounts of silt, clay, and muck from entering municipal sewers, waters, swales or wetlands of New York State during construction.

C. Prevent fresh concrete, concrete leachate, and washings from equipment and trucks, from entering municipal sewers, waters, swales or wetlands of New York State during construction.

D. Place silt fence to control erosion at the downslope edge of disturbed areas. This barrier to sediments is to be put in place before disturbance of the ground occurs and is to be maintained in good condition until disturbed land is heavily vegetated or otherwise permanently stabilized.

E. Seed areas of soil disturbance resulting from this project with appropriate perennial grass seed and mulched with straw within seven (7) calendar days as described in general erosion control. Mulch shall be maintained until a suitable vegetative ground cover is established and as directed by the Architect.

3.4 CONSTRUCTION SITE DUST CONTROL

A. The Contractor shall prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety issues.

B. Dust control applies to construction roads, access points, other disturbed areas and stockpiles subject to surface dust movement and dust blowing.

C. Contractor may use any number and combination of dust control methods, as approved by the Architect. They include:
1. Applying water to haul roads
2. Restricting vehicle speeds to 10 mph
3. Hauling materials in properly tarpped or watertight containers.
4. Covering stockpiles and materials
5. Wetting equipment and work area
6. Mulching
7. Spray adhesives and polymer additives (MSDS sheets required)
8. Barriers and wind breaks

D. Contractor is responsible for any cleanup and site restoration associated with dust control measures, dust pollution on or off the project site property at no additional cost to the Owner.

3.5 STORM STRUCTURE PROTECTION

A. Install fiber rolls as detailed around drainage structures and where shown on the plans to protect site elements from silt and sediment.

B. Filter socks shall be anchored in earth with wooden stakes driven a minimum of 12” into the soil on 4-foot centers on the centerline of the sock. On uneven terrain, effective ground contact can be enhanced by the placement of a fillet of filter media on the disturbed area side of the compost sock.

C. Wrapping the storm structure grate with fabric is NOT acceptable, however straw bales may be used.

D. Upon stabilization of the area contributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed in accordance with the SWPPP. For removal, the mesh can be cut, and the compost spread as an additional mulch to act as a soil supplement.

3.6 SILT FENCE

A. Locate as shown on drawings and as directed by the Architect. Excavate trench along the lower perimeter(s) of site, along the contract limit line, and as indicated on the drawings. Place excavated material on uphill side of trench for backfilling.

B. Drive stakes securely into the downhill side of the trench. When prefabricated silt fence with fabric attached to stakes is used, drive stakes so that fabric is buried in the ground as detailed.

C. Backfill trench with excavated material, so that fabric is securely buried in the ground to prevent undermining. Tamp soil.

D. Join sections by overlapping fabric between two (2) stakes. Set stakes simultaneously. Overlap by minimum six (6") inches, fold, and staple to prevent sediment bypass.

E. Attach silt fence securely to stakes spaced no more than eight (8' o.c.) feet on center. Secure fence fabric to stake with minimum three one (1") inch staples.

F. Toward the end of the project, when site is stabilized and as directed by the Architect, remove silt fence and correct lawn area around removal to a smooth, neat, well-draining condition.

3.7 OFFSITE SEDIMENT TRACKING CONTROLS

A. Install as detailed and shown on drawings to eliminate tracking sediment off site. Inspect after each rain storm and at the end of each work day.

B. When sediment begins tracking off site, sweep and clean affected roadway immediately and replace stone with clean No. 3 stone to retain sediment on site.

C. Remove fabric and stone at project completion. Complete construction of proposed final surface(s).

3.8 TEMPORARY SEDIMENT FILTER BAG FOR PUMPED WATER

A. Install prefabricated bags/pouches on top of straw bale base as recommended by the manufacturer. Replace system when full (discharge into bag/pouch is significantly reduced).

B. Silt may be used as general site fill or hauled off site. Remove straw bales, fabric, and prefabricated bags/pouches off site. Regrade area and return to lawn as specified.

3.9 TEMPORARY CONCRETE WASHOUT FACILITY

A. Install per detail in a location as approved by the Owner. Provide a stable surface, easily accessible by concrete trucks.

B. A sign shall be installed adjacent to each washout facility to inform concrete equipment operations to utilize the proper facilities. The sign shall be installed as detailed and maintained throughout the project.

C. Temporary concrete washout facility shall be constructed and maintained in sufficient quantity and size to contain all liquids and concrete waste generated by washout operations for the entire project and by all Contracts.

D. Perform washout of concrete mixers, delivery trucks, and other delivery systems in designated areas only.

E. Wash concrete only from mixer chutes into approved concrete washout facility.

F. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations.

G. Contents of the concrete washout facility shall not exceed 50% capacity of the facility. At or before 50% capacity is reached, discontinue pouring concrete until the facility is cleaned out. Remove hardened concrete and properly dispose off site. Allow slurry to evaporate or remove from site and dispose off site. Immediately replace the liner if it gets damaged.

H. Remove concrete washout facility when it is no longer needed as directed by the Architect.

3.10 TEMPORARY SEEDING

A. Provide temporary seeding of topsoil stockpile immediately.

B. When necessary and as directed by the Architect, provide temporary seeding on disturbed areas at no additional cost to the Owner.

3.11 PERMANENT SODDING

A. Install as described in Section 329201.

3.12 COMPOST FILTER SOCK

A. Compost filter socks will be placed on the contour with both terminal ends of the sock extended 8 feet upslope at a 45-degree angle to prevent bypass flow.

B. Filter socks shall be anchored in earth with wooden stakes driven a minimum of 12” into the soil on 4-foot centers on the centerline of the sock. On uneven terrain, effective ground contact can be enhanced by the placement of a fillet of filter media on the disturbed area side of the compost sock.

C. Upon stabilization of the area contributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed in accordance with the SWPPP. For removal, the mesh can be cut, and the compost spread as an additional mulch to act as a soil supplement.

3.13 SPILL RESPONSE EQUIPMENT

Use per manufacturer’s recommendations and as directed by the NYSDEC, or other governing agencies.

3.14 CLEAN UP

A. During the contract and at intervals as directed by the Architect and as erosion, sediment and pollution control procedures are completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well draining, and neat condition.

B. Clean storm ponding areas, catch basins and detention basins: Clean out contaminants, sediment, rubbish, construction debris, foreign objects and accumulated floatables from chambers and ponding areas thoroughly, immediately prior to final acceptance.

END OF SECTION 31 25 01

SECTION 321201 - ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of asphalt paving is shown on the drawings.

B. Asphalt Paving work includes, but is not limited to, the following:
1. Soil Stabilization Fabric
2. Granular Base Course
3. Asphaltic Concrete
4. Bituminous Tack Coat
5. Painted Lines and Traffic Markings
6. Hot Pour Crack Sealing and Filling
7. Field Quality Control
8. Asphalt Price Adjustment
9. Clean up

C. Provide all materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation (Asphalt Milling)

B. Section 312201 - Site Earthwork

C. Section 334001 - Storm Drainage

1.3 REFERENCES

A. The latest editions of the following Standards, as referenced herein, shall be applicable:
1. New York State Department of Transportation Standard Specifications, Section 402 - “Hot Mix Asphalt (HMA) Pavements" and 407 - "Bituminous Tack Coat"
2. “Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO).”
3. American Sports Builders Association (ASBA) Asphalt Guidelines, latest edition

B. The following reference standards shall apply for Testing and Inspection:
1. ASTM D1074: Standard Test Method for Compressive Strength of Bituminous Mixtures
2. ASTM D1188: Standard Test Method for Bulk Specific Gravity and Density of Compacted Mixtures Using Paraffin-Coated Specimens.
3. ASTM D2041: Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

4. ASTM D2726: Standard Test Method for Bulk Specific Gravity and Density of Non-absorptive Compacted Bituminous Mixtures
5. ASTM D2950: Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
6. ASTM D3203: Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
7. ASTM D3549: Standard Test Methods for Thickness or Height of Compacted Bituminous Paving Mixture Specimens
8. NYSDOT Materials Method 28 Friction Aggregate Control and Test Procedures

C. The following reference standards shall apply for pavement markings:
1. ASTM D562, D711, D1475, D1640, D2369, D3723, D3960.
2. DOT Code of Federal Regulations, Hazardous Materials and Regulations Board, Reference 49CFR, ICC Regulations
3. Federal Specification TT-P-115E, Type III (Type I if V.O.C. compliance)

D. Additional testing required, only if directed in writing by Architect, due to asphalt installation and material issues:
1. ASTM C295: Standard Guide for Petrographic Examination of Aggregate
2. ASTM D1560: Standard Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus
3. ASTM D4125: Standard Test Methods for Asphalt Content of Bituminous Mixtures by the Nuclear Method
4. ASTM D5444: Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
5. ASTM D6307: Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
6. ASTM D6931: Standard Test Method for Indirect Tensile (IDT) Strength of Asphalt Mixtures
7. ASTM D7312: Standard Test Method for Determining the Pavement Shear Strain and Complex Shear Modulus of Asphalt Mixtures Using the Superpave Shear Tester

1.4 SUBMITTALS

A. Provide Paving Contractor experience requirements, as outlined in "Quality Assurance" of this specification section, for the following:
1. General Paving

B. Provide Asphalt Producer Vendor Certificate and proof of quality control monitoring as outlined in "Quality Assurance" of this specification section.

C. Provide material certificates showing content/mechanical analysis for the following:
1. Asphaltic Concrete Mix Design with Authorization Signature:
    a. Type/name of mix (less than 24 months old)
    b. All aggregates gradations and quality measurements
    c. Plot (0.45 power graph) of the final aggregate blend

d. Bulk (dry) specific gravity of all aggregates and final aggregate blend (Gsb) including worksheets for natural (virgin) as well as reclaimed asphalt pavement (RAP)
e. Grade of asphalt binder (PG) being used
f. Optimum percent asphalt binder (Pb)
g. Mix air voids at optimum (Va)
h. Bulk specific gravity of mix at optimum (Gmb)
i. Theoretical maximum specific gravity of mix at optimum
j. Voids in the Mineral Aggregate (VMA) and Void Filled with Asphalt (VFA)
k. Dust to total asphalt content (AC) ratio
l. All design data and associated design curves

2. Bituminous Tack Coat

D. Provide Manufacturer's Product Data (MPD) for the following:
1. Soil Stabilization Fabric
2. Painted Lines and Traffic Markings
3. Asphalt Sealer
4. Hot Pour Crack Sealing and Filling

E. Provide shop drawings for the following:
1. Painted Lines and Traffic Markings: Shop drawings indicating sizes, shapes, patterns, and colors of markings, including manufacturers and types of paint.
2. Owner to approve all paint colors prior to installation.

F. Submit Asphalt Placement Work Plan, indicating paving pass widths, paving directions, site access, and timing/coordination of any site equipment installation (posts, boxes, fencing, etc.) indicated in 3.3 of this specification section. Supply Owner with yield calculations for all asphalt paving products and materials used on the project as part of the work plan.

G. Field Quality Control test reports as indicated in this specification section.

1.5 QUALITY ASSURANCE

A. Paving Contractor Experience Requirements:
1. General Paving: Contractor shall have the experience of at least five (5) years in business. Paving superintendent has a minimum of three (3) years' experience as a paving crew operating foreman.

B. Asphalt Testing and Inspection Services:
1. The Owner [or Contractor] will employ and pay for the services of an Independent Testing Agency to provide testing and inspections of asphalt pavements.
2. The services and the information provided by the Testing Agency are provided for the sole benefit of the Owner [or Contractor]. The information is provided to the Contractor [or Owner] for the sole purpose of being aware of what is being reported.
3. The Contractor is solely responsible for assuring the work complies with the Contract Documents in all respects and may not rely on the testing agency for this or any other assurances. The Testing Agency and their representatives are not authorized to revoke,

alter, relax, enlarge, or release any of the requirements of the Contract Documents, approve or accept any portion of the work, perform or excuse any duties of the Contractor, or be involved in the scheduling of any work.

4. Asphalt paving materials and operations shall be tested and inspected as the work progresses. Failure by the Testing Agency to detect any defective work or material shall not in any way prevent later rejection (when such defect is discovered) nor shall it obligate the Owner for final acceptance.

C. Asphalt producer shall monitor production according to the procedures of NYSDOT Material Method 28 Friction Aggregate Control and Test Procedures. Asphalt producer shall be a New York State approved/certified HMA (Hot Mix Asphalt) manufacturing facility.

D. Calibrated equipment and qualified personnel must be always accessible during the construction of the HMA.

1.6 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Atmospheric conditions for applying courses:
1. Hot mix asphalt shall generally arrive on the project site between 270°-300° F. (per asphalt producer recommendations).
2. Place asphalt concrete wearing course or bituminous surface treatment only when atmospheric temperature is above 50 degrees F. and rising, and when asphalt binder course is thoroughly dry.
3. Place binder course only when air temperature is above 45 degrees F. and rising and when asphalt base course or granular stone base course is thoroughly dry.

C. Grade Control: Establish and maintain required lines and elevations.

D. Codes and Standards: Perform the work in compliance with applicable requirements of governing authorities having jurisdiction. Obtain and pay for permits required by local authorities.

E. Construction Review and Testing: Notify and coordinate with the Independent Testing Agency and Architect when the subgrade is shaped and ready for proof rolling. Also, when the granular base course is fully installed, compacted and ready for density testing. Protect subgrade and subbase at all times.

F. When staging or scheduling delays occur and wearing course cannot be installed directly after binder course installation before winter, provide temporary asphalt transition ramp/collar around drainage structures in paved areas and at handicap ramps to prevent damage by snow plow. Remove prior to installation of wearing course. Power wash surface and apply asphalt tack coat, as specified, prior to wearing course installation, at no additional cost to the Owner.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Deliver all materials to the job site with all labels intact and legible at time of installation.

B. Store materials off ground under cover. Protect from damage or deterioration.

C. Handle materials to prevent damage to surface, edges, ends and factory applied finishes of items. Damaged material shall be rejected and replaced.

PART 2 – PRODUCTS

2.1 SOIL STABILIZATION FABRIC

A. Shall be a heavy duty, commercially manufactured woven polypropylene geotextile. Standard of quality shall be Mirafi 500X, manufactured by TenCate or Architect approved equal.

2.2 GRANULAR BASE COURSE AND GRAVEL PAVEMENT

A. Shall be as specified in Section 312201.

B. The graded and designed granular base below all new Asphaltic Concrete Pavements shall be constructed, tested, and prepared in accordance with Section 312201 - Site Earthwork of the Contract Documents.

2.3 ASPHALTIC CONCRETE

A.

Pavement Types	Percent Asphalt*
37.5mm Type 1 Base Course	4.8% Asphalt
19.0mm Type 3 Binder Course	4.8% Asphalt
9.5mm Type 7 Top Course	6.3% Asphalt

*Percentage of Asphalt is approximate and shall be based off actual project submittals provided by the Asphalt Producer.

B. Hot Mix Asphalt Top Course: Pavement shall meet the minimum requirements for 9.5 mm (Type 7) or 12.5 mm (Type 6) [PM to select top course] SUPERPAVE Hot Mix Asphalt Top Course (75 gyrations), with a PG 64-22 Binder as specified in Section 404, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 20% of the total mix.

C. Hot Mix Asphalt Binder Course: Pavement shall meet the minimum requirements of 19.0mm SUPERPAVE Hot Mix Asphalt Binder Course (75 gyrations), with a PG 64-22 Binder, as specified in Section 404, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 20% of the total mix.

D. Hot Mix Asphalt Base Course: Pavement shall meet the minimum requirements of 37.5mm SUPERPAVE Hot Mix Asphalt Base Course (75 gyrations), with a PG 64-22 Binder, as

specified in Section 402, of the current NYSDOT Standard Specifications, with the exception that the maximum proportion of Recycled Asphalt Pavement (RAP) to virgin aggregates shall not exceed 30% of the total mix.

E. The coarse aggregate used in HMA shall be sound, angular crushed stone (crushed or rounded gravel is not acceptable). The fine aggregate shall be well graded, moderately sharp to sharp (angular) sands.

2.4 BITUMINOUS TACK COAT

A. Material shall consist of an asphalt emulsion, Grade RS-1h, and shall meet the minimum requirements of Section 407, of the current NYSDOT Standard Specifications. Bituminous Tack Coat shall be installed over all new and existing concrete and asphalt pavements and structures prior to the installation of new Hot Mix Asphalt materials. The following application rates shall apply:

1.	New Hot Mix Asphalt	0.05-0.07 gal/sy
2.	Milled Surfaces of Existing Asphalt	0.10-0.15 gal/sy
3.	Abutting Vertical Edges (drainage structures, appurtenances)	0.05-0.07 gal/sy
4.	All Styles of Curbs and Gutters	0.05-0.07 gal/sy
5.	Delayed asphalt installation of HMA Courses	0.10-0.15 gal/sy

2.5 PAINTED LINES AND TRAFFIC MARKINGS

A. The extent of the pavement markings shall match the extent, location and composition of pavement markings existing at the site prior to start of work where applicable.

B. The work includes, but is not limited to the following: parking stall divider lines, wheelchair legends, “STOP” legends, “NO PARKING” legends, pick-up zone, striping and legends, directional arrow legends, diagonal striping, center line striping, fire lane striping, student area line striping, and other pavement markings as may be shown on the plans.

C. Provide ready-mixed, one component waterborne traffic line paint. Standard of quality shall be: Pro-Park® Waterborne Traffic Marking Paint B-97 Series as distributed through Sherwin-Williams, 800-474-3794; or Architect approved equal.

1. Colors (as approved by the Owner in writing):
   a. Yellow: 1 Gallon & 5 Gallon, Product Number B97YD2467
   b. White: 1 Gallon & 5 Gallon, Product Number B97WD2434
   c. Blue: 1 Gallon & 5 Gallon, Product Number B97LD2022
   d. Black: 1 Gallon & 5 Gallon, Product Number B97BD2021

2. Paints shall contain all necessary co-solvents, dispersants, wetting agents, preservatives and all other additives, so that paint shall retain viscosity. Halogenated solvents and glass beads shall not be permitted.

3. Volatile Organic Compound (VOC) content shall not exceed 250 grams maximum per liter of paint as determined in accordance with ASTM D 3960 test, excluding water and exempt solvents.

2.6 HOT POUR CRACK SEALING AND FILLING

A. Single component, hot applied asphalt crack and joint sealant capable of withstanding temperatures of up to 450° without experiencing polymer degradation.

B. Shall be supplied in solid blocks comprised of heat stabilized polymers and asphalt.

C. Meeting the following material requirements when tested in accordance with ASTM D5329. (see chart below)

Chemical & Physical Analysis

Recommended Application Temperature	350-400°F
Maximum Heating Temperature	450°F
Cone Penetration at 25°C	50 max.
Flow at 60°C, mm	0.
Softening point	200°F Min.
Flexibility 0°F	(1" Mandrel)-Pass
Specific Gravity	1.17
Asphalt Compatibility	Passes

D. Standard of quality shall be Crack Master Supreme as manufactured by Thorworks Industries, Inc., 800-395-7325, www.thorworks.com or approved equal.

PART 3 - EXECUTION

3.1 PREPARE SURFACE

A. Prior to commencement of asphalt paving, all excavations, drainage, utilities, backfilling, fencing, bollards, storm structures, curbing installations, adjustments, proof-rolling and density test procedures shall be complete to the satisfaction of the Architect.

B. Prior to commencement of tack coat and asphalt paving within pavement milled areas, as shown on the plans, all cracks and joints in the milled pavement surface shall be prepared and filled in accordance with the project specifications. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat.

C. Saw cut, using straight and true lines, all existing asphalt pavements to remain in place with straight, neat edge for abutting against proposed asphalt pavement.

D. Provide and confirm field quality control as described in Section 312201 for pavement subgrade and granular base course stone.

3.2 CONSTRUCT PAVEMENT GRANULAR BASE COURSE

A. General: Consists of placing granular base course material, in layers of specified thickness, over prepared subgrade and fabric to support a pavement course.

B. Grade Control: Provide engineering layout per Section 312201 and grade stakes. During construction, protect grade stakes; maintain lines and grades including crown and cross-slope of each course.

C. Install soil stabilization fabric after subgrade has been acceptably compacted and proof rolled. Install soil stabilization fabric as recommended by the manufacturer AND;
   1. Lay fabric in direction of construction traffic.
   2. Overlap fabric side to side and end to end a minimum of two (2') feet.
   3. Establish reasonable compaction and rut stability before using heavy or vibratory compaction equipment.

D. Placing:
   1. Place granular base material over soil stabilization fabric, on prepared subgrade in layers of uniform thickness, conforming to the asphalt pavement details on the drawings.
   2. Place granular base material in a maximum of six (6) inch layers and compact with a vibratory or 10 ton smooth wheeled roller.

E. Provide density testing as described in Section 312201.

F. Surface Smoothness: Test finished surface for smoothness. Surface will not be acceptable when it deviates more than 3/8" measured by a 10 foot straightedge, in any direction.

G. The finished grade of the granular base course shall be verified to ensure that the final finished product of the bituminous concrete pavement surface will be installed to the lines and grades of the existing pavements and proposed elevations surveyed by the Contractor prior to the start of the paving work.

3.3 PLACE ASPHALT MIX

A. General:
   1. The Contractor shall submit a paving plan, indicating intended direction of paving, number of pulls, etc. for approval prior to the start of paving operations.
   2. Joints: Saw cut vertical straight, neat edges for joints required. Joints shall be sharp and clean, conforming to shapes drawn on drawings. Ragged joints will not be accepted.
   3. Mill two (2') feet into surface of adjacent asphalt so joints do not line up or "stack".
   4. Place bituminous tack coat to all surfaces as indicated in this specification. When pavement surface temperature is above or below the 75-130 degrees F. range, the grade of asphalt emulsion must be modified according to NYSDOT standards. Tack coat shall not

be applied to a wet surface or when the pavement surface temperature is below 45 degrees F.

5. Place asphalt on approved prepared surface, spread and strike-off.
6. Spread mixture at minimum temperature of 225-240 degrees F. Place inaccessible and small areas by hand. Hand work shall be minimized to ensure the best possible finished surface.
7. Place each course to required grade, cross-section, and compacted thickness.
8. Paving operations shall not be scheduled when ample time does not exist to place, compact, and finish roll the hot mix asphalt during daylight hours and prior to rainfall.

B. Pavement Placing: Shall be installed in accordance with Section 402-"Hot Mix Asphalt (HMA) Pavements", of the current NYSDOT Standard Specifications.

C. Paving Equipment:
1. Must be capable of placing, spreading and finishing courses of HMA to the specified thickness.
2. HMA shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging.
3. Auger extensions are required while pavers are extended beyond the basic screed width.
4. Paving equipment shall be self-propelled and capable of maintaining the line and grade shown on the plans with suitable electronic equipment. The screed shall be straight and true with no bow and utilizing a vibratory screed. Paving equipment should have fully functional screed heaters and joint preheaters.

D. Asphaltic Concrete shall be installed as follows:
1. Medium Duty Asphalt Pavement: Installed in two (2) lifts consisting of 19.0mm SUPERPAVE Hot Mix Asphalt Binder Course overlain by 9.5mm SUPERPAVE Hot Mix Asphalt Top Course.
2. Heavy Duty Asphalt Pavement: Installed in three (3) lifts consisting of a 37.5mm SUPERPAVE Hot Mix Asphalt Base Course overlain by 19.0mm SUPERPAVE Hot Mix Asphalt Binder Course overlain by 9.5mm SUPERPAVE Hot Mix Asphalt Top.

E. Place in strips not less than ten (10') feet wide, unless otherwise acceptable. In placing each succeeding pass after the placement of the initial pass, the screed of the paver shall be set such that it overlaps the preceding pass by 6" and be sufficiently high such that when compacted, a smooth joint is produced. Prior to pinching the joint, the excess material shall be pushed onto the edge of the new pass with a lute. Excess material shall be removed.

F. After first lift has been placed and rolled, place succeeding lifts and extend rolling to overlap previous lifts. Where possible, top course shall be placed at right angles to binder course and in the direction that the drainage flows. Where this is impractical, offset joints of the two courses by a minimum of two (2') feet so upper and lower joints do not align.

3.4 ROLL ASPHALT MIX

A. General:

1. Rollers shall conform to the manufacturer's specifications for all ballasting. At least one vibratory roller shall be required for each project, with two rollers required as a minimum. (Three rollers shall be required when tonnage is greater than 300 tons/day.)
2. Rollers shall be of a good condition and capable of compacting the HMA to the minimum in-place density required by this specification. Compact asphalt with a nominal 10 ton steel wheel roller or pneumatic rubber tired roller. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
3. Begin rolling when mixture will bear roller weight without obvious or excessive displacement.

B. Finish Rolling: Each lift of the Asphaltic Concrete Pavement shall be mechanically rolled and compacted to the finished thicknesses specified in the Contract Documents. The pavements shall be compacted to a minimum of 94%-97% (95%-102% at longitudinal joints) of the materials theoretical density as determined by AASHTO Method T 209 and an air void percentage of 5%-6% maximum.

C. Patching: Remove and replace paving areas mixed with foreign materials, dirt, and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

D. Joints:
1. The Contractor shall sequence the installation and orientation of all Asphaltic Concrete Pavements such that the minimum numbers of longitudinal and transverse joints are produced and in accordance with the approved Asphalt Placement Work Plan.
2. Neat, straight butt joints between successive passes. Offset joints a minimum of six (6") inches between lifts of asphalt.
3. When repairs or staging of work occurs, make neat vertical saw cut between old and new work to create butt joint. Heat joint prior to pouring. Cold joints are not acceptable.
4. Apply bituminous tack coat to all surfaces and rates indicated under "Bituminous Tack Coat" of this specification section. Tack coat shall not be required on abutting vertical edges for pavements placed in the same day.
5. Minimize construction, longitudinal, and transverse joints left open for an extended period of time.
6. Construct longitudinal joints by paving in a hot fashion with a temperature of not less than 220°F to ensure maximum performance and adhesion.
7. Compact all joints to provide for a neat, uniform and tightly bonded joint that will meet both surface tolerances and density requirements of this specification.
8. Cut straight and true (vertical construction or transverse joints if the material has cooled to less than 220°F prior to the placement of the next pass to ensure the best performing joint possible.

E. Edges: Roll at 45 degrees as detailed, creating clean edge conforming to shapes indicated on the drawings. Ragged edges will not be accepted. Return and saw cut ragged edges at no additional cost to the Owner as directed by the Architect.

F. The final finished grades of the new Bituminous Concrete Pavements must be smooth and true to the contours and shall be installed to the lines and grades of the site prior to start of

construction. The final finished grades shall match adjacent pavement surfaces and concrete slabs, aprons, and doorways.

G. Construction Delays (over 48 hours): When placement of the wearing course over the binder course is delayed over 48 hours, thoroughly clean existing surface of dirt, oil and other debris by pressure washing and sweeping. Place bituminous tack coat as specified in this section.

3.5 ASPHALT TOLERANCES

A. Thickness and Density: Compact each asphalt course to produce the thickness indicated on the drawings within the following tolerances:
1. Base Course: Plus or minus 1/2-inch
2. Binder Course: Plus or minus 1/4-inch
3. Wearing Course: Plus or minus 1/8-inch

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. For Asphalt Concrete:

Base Course Surface:	3/8"
Binder Course Surface:	1/4"
Wearing Course Surface:	1/8"

C. Asphalt Cores: Shall be provided as indicated under "Field Quality Control" of this specification.

3.6 FIELD QUALITY CONTROL

A. The Owner's Testing Agency shall provide the following in the daily report at a minimum:
1. Verify the following for the asphalt mix design prior to asphalt placement:

a. The asphalt mix design has been approved.

b. The asphalt mix design specifies the minimum relative compaction and the methods required to determine maximum density.
2. Verify the asphalt subgrade has been acceptably proof-rolled. (See Section 312201.)
3. Inspect /test aggregate base course material for in-place density (95%) and thickness. Test materials for gradation classification, and physical properties. (See Section 312201.)
4. Inspect/test asphalt wearing course material for compaction during placement and conduct thickness measurements during lay-down. Take temperature of the asphalt mixture and compare actual temperature with the approved asphalt mixture design range. As a minimum, perform the following inspection/tests:

a. Collect trip tickets from trucks delivered to the site and verify correct mix design being used for the project.

b. Temperature tests: one per truck.

c. Lay down thickness (uncompacted): one per strip or 500 square feet minimum

d. Verify equipment rolling pattern and passes to ensure proper compaction: one per day

e. Density test (daily lab density): one test per 5000 square feet minimum

f. Hot mix samples (laboratory testing for density per ASTM D1188): one per day

g. Thickness per ASTM D3549 and density samples per ASTM D2950 by a properly calibrated nuclear asphalt testing device. If there is a disagreement between tests done by ASTM D2950 and ASTM D1188, the values done by ASTM D1188 will govern: one test per 20,000 square feet (surface lift), one test per 10,000 square feet (base lift)

h. Air voids per ASTM D3203 or D2726: one test per 5000 square feet minimum

i. Verify compaction at the joints and seams. The completed paved surface to be true to grade and cross section. Verify smoothness by using an unleveled 10 foot straightedge and ensuring no gap at any point between straightedge and pavement exceeds surface smoothness requirements above except at interception or at changes of grade.

j. The screed/lay down thickness tolerance shall be between 1/8 to 3/16 inches greater than the required asphalt minimum layer requirement. When screed depth is set for the exact thickness as specified, immediately notify the Owner's Representative and Contractor that the installed asphalt thickness may be deficient to achieve the specified minimum thickness. Identify areas of non-complying thickness and attach a drawing identifying the areas to the daily field report.

k. Immediately notify the Owner's Representative and Contractor when paving is being conducted in cold weather and asphalt temperatures are below or above the design mix range.

l. Check the surface grades and drainage patterns. Identify on a drawing all paved areas that are holding water after asphalt placement and notify the Owner's Representative and Contractor. Small ponding areas (bird baths) larger than two (2') feet in any dimension are not acceptable. When this test proves that surface conditions are not acceptable, the Contractor will be responsible for correcting the problem areas. Install a one (1") inch shim coat of wearing course material, or other means acceptable to the Architect.

m. Verify tack coat and edge coat have been applied at the proper rate.

5. Asphalt Cores: Shall be as directed by the Architect.

a. Prior to final acceptance of the asphalt and before lining or other surface materials (resilient track surfacing, etc.) are placed, the Owner's Testing Agency shall core 3" diameter areas of the asphalt surfacing where directed by the Architect. Consistency, density, thickness, and tensile strength per ASTM D6931 will be evaluated.

b. Patch core areas as directed by the Architect to match adjacent density, texture and thickness.

c. Coordinate day to day scheduling with the Testing Agency.

d. If cores vary significantly from the contract requirements, additional cores will be performed by the Testing Agency as directed by the Architect. Once the overall general quality is determined, provide remedial work as directed by the Architect to achieve the quality and consistence as specified.

e. Unacceptable Paving: Remove and replace unacceptable paving as directed by the Architect, immediately and without argument or delay. Correction of deficient areas in the wearing course shall be done by sawcutting and removal of defective area of work. Tack coat shall be applied to all edges and the pavement shall be replaced. Shimming or skin patching of the wearing course shall not be permitted. Correction of deficient areas within the binder course shall be corrected by sawcutting and milling high spots, and truing and leveling low spots or as directed by the Architect.

3.7 SURFACE PROTECTION

A. Protection: After final rolling and sealing, do not permit any type of vehicular or construction traffic on pavement until it has cooled and hardened as recommended by the producer/manufacturer, minimum of 48 hours.

B. Provide protection including, but not limited to, fencing, traffic cones, barrels, lights, reflective signs, flagpersons and barricades until mixture has cooled and attained its maximum degree of hardness.

3.8 PAINTED LINES AND TRAFFIC MARKINGS

A. Cleaning: Sweep and clean surface to eliminate loose material and dust. Remove dirt, oils and other foreign matter. All surfaces to receive pavement markings shall be clean and in good condition to accept pavement markings.

B. Coordinate provisions for installation with work of other trades.

C. Locate to alignment and dimensions as shown on drawings and/or approved by Owner.

D. Painted markings shall meet regulations described in the "Manual of Uniform Traffic Control Devices", latest edition, as published by NYSDOT, Division of Traffic and Safety, Section

262.25 and figure PM-42; and they shall comply with the most recent version of the Americans with Disabilities Act Standards for Accessible Design.

E. Protect: Adjacent surfaces and other items to remain with tape, drop cloths, or other Architect approved means.

F. Application: Two coats according to manufacturer's recommendations resulting in a dense, opaque application without any ghosting of former pavement markings showing through. Overspraying along edges will not be accepted. Edges shall be sharp and crisp, to the shapes required by the drawings.
   1. First coat shall be installed at the recommended DFT (dry film thickness) after paving is in place. The second coat shall be applied at the recommended DFT no later than thirty (30) days after the completion of work.
   2. Apply paint materials using clean brushes, rollers or spraying equipment.
   3. Apply paint materials as a rate not exceeding those recommended by the paint manufacturer for surfaces being painted, less 10% of losses
   4. Comply with manufacturer’s recommendations for drying time between coats. The minimum DFT must be met. Apply additional coats as needed to achieve minimum total specified DFT of the paint system.
   5. The minimum required total Dry Film Thickness (DFT): The DFT shall be the minimum required thickness as measured in mils.
   6. System coverage requirements minimum total thickness (unless otherwise noted):
      a. 1st Coat – 3.0 mils
      b. 2nd Coat – 6.0 mils
   7. Exterior Paint Systems: Provide the following paint systems as indicated: (Colors to be approved by Owner.)
      a. Parking stall, division and limit lines shall be 4” in width, true and straight. Color: White – DFT 6.0 mils
      b. Pavement lettering “NO PARKING” shall be 2’-0” in height. Color: Yellow – DFT 6.0 mils
      c. Compact lettering “COMPACT” shall be 1’-0” in height. Color White – DFT 6.0 mils
      d. Stop legends shall be as detailed on drawings. Color: White – DFT 6.0 mils
      e. Wheelchair legends shall be as detailed on the drawings. Color: Blue background with white symbols. Parking stall striping shall be Blue at handicap stalls only – DFT 6.0mils
      f. Diagonal striping Handicapped. Color: Blue – DFT 6.0 mils
      g. Diagonal striping Loading Zone. Color: Yellow – DFT 6.0 mils
      h. Directional signage shall be as detailed on the drawings. Color: White – DFT 6.0 mils
      i. Center line striping shall be 4” in width as detailed on the drawings. Color: White – DFT 6.0 mils

G. Allow 48 hours minimum curing time for paint before allowing traffic on surfaces. Clean up thoroughly including all protective tape, spilled paint, and debris. All parking area marking and painting to be protected by appropriate traffic barriers, lighted if necessary, so located as to prohibit parking and traffic until traffic lines are completed and properly dry.

3.9 HOT POUR CRACK SEALING AND FILLING

A. The crack must be free from moisture, dust, and loose aggregate. Routing or wire brushing are preferred methods followed by a compressed air heat lance immediately prior to sealing. The substrate and air temperature must be above 45°F.

B. Shall be melted in direct fired or oil jacketed melters. Material should reach recommended pouring temperature of 350-400°F. Fresh material may be added as sealant is used.

C. Apply heated crack filler using either a pump and wand system or a pour pot. For best results the sealant depth to width ratio should not exceed 2 to 1 (i.e. 2-inches deep to 1-inch wide). The cooled sealant height should not exceed 1/8" above surrounding pavement. Using a sealing shoe or squeegee, band the material 2 to 3 inches wide over the crack.

3.10 CLEAN UP

During the contract, and at intervals as directed by the Architect, and as asphalt paving is completed, clear the site of extraneous fabric, gravel, asphalt and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 32 12 01

SECTION 321301 - SITE CONCRETE WORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of site concrete work is shown on the drawings and includes formwork, reinforcement, accessories, cast in place concrete, installation of embedded items, mix designs, finishing, curing, sealing, testing and acceptance requirements for concrete.

B. Site Concrete work includes, but is not limited to, the following:
   1. Concrete walks and pads
   2. Concrete curb ramps with detectable warning system
   3. Concrete footings, bases, and foundations
   4. Exterior anchoring cement non-shrink grout
   5. Concrete scheduling April 1 to October 15
   6. Clean up

C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 312201 - Site Earthwork

B. Section 323000 Series - Site Improvements for Court Improvements Work, Granite Curb, Playscape Improvements

C. Section 334001 - Storm Drainage

1.3 REFERENCES

A. American Concrete Institute (ACI), latest editions:
   1. 301-16 – Specification for Structural Concrete
   2. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete
   3. 305R-20 – Guide to Hot Weather Concreting
   4. 306R-16 – Guide to Cold Weather Concreting
   5. 311 – Recommend Practices for Concrete Inspection
   6. 315 - Details and Detailing Concrete Reinforcement
   7. 318-19 - Building Code Requirements for Structural Concrete
   8. 347 – Guide to Formwork for Concrete

B. Portland Cement Association (PCA). “Design and Control of Concrete Mixtures”, latest edition.

C. American Society for Testing and Materials (ASTM):
   1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement
   2. ASTM C31 - Standard Practice for Making and Curing Test Specimens in the Field
   3. ASTM C33 - Concrete Aggregate
   4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
   5. ASTM C94 - Ready-Mixed Concrete
   6. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars
   7. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete
   8. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
   9. ASTM C150 - Portland Cement
   10. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete
   11. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method
   12. ASTM C260 - Air Entraining Admixtures for Concrete
   13. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete
   14. ASTM C595 – Blended Hydraulic Cements

D. Concrete Reinforcing Steel Institute (CRCI)_Manual of Standard Practices

E. New York State Building Code, latest edition

F. New York State Department of Transportation (NYSDOT) Standard Specifications

1.4 SUBMITTALS:

A. Steel Reinforcement Shop Drawings that detail fabrication, bending, and placement. Comply with CRSI – Manual of Standard Practice showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement, mechanical connections, tie spacing, hoop spacing required for:
   1. Athletic Equipment footings

B. Manufacturers Product Data (MPD) and Samples where indicated are required for the following:
   1. Expansion Joint and Sealant (Vertical and Horizontal): MPD and Color Samples
   2. Water Based Curing and Sealing Compound
   3. Water Based Penetrating Sealing Compound
   4. Concrete Control System for Type 1L Cement mix
   5. Slip Dowel System
   6. Cold and Hot Weather Admixture
   7. Air Entrainment
   8. Detectable Warning System
   9. Exterior Anchoring Cement Non-Shrink Grout
   10. High Strength Anchoring Epoxy System
   11. Concrete Bonding Agent

C. Submit proposed 4,500 psi concrete mix design and test data in accordance with ACI 301 to the Architect for review prior to commencement of the work.
   1. Indicate the locations and elements for which the mix will be used.
   2. Include in the concrete mix design all required or proposed admixtures necessary to facilitate the installation of the concrete by the means and methods selected by Contractor for this project.

D. Mill test certificates and/or test reports for cement indicating compliance with these specifications.

E. Qualification Data: For Concrete Manufacturer.

F. Welding Certifications

G. Formal Letter from Concrete Contractor and/or Concrete Manufacturer with recommendations of materials to be used to maintain and remove ice / snow from newly installed concrete surfaces. The letter should also reference the potential damage of concrete surfaces from the use of de-icing chemicals and rock salt, by the Owner, during the first (1) year of concrete curing, from the date of placement.

1.5 QUALITY ASSURANCE

A. Concrete Manufacturer Qualifications: Company experienced in manufacturing ready-mix concrete products and that complies with ASTM C 94 and ASTM C 685 requirements for production facilities and equipment.
   1. Batch tickets are required to be provided for each batch of concrete produced and delivered to the project site.

B. Concrete Testing Services: The Owner shall employ an acceptable independent testing laboratory to perform materials evaluation, testing of concrete mixes, and quality control testing. Coordinate day-to-day scheduling with the testing agency. Field technician shall be ACI Certified Grade 1 Field Technician.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4 “Structural Welding Code – Reinforcing Steel”

D. Construct and erect concrete formwork in accordance with ACI 301 and 347.

E. Perform concrete reinforcing work in accordance with ACI 301.

F. Perform cast-in-place concrete work in accordance with ACI 301.

G. Conform to current New York State Building Code.

H. Field quality control tests are specified in Part 3 - Execution.

1.6 JOB CONDITIONS

A. Job conditions in Section 312201 apply. Provide ample and skilled manpower for concrete installation which is a recognized time sensitive procedure.

B. All concrete work shall conform to American Concrete Institute (ACI) 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete".

C. Use of ASTM C595 Type 1L Cement (PLC), within the submitted concrete mix design, supplied by the Ready-Mix Producers and to be utilized by the Concrete Installer for site scope items shall require verified written communication and collaboration between the Ready-Mix Producers and the Concrete Installer on the setting time, slump, air content, finishability, and pumpability of the supplied concrete. The Concrete Installer shall be fully aware of all limitations of this type concrete mix to receive a tooled / troweled / broomed finish, as shown on the plans and as specified. The Concrete Installer is responsible for providing the appropriate knowledge, expertise, manpower, and equipment necessary to ensure a clean, durable, well finished concrete product that will resist any potential delamination or finishing failures, which will need to be fully removed and replaced at no additional cost to the Owner.

D. Do not install concrete work when the temperature of the outside air is below 50 degrees F. and falling unless suitable means acceptable to the Architect are provided to protect work from cold and frost and ensure that mortar and concrete will cure without freezing as indicated in "Cold Weather Concreting" below, including temporary heat and covers.

E. Cold Weather Concreting: Provide non-chloride accelerating water reducing admixture in site concrete work placed at ambient air temperatures below 50 degrees F. (10 degrees C.). Comply with International Masonry Industry All-Weather Council cold weather construction and protecting recommendations and American Concrete Institute 306R-10 "Guide to Cold Weather Concreting."

F. Hot Weather: Provide water reducing retarding admixture in site concrete work placed at ambient air temperatures above 80° F. Comply with American Concrete Institute 305R-20 "Guide to Hot Weather Concreting."

G. Construction Review: Notify the Architect/Geotechnical Engineer when stairs, retaining walls, foundations, walks, ramps, curbs, and pads are formed and ready to receive concrete. Radius form layout and score patterns shall be inspected and approved by the Architect.

H. Schedule: Unless otherwise directed in writing by the Architect, construct site concrete work from April 1 to October 15. This permits a minimum 30-day dry curing period prior to possible application of deicing chemicals and rock salt by the Owner.

1.7 ADA REQUIREMENTS

A. GENERAL: Concrete work shall comply with the Americans with Disabilities Act as described in the 2010 ADA Standards issued by the Department of Justice (DOJ) and the Department of Transportation (DOT) or latest edition, shall be used.

B. Curb ramp and concrete walk surfaces shall meet the following tolerances:

1. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes.
2. Thresholds at doorways shall not exceed 3/4" in height for exterior sliding doors or 1/2" for other types of doors. Raised thresholds and floor level changes at accessible doorways shall be beveled with a slope no greater than 1:2.
3. Detectable warning system shall cast in place for the safety and convenience of the visually impaired. Contractor shall have a minimum of three (3) years experience with materials and installation.

1.8 CONCRETE FIELD MOCKUP(S)

A. CONCRETE FLAT WORK (using Type 1L Concrete):
1. Prior to installation of concrete flatwork using Type 1L concrete, erect a 5’ x 5’ minimum sample panels in place to further verify finishing time, slump, and setting time.
2. Construct at least two (2) weeks before start of other concrete work to allow concrete to set up before observation.
3. Mockup shall demonstrate each forming and finishing condition required on Project using materials, workmanship, joint treatment, curing method, and finishinig techniques to be used throughout the project.
4. Retain samples of cement and aggregates used in mockup for comparison with materials used in remaining work.
5. When Architect determines that mockup does not meet requirements, demolish and remove it from the site and cast another until mockup is accepted.
6. Keep accepted mockup undisturbed during construction as a standard for judging competed work.
7. Demolish accepted mockup and dispose offsite only when directed by the Architect.

PART 2 - PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

A. Forms: Either steel or wood, exterior type softwood, PS1, of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use forms that are straight and free of distortion and defects, extending the full depth of concrete. Concrete walks which require radius form work shall be set with flexible forms, conforming to the shapes and dimensions as indicated.

B. Lumber: PS 20.

C. Form Ties: Snap-off, metal type of fixed length, cone type.
1. Ties shall be left in place and equipped with swaged washers or other approved devices to prevent seepage of moisture along the tie.
2. Depth of Breakback: Minimum one (1") inch.
3. Unless otherwise noted, provide form ties, which will not leave holes larger than one (1") inch diameter in concrete surface.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish, free of rust and/or oxidation. Reinforcing bars shall be bundled and tagged with grades and suitable identification markings, shall be waterproof, and shall not be removed until steel is placed.

B. Steel Welded Wire Reinforcement ASTM A185, plain type:
   1. Flat Sheets
   2. Mesh size: 6 x 6 (standard W1.4 x W1.4, heavy duty W2.1 x W2.1)
   3. Free of rust and/or oxidation

C. Reinforcement Accessories:
   1. Tie Wire: FS QQ- W-461 G, annealed steel, back, 16-gage minimum.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement. They shall provide sufficient supports at close enough spacing so that the steel will carry the weight of the workmen and the fresh concrete without deformation from its specified location.

D. Fabricate concrete reinforcing in accordance with ACI 315 and CRSI's Manual of Standard Practice.

E. Slip Dowels: Shall be a slip dowel system comprised of a round dowel sleeve and corresponding base. Standard of quality: shall be Speed Dowel as distributed by A.H. Harris, (860) 216-9500 or Architect approved equal.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials or the same type, brand, and source throughout the project:
   1. Portland Cement: ASTM C 150, Type I/II.
   2. Fly Ash: ASTM C 618, Class F or C, with loss on ignition less than 6%.
   3. Slag Cement: ASTM C 989, Grade 100 or 120.
   4. Blended Hydraulic Cement*: ASTM C 595 Type 1L.

      *Use of Blended Hydraulic Cement (Type 1L) requires additional project requirements prior to approval / use within this specification.

B. Aggregates per (ASTM C33):
   1. Fine aggregates: clean, sharp, natural sand.
   2. Coarse Aggregates: hard, sharp, angular, strong, clean, 3/4" maximum size stone meeting the requirements of New York State Department of Transportation Specification 703.02.

C. Water: Clean (not detrimental to concrete) and potable (ASTM C 94).

2.4 ADMIXTURES

A. Calcium Chloride in concrete is prohibited.

B. Air Entrainment Admixture: ASTM C260, Darex AEA ED or Architect approved equal.

C. Water Reducing Admixture: ASTM C494, Type A; not containing more chloride ions than are present in municipal drinking water.

D. High Range Water Reducing Admixture: ASTM C494, Type F or G; not containing more chloride ions than are present in municipal drinking water.

E. Cold Weather Accelerating Admixture: (Ambient temperature below 50°F.) Non-chloride water reducing accelerating admixture, ASTM C494, Type C, PolarSet as manufactured by WR Grace & Co. or Architect approved equal. Mix at rates recommended by the manufacturer. No reduction in compression rating of the concrete is permitted.

F. Hot Weather Water Reducing and Retarding Admixture: (Ambient temperature above 80° F.) Shall be Daratard series admixture, ASTM C494, Type D, as manufactured by WR Grace & Co. or Architect approved equal. Mix at a rate recommended by the manufacturer. No reduction in compression rating of the concrete is permitted.

2.5 RELATED MATERIALS

A. Expansion Joints:
   1. For Radius Applications: Expansion joint filler shall be polyethylene closed cell backing with peel off strip, X-Foam as manufactured by W.R. Meadows or Architect approved equal.
   2. For Straight Applications: Expansion joint filler shall be fiber expansion joint with peel off snap-cap, as manufactured by W.R. Meadows or Architect approved equal.

B. Caulking for flat slabs shall be one-part elastomeric self-leveling polyurethane gray sealant Pourthane SL or Architect approved equal. Caulking for vertical surfaces shall be one component elastomeric gun grade polyurethane sealant Pourthane NS, color as selected by the Owner to match wall stain or Architect approved equal.

C. Fiber Reinforcement for Concrete Curbs: Shall be Grace Fibers ¾" long, fibrillated polypropylene fibers as manufactured by WR Grace & Co. or Architect approved equal. Add fibers to concrete at the rate of 2.0 lbs/c.y. and as recommended by the manufacturer.

2.6 COMPOUNDS, HARDENERS, AND SEALERS for NON-TYPE 1L CEMENT MIXES

A. Water Based, Acrylic, Curing and Sealing Compound: ASTM C309, Type 1, Class A and B, clear or translucent. Standard of quality shall be VOCOMP-20 as manufactured by W.R. Meadows or Architect approved equal.

B. Water Based Penetrating Sealer: clear, penetrating, breathable, VOC-compliant, solvent free surface treatment for use on concrete to protect against water and chloride intrusion. Standard

of quality shall be Protectosil 300 S as manufactured by Evonik Corporation or Architect approved equal.

2.7 COMPOUNDS, HARDENERS, AND SEALERS for TYPE 1L CEMENT MIXES

A. Curing, Sealing, and Protection System for Type 1L Cement Mix: Clear, penetrating, reactive, VOC-compliant system consisting of combined evaporation reducer, finish aid, curative, fixative, densifier, sealer agents to promote proper cure and produce mechanically and chemically densified power troweled concrete surfaces. Standard of quality shall be Emerald Concrete Control Series (Emerald Control, IceCore, and Emerald X) as manufactured by Green Umbrella Systems (greenumbrellasystems.com) or Architect approved equal.

2.8 CONCRETE MIX - GENERAL

A. Prepare design mixes for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both. Concrete mix designs shall conform to the requirements of ACI 301.

B. Cementitious Materials:
   1. Use cementitious materials of the same brand and type and from the same manufacturing plant as those used in establishing the approved concrete mix design.
   2. Fly ash or slag cement may be used as needed to reduce the total amount of Portland cement, which would otherwise be used, by not more than 15 percent. Notify concrete finishers of concrete material containing fly ash or slag cement.

      a. Exception: Do not use fly ash or slag cement in any concrete mixtures for exterior concrete / slabs that will have moisture sensitive coating or finishes applied to the concrete.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Use aggregates from the same source and of the same size range as those used in the approved concrete mix design.

E. Admixtures: Use admixtures of the same brand and type as those used in the approved concrete mix design. Use admixtures according to the manufacturer’s instructions.

F. Mix and deliver ready-mix concrete in accordance with ASTM C94.
   1. Concrete must achieve stated minimum compressive strength at 28 days.
   2. Concrete containing fly ash or slag cement must achieve stated minimum compressive strength at 56 days.

2.9 CONCRETE MIX – WALKS, SLABS, FOOTINGS, AND CURBS

A. Concrete Mix:

1. Compressive Strength (Minimum at 28 days): 4,500 psi
2. Slump (Maximum): 4 inches +/- 1”
3. Air Entrainment: 6 – 8.5% +/- 1.5%
4. Flexural Strength (ASTM C78): 650 psi at 28 days.

B. Use water-reducing admixture in all concrete.

C. Water/Cement Ratio: Maximum 0.45 for 4,500 psi concrete.

D. Maximum Size of Coarse Aggregate:
1. General Work: Per ACI 301, 3/4" maximum.

E. Select admixture proportions for normal weight concrete in accordance with ACI 301.

F. Add air-entraining agent to concrete mix for all concrete work exposed to exterior.

2.10 MIXING WATER CONTROL

A. The quantity of mixing water used in the concrete mix shall be determined by the Contractor, except that the Architect/Geotechnical Engineer may direct that such quantity of water be reduced if the slump of the concrete exceeds the specified slump. The Contractor's determination of the quantity of mixing water shall conform to the various limits on water/cement ration and slump specified. Concrete consistency shall be uniform from batch to batch.

B. During the work, the batch plant will make quantitative measured moisture determinations of the aggregates utilized in each batch. Aggregate weights and batch water requirements shall be adjusted accordingly for measured aggregate moisture content.

C. When concrete is transported in units approved for mixing, the addition of not more than 10% of the total design water will be permitted at the job site to obtain initial slump.
1. Any addition of water shall be followed by mixing of at least 30 revolutions in the mixing speed range.
2. No more than two additions of water at the point of deposition before discharge shall be allowed.
3. No retempering of the concrete will be permitted. Retempering is defined as the addition of water after the mix has attained its desired initial slump.

2.11 DETECTABLE WARNING SYSTEM

A. Cast in place iron detectable warning plates (cast iron), with raised detectable/tactile domes. Units shall be interlocking or concealed bolted to provide varying lengths, ADA compliant. Standard of quality shall be East Jordan Iron Works, Inc., Cast Iron Detectable Warning Plates, (800) 626-4653, www.ejiw.com or Architect approved equal.

B. Finish: Natural Patina providing visual contrast.

C. Guarantee period shall be five (5) years from substantial completion including defective work, breakage, deformation, heave, and loosening plates.

2.12 EXTERIOR ANCHORING CEMENT (NON-SHRINK GROUT)

A. For Steel Posts, Fencing and Other Non-Aluminum Elements: Shall be an exterior grade anchoring cement (non-shrink grout) with a min. compressive strength (ASTM C-109) of 7,200 psi at 28 days. Standard of quality shall be Super Por-Rok as manufactured by CGM, Inc., www.cgmbuildingproducts.com, or Architect approved equal.

B. For Aluminum Posts and Elements: Shall be an exterior grade anchoring cement (non-shrink grout) with a min. compressive strength (ASTM C-109) of 7,200 psi at 28 days. Standard of quality shall be Por-Rok as manufactured by CGM, Inc., www.cgmbuildingproducts.com, or Architect approved equal.

2.13 HIGH STRENGTH ANCHORING EPOXY SYSTEM

A. A two-component vinylester adhesive anchoring system. The system includes injection adhesive in plastic cartridges, mixing nozzles, dispensing tools and hole cleaning equipment.

B. Designed for bonding threaded rod and reinforcing bar elements into drilled holes in concrete and masonry base materials.

C. Standard of quality shall be AC100+ GOLD Vinylester Injection Adhesive Anchoring System as distributed by A.H. Harris, (315) 414-0340, or Architect approved equal.

2.14 CONCRETE BONDING AGENT

A. Shall be a concrete bonding adhesive specifically formulated for permanently bonding new concrete to old concrete in exterior applications.

B. Concrete bonding adhesive applied to appropriate substrates will achieve tensile bond strengths typical of 150 psi in 28 days.

C. Standard of quality shall be Quickrete Concrete Bonding Adhesive or Architect approved equal.

PART 3 - EXECUTION

3.1 CONCRETE WALKS AND PADS

A. Surface Preparation: Remove loose material from the compacted subgrade surface immediately before placing concrete. Remove any standing water, mud, debris, frost, snow, ice from surfaces upon or against which concrete is to be placed.

B. Proof-roll prepared subgrade surface to check for unstable areas and the need for additional compaction. Do not begin concrete pour until such conditions have been corrected, subgrade is compacted to 95% and ready to receive concrete.

C. Form Construction: Construct to required size and shape. Brace and secure to maintain alignment, elevation and position. Check completed formwork for grade and alignment, prior to installing concrete. Clean forms as needed to removed foreign matter.

D. Install welded wire mesh on concrete brick or mesh chairs to proper level in maximum lengths possible. Offset end laps in both directions. Splice laps with tie wire. Lifting mesh after concrete pouring is not acceptable.

E. Prepare concrete mixture including the following:
   1. Add hot weather or cold weather admixture to accommodate field weather conditions.

F. Concrete Testing: Will be performed as described in Part 3, "Field Quality Control" of this specification section.

G. Conveying Concrete:
   1. Convey concrete by means that will prevent segregation and loss of mortar form the mix.
   2. Provide adequate manpower and equipment in the form of buckets, buggies, chutes, conveyors or other approved means to assure continuous operation.
   3. Convey concrete so that no equipment with aluminum parts comes in contact with fresh concrete.

H. Concrete Placement:
   1. Do not place concrete until subgrade and forms have been checked for line and grade.
   2. Moisten granular base course as required to provide a uniform dampened condition at the time concrete is placed.
   3. Do not place concrete around manholes or other structures until they have been brought to the required finish grade, alignment, and expansion joints have been installed.

I. Spread concrete as soon as it is deposited on the granular base course, using methods which prevent segregation of the mix, and with as little rehandling as possible. Consolidate concrete along the face of forms. Consolidate with care to prevent dislocation of mesh, reinforcing and joint materials.

J. Concrete Joints:
   1. Construct expansion and contraction joints as detailed and as shown on plans. Concrete joints that do not follow the pattern(s) shown on the plans and/or changes that have been approved by the Architect will be removed and replaced at no additional cost to the Owner.
   2. When the walkway is abutting existing walks, place transverse joints to align with previously placed joints, unless otherwise shown.
   3. Contraction Joints: Approximately 5'-0” on center. Break walk into individual slabs of not more than twenty-five (25 sf) square feet with jointing tool, round edges. Saw cut scoring pattern (contraction joints) to depth shown on details for each type of concrete work with new, sharp concrete sawblade one day (24 hours) after the pour. Joint cuts to be clean, sharp, uniformly made cuts to achieve scoring pattern as shown and detailed.

4. Expansion Joints: Provide where abutting building(s), columns, structures, concrete paving and curbs, catch basins, manholes, inlets, walks, walls, other fixed objects and as directed by the Architect.
5. Locate expansion joints at thirty feet on center (30' o.c.) for each walkway lane, unless otherwise shown. Provide slip dowels as detailed and specified.
6. Locate expansion joints with slip dowels at all flush building access points, whether specifically shown on drawings or not.
7. Extend joint fillers full width and depth of the joint, flush with finished pavement grade, and not less than 1/4" or more than 1/2" below the finished pavement surface. Joint surfaces shall be clean and dry prior to installation of sealant as per manufacturer's recommendations. Remove excess sealant on surfaces adjacent to joint.

K. Concrete Finishing:
1. Perform concrete finishing using machine or hand methods as required.
2. After striking off and consolidating concrete, smooth the surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.
3. After floating, test surface for trueness with a ten (10') foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous, smooth finish.
4. Work edges of slabs and joints with a 1/8" radius edging tool, two (2") wide, unless otherwise shown.
5. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows.
6. Broom finish, by drawing a medium hair broom across the concrete surface as detailed. Repeat operation when required to provide a medium texture acceptable to the Architect.
7. For handicap curb ramps, tool grooves along sloping surfaces in line with drainage flow as detailed.

L. Concrete Curing and Sealing Non-Type 1L Cement Mixes:
1. Refer to schedule note in 1.6 Job Conditions above.
2. Immediately after placement, protect concrete from premature drying.
3. Remove all dirt, dust, oil, grease, asphalt, vegetation, grass, and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry.
4. Stir curing compound thoroughly before using.
5. Apply a continuous, uniform film by solvent-resistant low-pressure spray only, short-nap roller or lamb's wool applicator. For best results, use a canister curing compound sprayer. Use spray tip number 8004 or equivalent for water-based or waterborne products.
6. For curing, coat evenly and uniformly as soon as possible after final finishing.
7. Apply penetrating sealer minimum thirty (30) days after application of curing compound when all construction is completed and structure is ready for occupancy / use, prior to any application of de-icing chemicals. Following manufacturer’s recommendations for application over concrete including removing any remaining curing products.
8. When soil contamination occurs, notify the Architect immediately in writing. Remove contaminated soils and legally dispose of, provide soil test(s), replace soil, plantings and lawns at no additional cost to the Owner.

M. Concrete Curing and Sealing Type 1L Cement Mixes:

1. Refer to schedule note in 1.6 Job Conditions above.
2. Follow Emerald Concrete Control Series Application Guide. Do NOT skip any required step as directed. Do NOT reuse sprayers between steps.
3. Immediately after screed apply Emerald Control at 800 sf per gallon with sprayer, continue finishing as detailed and specified.
4. Once slab is walkable and finishing is complete install IceCore at a rate of 500 sf per gallon.
5. Wait 48 hours after pour, once slab is dry and clean install Emerald X at a rate of 800 sf per gallon. Keep concrete clean of ANY traffic for 24 hours minimum.

N. When soil contamination occurs, notify the Architect immediately in writing. Remove contaminated soils and legally dispose of, provide soil test(s), replace soil, plantings and lawns at no additional cost to the Owner.
1. Detectable Warning System:
2. Pour and float concrete, set tile by tamping grid pattern down into the concrete until all air voids are removed with a rubber mallet.
3. Place two cinder blocks or 25 lbs weight on the tile to prevent floating.
4. Create an edge around the perimeter of the tile using a 3/8" radius edging tool then float the concrete around the tile's perimeter using a steel trowel.
5. After concrete has cured, remove protective plastic wrap.
6. Protect tiles against damage during construction and clean tiles as recommended by the manufacturer.

3.2 FOOTINGS, BASES, AND FOUNDATIONS

A. Footings, Bases, Foundations: Locate and provide where shown on drawings and as detailed.

3.3 INTERRUPTION OF CONCRETING

A. Should placing concrete be suspended or unavoidably interrupted, provide keyways and bulkheads to prevent feather-edging when work is resumed. Roughen horizontal surface for bond.

3.4 REPAIR AND PROTECTION FOR CONCRETE WORK

A. Cut out and replace defective concrete work which has blisters, cracking, crazing, curling, discoloration, dusting, efflorescence, low spots, pop outs, scaling or mortar flaking, spalling, settling, or heaving as defined by Portland Cement Association 2001, "Concrete Slab Surface Defects" and as directed by the Architect.

B. Modify or replace concrete not conforming to the required lines, details, elevations and specifications as directed by the Architect.

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

3.5 ANCHORING RAILINGS AND POSTS INTO CONCRETE

A. Aluminum posts **must** be coated or treated with a good sealer or paint prior to anchoring.

B. Drill the hole as detailed. Blow out all dust and loose particles.

C. Fill the hole with water. Scrub the sides and bottom of the hole and with a stiff wire brush such as a bottlebrush. This is important.

D. Remove excess water with rag or other absorbent materials. Leave the hole clean and uniformly damp.

E. Mix the anchoring cement in a clean container to flowable consistency based on the following formula. For best results, measure accurately. The correct amount of water is as follows:

2.3 oz per lb
11.5 oz for 5 lbs
115 oz for 50 lbs
7 quarts for 100 lbs

Measure the amount of anchoring cement and water to be mixed. Add the measured amount of water to the appropriate amount of cement and mix until the desired consistency is achieved. (NEVER USE MORE WATER THAN PRESCRIBED). This will reduce the ultimate strength, increase the possibility of volume instability and may cause the product to become soft and less durable.)

F. Fill the hole with the plastic cement first, and then tamp the bolt, post or rod with a twisting motion into place. If the material becomes too fluid during the tamping process and sags out of place, let it stand for a few minutes and it will stiffen. Smooth out the surface around the bolt with spatula or trowel.

G. Let the cement harden for at least 60 minutes. For heavy equipment, allow 4 hours prior to use or loading.

3.6 ANCHORING BOLTS, DOWELS, AND REBAR INTO CONCRETE

A. Anchor Hole Preparation: Prepare all anchor holes prior to placement of anchoring epoxy. Hole diameter is typically 1/8" (3 mm) greater than the anchor diameter. Hole depth is typically nine times anchor diameter. Required minimum anchor hole depth is 6". Consult project specifications and details. Drill hole to proper diameter and depth and blow all dust from the bottom of the hole, brush and blow (4x) repeatedly to remove all dust and debris. The anchor hole must be clean and free of standing water prior to placement of material.

B. Application: Use only professional caulking guns. Remove plastic caps and plugs from cartridge. Save for closing cartridge. Attach mixing nozzle to cartridge. Discard small amounts of gunned products until uniform color is achieved. Mixing nozzle will harden in approximately 20 min. if not in use.

C. Hardened nozzles must be discarded. Dispense the epoxy at the bottom of the hole while withdrawing nozzle. Dispense epoxy (typically filling 5/8 of hole) so that once threaded rod or rebar is inserted, the hole is completely full. Insert threaded rod or rebar to the bottom of the hole while turning clockwise. Promptly remove any excess material. Leave anchor undisturbed for 6 hours (at 77°F /25°C), or longer for colder temperatures. Load can be applied 8 hours at 77°F (25°C).

3.7 CONCRETE BONDING AGENT

A. Required at elements where new concrete is applied and joined to existing concrete.

B. Surface Preparation:
1. Apply only to clean, sound, dry surfaces.
2. Remove dust, dirt, oil, grease, wax, unsound concrete and plaster, paint, and other foreign materials.

C. Applications:
1. Apply to a dry surface with brush, roller or spray to the thickness of a paint coat.
2. Place new concrete, topping mixes, Portland cement, or patches as soon as the adhesive is dry.
3. Make sure basecoat is dry before applying adhesive.
4. Tools, brushes and other application accessories should be immediately cleaned with soapy water. Use hot water to clean up any drippings.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing shall be performed by ACI certified technicians; Grade 1. Certificates shall be submitted to the Architect for people performing inspection and testing prior to the start of work.

B. Field Inspection and testing shall be paid for as directed under 1.5 "Quality Assurance". Where retesting, additional inspection, lab tests or other professional services are required due to rejected work, any cost associated therewith will be solely at the Contractor's expense.

C. The Contractor shall plan his operations to allow adequate time for all required testing and inspection.

D. The Contractor shall provide facilities and equipment necessary to obtain and handle representative sample of materials to be tested.

E. The testing laboratory shall be responsible to the Owner for the field control of all concrete and may reject batches because of high slump, uncontrolled air entrainment, delays or other conditions of non-compliance with these specifications.

F. Sampling and Field testing will be performed during concrete placement per ASTM C31, C39, C143, C172 and C173.

G. Five (5) Concrete Test Cylinders: Taken for every thirty (30) or less cubic yards of concrete placed are required or a fraction thereof;
   1. Two (2) Cylinders will be tested at 7 days; two (2) cylinders will be tested at 28 days and one (1) cylinder will be tested at 56 days.

H. One (1) Additional Test Cylinder: Taken during cold weather concreting, to be cured on the job site under the same conditions as placed concrete it represents, is required.

I. Air Content Test: Taken for each set of test cylinders taken, is required.

J. One (1) Slump Test: Taken for each set of test cylinders taken is required.

K. Test results will be reported to the General Contractor and Architect on same day tests are made. Emailed reports will follow to the Owner, Architect, and Landscape Architect. Email copies of laboratory test, evaluation reports for concrete materials and mix designs will be submitted.

3.9 CLEAN UP

uring the contract and at intervals as directed by the Architect and as concrete work is completed, clear the site of gravel, concrete, appurtenances and debris. Leave the site in a clean, safe, well-drained, neat condition.

END OF SECTION 32 13 01

SECTION 32 16 01 - GRANITE CURB

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of granite curb is shown on the drawings.

B. Provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 321201 - Asphalt Paving

B. Section 321301 - Site Concrete Work

1.3 SUBMITTALS

A. Provide material certificates showing granite curb source and that material meets product specification in Section 2.1 below.

1.4 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Construction Review: Mark location in field for review by Architect prior to setting granite curb.

PART 2 - PRODUCTS

2.1 GRANITE CURB

A. Shall be hard, durable, light grey in color and free from seams which would impair its strength. The curb shall be sawed top and split face. No drill marks shall appear on the exposed face. Minimum length shall be 2 ft.; maximum 8 ft. Curbs set to a radius of less than 100 ft. shall be cut to the curve required. Maximum length on curves shall be four feet.

B. Provide project specific granite types:
   1. Vertical Curbs:

a. Standard: 5" x 16"
2. Transition Curb
3. Vertical Curb Corners (for radius 3'-0" or less)

C. Standard of quality: As manufactured by Geneva Granite Co. (315) 789-8142 or Architect approved equal.

2.2 WET CONCRETE SETTING BED

Shall be 4,500 psi as specified in Section 321301.

2.3 GRANULAR BASE COURSE

As specified in Section 312201, 2.1, B.

2.4 MORTAR

Shall be one part Portland cement, one part lime and three parts mason's sand by volume.

2.5 DRY MIX CONCRETE

Shall be Portland cement dry, mixed in the proportions of, one part Portland cement to three parts of concrete sand and six parts of coarse aggregate (passing 1-1/2" screen).

PART 3 - EXECUTION

3.1 SETTING CURB

A. Curbing shall be set leveled on a 6 inch dry mix concrete setting bed foundation.

B. Set granite to line and grade as shown on the plan. Provide continuous wet concrete backing both sides of curb. Joints shall be a minimum of ¼" and shall be fully mortared from face to back of curb. Bevel corners to 45 degrees with a mitered joint.

C. Set curbs to the line and grade given in a smooth curve or straight line. When curbing ends, it shall transition from a six (6") inch reveal to no reveal meeting finished grade.

D. Curbing shall be set, backfilled, and compacted to ½ the height on the sidewalk face to prevent movement when backfilling is placed. Once the paving has been rolled, the remaining fill shall be placed and compacted to avoid future settlement of the walk.

E. Pointing: The joints between curb stones shall be carefully filled with cement mortar and neatly pointed on the top and front exposed curb portions. Remove excess mortar and clean curb.

F. Backfill curbing with wet concrete each side of the curb stone and all spaces under the curb shall be filled with concrete so that the entire unit is completely supported.

3.2 CLEAN UP

During the contract and at intervals as directed by the Architect and as granite curb installation is completed, clear the site of extraneous granite curb, concrete, gravel, asphalt and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 32 16 01

SECTION 32 30 01 - COURT IMPROVEMENTS WORK

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of court improvements work is shown on the drawings.

B. Court improvements work includes, but is not limited to, the following:
   1. Concrete for footings
   2. Basketball goal posts, back boards and nets
   3. Instruction of Owner’s Designated Representative
   4. Clean Up

C. The Contractor shall provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 321301 - Site Concrete Work

B. Section 323100 - Chain Link Fence and Gates

C. Section 334001 - Storm Drainage

1.3 REFERENCES

A. National Federation of State High School Associations (NFHS) Rules and Interpretations, latest edition.

B. American Sports Builders Association (ASBA): Tennis Courts: A Construction and Maintenance Manual, latest edition.

C. USTA Guidelines.

1.4 SUBMITTALS:

A. Manufacturer's Product Data (MPD) required for:
   1. Basketball Goal Posts, Backboards and Nets

1.5 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Construction Review: Notify the Architect when new court and all footing locations are marked in the field and ready for review.

1.6 QUALITY ASSURANCE

A. Manufacturer's warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

B. Installer Experience Requirements:
1. Submit business name, business owner(s) name(s), business address, telephone number, website and/or email address signed by the Contractor/Subcontractor who meets the qualifications set forth in this specification and is proposed by the Contractor to perform the installation of the court improvements.
2. Provide a list of at least five (5) work projects of comparable size, scope and quality completed successfully by the proposed Contractor/Subcontractor within the past three (3) years that includes the date completed, project Owner's name and current contact information, including telephone numbers and email addresses.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to project site in wrapped, neat, secure condition. Provide means to unload products from delivery trucks.

B. Protect all products and installation area from vandalism, theft, other construction, premature use, etc. until Owner acceptance and Architect sign off.

C. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

1.8 SUBSTITUTIONS

A. If a product is being submitted as a substitution to the specified product; then the Prime Contractor shall submit and request a product material substitution with his/her bid. The Prime Contractor shall at a minimum provide the following for review by the Architect and Owner:
1. All submittals as specified herein
2. Product comparison
3. Cost Information (including proposal of change in Contract Sum)
4. Contractor's certification that proposed substitution complies with requirements in the Contract Documents

5. Contractor’s waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

PART 2 - PRODUCTS

2.1 BASKETBALL COURT GOAL POSTS, BACKBOARD, HOOP AND NET

A. Concrete Footing: Shall be 4000 psi concrete as specified in Section 321301.

B. Posts: Shall be a 4½" galvanized, powder coated steel gooseneck post with four (4) foot extension. Standard of quality shall be model GN45 as manufactured by Gared Sports, Inc. (800-342-0334) or Architect approved equal.

C. Backboards: Shall be 36½" x 54" aluminum with white power coated paint finish. Standard of quality shall model 1850 as manufactured by Gared Sports, Inc. (800-342-0334) or Architect approved equal.

D. Goals: Shall be breakaway goals with internal shock absorber to prevent coated flyback action and designed to eliminate any possible entrapment area between the backboard and goal. Goals shall meet all NYS High School specifications. Standard of quality shall be model 2042 as manufactured by Gared Sports, Inc. (800-342-0334) or Architect approved equal.

E. Net: Shall be nylon thread, hour glass non-tangling design. White color.

PART 3 - EXECUTION

3.1 INSTALL ASPHALT PAVEMENT

As specified in Section 321202.

3.2 INSTALL BASKETBALL COURT GOAL SUPPORT POSTS, BACKBOARD, HOOP AND NETS

A. Locate according to drawings and install per manufacturer's instructions. Coordinate work with others.

B. Posts shall be centered in concrete footings, plumb and vertical.

C. Provide and install supports, backstop, hoop, net and other accessories securely. Protect installation from movement and loading until the concrete has attained its full design strength (approximately 28 days). Then provide nets and other accessories securely.

D. Protect installation until accepted. Test breakaway/reset feature six (6) times and review process and results with Owner.

E. Provide and install painted lines as noted and detailed on plans.

3.3 INSTRUCTION OF OWNER'S DESIGNATED REPRESENTATIVE

A. After installation and prior to final acceptance of the Project, provide an instruction period for the Owner's designated representative. Instruction shall be sufficient to cover the contents of the equipment operations and maintenance requirements, a walk-through of the project, and a review of all warranties

3.4 CLEAN UP

During the contract and at intervals as directed by the Landscape Architect and as court improvements work is completed, clear the site of extraneous fabric, gravel, asphalt, packaging material, glass, paint and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 32 30 01

SECTION 32 30 02 - PLAYSCAPE WORK

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of playground work is shown on the drawings.

B. The following to be provided by the Owner:
   1. Play Equipment (including wear mats)
   2. Play Area Surfacing Material

C. Contractor to provide all materials, labor, equipment and services required to accomplish all related work in accordance with the drawings and specifications.
   1. Receiving, unloading, and storing of equipment and surfacing
   2. Installation – of the equipment provided by Owner
   3. Installation – of the surfacing materials provided by Owner
   4. Drainage stone and fabric
   5. Play Equipment Audit - per this specification

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation

B. Section 312201 - Site Earthwork

C. Section 321201 - Asphalt Paving

D. Section 321301 - Site Concrete Work

E. Section 334001 - Storm Drainage

1.3 SUBMITTALS:

A. IPEMA CERTIFICATION: All standard pieces of playground equipment shall be certified by the International Playground Equipment Manufacturers Association (IPEMA) for conformance to the requirements of ASTM F1487.

B. CPSC COMPLIANCE: All pieces of playground equipment shall be certified by the manufacturer to be in compliance with the Handbook for Public Playground Safety.

C. CPSIA of 2008 COMPLIANCE: All playground equipment shall be certified by the manufacturer to be in compliance with all applicable requirements of the Consumer Product Safety Improvement Act of 2008. Lead test data that is shipped with the equipment shall be turned over to the Owner immediately after the equipment arrives.

D. MAINTENANCE AND USE MANUAL: Submit information describing the manufacturer's maintenance manual.

1.4 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Construction Review: Notify the Architect when the playscape is staked out, posts are installed, and upon completion of playscape.

1.5 QUALITY ASSURANCE

A. Installer: At least twenty (20) completed play structures with similar components and complexity. Upon request, provide list of completed structures to the Owner's Representative with playground owner's name, address, telephone number and representative's name.

B. Installer must be a Manufacturer's Factory Certified Installer:
1. Proof of certification by manufacturer shall be produced.
2. Certified Playground Safety Inspector with crew at all times.
3. Proof of NPSI Certification required.

1.6 ADA COMPLIANCE CHART

A. The play area or areas shall meet or exceed the accessibility requirements set for by the ADA as follows:

Total Elevated Play Components:			8
Total Elevated Play Components Accessible by Transfer or Ramp Shown:	8	Required	4
Total Elevated Play Components Accessible by Ramp Shown:	0	Required	0
Total Accessible Ground Level Play Components Shown:	21	Required	3
Types of Ground Level Play Components Shown:	11	Required	3

PART 2 PRODUCTS

2.1 OWNER PROVIDE EQUIPMENT AND SURFACING

A. Playground Equipment: Details and specifications representing the minimum acceptable standard of quality have been based on playground equipment by Landscape Structures, Inc. as supplied by Parkitects or Architect approved equal, and will be furnished by the Owner when requested by the Contractor a minimum of eight (8) weeks prior to Contractor schedule.

B. Play Area Surfacing: Details and specifications representing the minimum acceptable standard of quality have been based on Playground Grass Ultra surfacing by ForeverLawn of Ohio, Inc.

844-614-8873, or Architect approved equal, and will be furnished by the Owner when requested by the Installation Contractor a minimum of eight (8) weeks prior to Contractor schedule.

2.2 PLAY AREA - SPECIFIC COMPONENTS AND ATTACHED PLAY EVENTS

Shall be furnished by the Owner and installed by the Contractor.

2.3 PLAY AREA - SPECIFIC INDEPENDENT PLAY ITEMS

Shall be furnished by the Owner and installed by the Contractor.

2.4 SITE FURNISHINGS INSIDE PLAYSCAPE EDGING

Shall be furnished at playscapes only by the Owner and installed by the Contractor.

2.5 SUBSURFACE DRAINAGE FABRIC: 140N non-woven filter fabric as manufactured by Mirafi, Inc., Mirafi, Inc., Charlotte, NC (704) 523-7477 or Architect approved equal.

2.6 PLAY SURFACE DRAINAGE STONE: The playscape surface drainage stone base material shall be crushed stone conforming to ASTM C 33 No. 57, as presented in Table 1.

TABLE 1
GRANULAR BASE
GRADING REQUIREMENTS

ASTM C 33 No 57	
Sieve Size	**Percent Passing**
1 ½ in (37.5 mm)	100
1 in (25 mm)	95 to 100
½ in (12.5 mm)	25 to 60
No. 4 (4.75 mm)	0 to 10
No. 8 (2.36 mm)	0 to 5

PART 3 EXECUTION

3.1 EXAMINATION OF SITE

A. Prior to beginning installation, examine site and existing conditions to verify that site clearing and earthwork operations, including rough and finish grading, have been completed in

accordance with play structure manufacturer's requirements for proper installation of the play structure.

B. Identify to Prime Contractor or Owner any conditions that would prevent installation of play structure in accordance with manufacturer's instructions. Do not begin installation of play structure until unsatisfactory conditions have been corrected. Beginning of installation indicates acceptance of existing conditions.

3.2 CONTRACT INSTALLATION

A. Equipment shall be installed in conformance to the manufacturer's specifications and architectural drawings and specifications contained within this document.

B. At the completion of the project provide a written statement which certifies the playscape has been inspected and is safe for use.

3.3 PLAY STRUCTURES

A. Installed equipment to conform with manufacturer's specifications and IPEMA standards. Installer must be Manufacturer Certified and CPSI to assure proper installation of equipment.

B. Install concrete footings as shown in detail. Top of concrete footing shall be brought to subgrade only and in no case shall they be less than 15 inches below finish grade.

C. Adjust play structure according to manufacturer's instructions. All members shall be vertical or horizontal.

3.4 SUBSURFACE DRAINAGE FABRIC

A. Fasten in continuous strips on top of all playground subgrades, after equipment is installed. Overlap joints by 18" minimum and staple per manufacturer's instructions. Install second layer after drainage stone is placed.

3.5 PLAYGROUND TURF INSTALLATION

A. SafetyFoam subsurface (resilient surface): 1" SafetyFoam for a 5' CFH and 2" SafetyFoam for a 9' CFH.

B. Artificial Turf: The turf will be rolled out in sections, cut around the poles, and seamed together using the micromechanical seaming system as the primary bond.

C. Securing: The turf will be secured around the perimeter. If using nailer boards, 1" staples will be used to secure the turf to the boards. Staples will be placed every 1/2 inch. (See edge details).

D. Protection: Surface installer shall be responsible for the protection of the rubber surface during the installation process. Surface installer shall be responsible for the protection of the surface during the curing period upon completion of the installation.

3.6 ADJUSTING, CLEANING AND PROTECTION

A. Adjust all components after completion of installation to comply with manufacturer's requirements and to provide for safe operation of all items.

B. Clean all surfaces after completion of structure installation, and provide means of preventing unauthorized access to structure until surfacing is installed and/or concrete has cured.

3.7 CLEAN UP

During the contract and at intervals as directed by the Architect and as playscape installation is completed, clear the site of extraneous packaging and debris. Leave the site in a clean, safe, well draining, neat condition.

PART 4 - INSPECTION

4.1 POST INSTALLATION AUDIT

The Contractor will contract with the supplier to have the play equipment Audited after installation and will provide this information, through the Architect or owner, should any installation errors result in non-conformance of the play equipment to the ASTM or CPSC playground safety standards.

A. The Audit shall be performed by a Certified Playground Safety Inspector.

B. The Audit shall be based on;
   1. Handbook for Public Playground Safety, Publication number 325, 1997 U.S. Consumer Product Safety Commission, Washington, DC 20207
   2. Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, Designation F 1487-07ae1, ASTM International, 100 Barr Harbor Dr., West Conshohocken, PA 19428

C. The Audit report shall include:
   1. An inventory of the play equipment giving each play structure an official name and documenting the following information: manufacturer, age group designation, critical fall height (in inches) and a listing of each component type to be audited in the play area.
   2. A summary of non-compliance, beginning with Hazard Priority Rating 1, the most severe, and ending with HPR 3, the least severe. The name of the Play Structure where the non-compliance was found is stated along with the following: the inspection category (along with a short-hand description of the section of standard being reviewed), citation

(of the exact section of the standard), picture (of the non-compliant item) and the inspector's findings.

END OF SECTION 32 30 02

SECTION 32 30 03 - METAL BOLLARDS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of metal bollards is shown on the drawings and as specified in the contract documents.

B. Metal bollards work includes, but is not limited to, the following:
   1. Providing and installing metal bollards and furnishings as noted in the specifications and as detailed.
   2. Cleanup

C. Provide all labor, materials, tools, equipment, and services required to install metal bollards and furnishings as indicated on the plans and as specified.

D. The installation of all new materials shall be performed in strict accordance with the manufacturer’s installation instruction and in accordance with all approved shop drawings and submittals.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 321301 - Site Concrete Work

1.3 REFERENCES

A. Manufacturers Data and Recommended Installation Requirements

1.4 SUBMITTALS:

A. Provide Manufacturer's Product Data (MPD), Material Certificate and samples as noted:
   1. Metal Bollard Cover (¼” nominal wall thickness polyethylene thermoplastic): MPD
   2. Metal Bollard Cover (¼” nominal wall thickness polyethylene thermoplastic): Sample and Color Selection Chart
   3. Reflective Tape: MPD and Sample

1.5 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Construction Review: Notify the Architect when footing location(s) for metal bollards are coordinated to avoid underground utilities and marked in the field.

1.6 QUALITY ASSURANCE

A. Manufacturer's warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

B. Minimum (5) year warranty against fading.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to project site in wrapped, neat, secure condition. Provide means to unload products from delivery trucks.

B. Protect all products and installation area from vandalism, theft, other construction, premature use, etc. until Owner acceptance and Architect sign off.

C. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 METAL BOLLARD

A. Pipe: Shall be galvanized schedule 40 steel pipe, 6 inch ID, 6.625" OD.

B. Concrete: Shall be 4000 psi as specified in Section 321301.

2.2 REFLECTIVE TAPE: Shall be exterior grade, reflective. Standard of quality shall be Scotchgard, as manufactured by 3M or Architect approved equal. Color as noted on detail.

2.3 BOLLARD COVER

A. Shall be made of ¼" nominal wall thickness polyethylene thermoplastic (HDPE). Top shall be domed. Standard of quality shall be as manufactured by Ideal Shield or Architect approved equal. Color shall be selected by Owner, and approved by Architect.

PART 3 - EXECUTION

3.1 INSTALL METAL BOLLARD

A. Shop cut bollard.

A. Locate per plan and install as detailed. Neatly saw cut pavement or install bollards before paving.

B. Auger hole for concrete footing. Set metal bollard in center of hole and brace plumb and vertical.

C. Fill annular spaces around and inside metal bollard with concrete. Dome top of concrete footing and concrete inside metal bollard to shed water. Check for plumb alignment.

D. When concrete has set, remove braces.

E. Install bollard cover and reflective tape per manufacturer's recommendations.

F. Finished metal bollard shall be set plumb. Cover shall be smooth and free of chipped or cracked areas. Protect bollards until accepted.

3.2 CLEAN UP

During the contract and at intervals as required by the contract documents and as directed by the Architect and as metal bollards are installed, clear the site of all extraneous materials, rubbish, and debris. Leave the site in a clean, safe, well-draining, neat condition.

END OF SECTION 32 30 03

SECTION 32 30 04 - TRAFFIC SIGNS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of traffic signs is shown on the drawings.

B. Provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 SUBMITTALS:

A. Provide shop drawings for each different type and size of sign listed in the Traffic Sign Schedule.

B. Provide MPD for signposts, breakaway system, and sign plates.

1.3 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. No work shall be fabricated until shop drawings for the work have been favorably reviewed by the Architect.

C. Construction Review: Notify the Architect when locations for signs are coordinated to avoid underground utilities and marked in the field for review.

D. Provide posts, bolts, splice bars, sign plates and build in coordination with work of other trades.

PART 2 - PRODUCTS

2.1 SIGNS

A. Sign Plate:
   1. Sign Plate shall be aluminum sheets .090" (approximately 3/32") thick, with two coats of Dupont Imron spray semigloss paint.
   2. Letters, numbers, symbols, and arrows shall be engineering grade, (EG) reflective. Sign plates, letters and numbers shall meet the colors and regulations described in the "Manual of Uniform Traffic Control Devices", latest edition, as published by the State of New York Department of Transportation, Division of Traffic and Safety.
   3. The following Traffic Sign Schedule shall apply:

SIGN WORDING	SIGN NO.	SIZE	LETTER SIZE / COLORS
Stop	R1 - 1C	30" x 30"	10"C/White and Red
HC Reserved Parking w/	P4 - 6C	12" x 18"	2" Green/White Blue Background
Van Accessible	P3-8(NY)	12" x 6"	2" Green/White
No Parking Any Time	P1-1	12" x 18"	3"C/Red on White

4. Refer to Traffic Sign Schedule and/or sign details on drawings for sign wording, quantities, and other information.
5. Hardware shall be galvanized.
6. Standard of quality shall be as manufactured by Eastern Metal/USA-Sign, www.usa-sign.com or Architect approved equal.

B. Breakaway Signposts:
1. Shall be minimum 2.5 lbs. / ft high carbon new billet steel (SP-80) U-channel posts with predrilled 3/8" holes at 1" on center.
2. Crashworthy to NCHRP 350 criteria. Meeting FHWA (Federal Highway Administration) for small sign support applications.
3. Lap Splice U-channel Breakaway System shall be 3/8” x ¾” x 5” and sized to post, bar color silver. Special manufacturer designed bolts for lap splice are required.
4. Hot dipped galvanized or Powder Coated Color as directed by the Architect.
5. Standard of quality shall be “Rib-Bak” U-channel signposts as manufactured by NUCOR Steel Marion, Inc. www.nucorhighway.com (800) 333-4011 or Architect approved equal.

C. Rubber Bases (where indicated on plans):
1. Shall be portable sign rubber bases with base weights as manufactured by Rubber Form Recycled Products, www.rubberform.com, (716)-478-0404, or Architect approved equal.

PART 3 - EXECUTION

3.1 INSTALL SIGNS

A. Erect signs plumb. Drive posts into firm ground or bolt to sleeve in pavement areas or concrete footings as detailed. Use driving caps to avoid deforming posts.

B. Mount sign plates at heights detailed. Attach metal sign plates to steel posts securely with 1/4" galvanized allen head screws.

3.2 CLEAN UP

During the contract and at intervals as directed by the Architect and as traffic sign installation(s) are completed, clear the site of extraneous paint, fasteners, concrete, gravel, asphalt, and debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 32 30 04

SECTION 323101 - VINYL CLAD CHAIN LINK FENCE AND GATES

1.0 PART 1. GENERAL

1.1. DESCRIPTION OF WORK:

A. The extent of vinyl clad chain link fence is shown on the drawings and includes, but is not limited to, the following:

1. New vinyl clad chain link fence and gates.

B. Provide all materials, labor, equipment, and services required to accomplish all related work in accordance with the drawings and specifications.

1.2. RELATED WORK SPECIFIED ELSEWHERE:

A. Section 31 22 01 - Site Earthwork

B. Section 32 12 01 - Asphalt Paving

C. Section 32 13 01 - Site Concrete Work

1.3. REFERENCES:

A. ASTM F552 Standard Terminology Relating to Chain Link Fencing

B. ASTM F567 Standard Practice for Installation of Chain Link Fence

C. ASTM F626 Standard Specification for Fence Fittings

D. ASTM F668 Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain Link Fence Fabric

E. ASTM F900 Standard Specification for Industrial and Commercial Swing Gates

F. ASTM F934 Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials

G. ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

H. ASTM F1083 Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

I. ASTM F1184 Standard Specification for Industrial and Commercial Horizontal Slide Gates.

J. WLG 2445 Chain Link Fence Manufacturers Institute, Chain Link Fence Wind Load Guide for the Selection of Line Posts and Line Post Spacing.

1.4. SUBMITTALS:

A. Provide Qualification Experience requirements as specified in "Quality Assurance" of this section. Provide a list of completed projects including Owner contact information.

B. Manufacturer's Product Data (MPD): Manufacturer’s catalog cuts indicating material compliance and specified options.

C. Shop Drawings: For fence, backstops, and gates including plan layout and details illustrating fence heights, location and sizes of posts, finishes, rails, braces, and installation procedures. Provide footing sizes and hardware list.

D. Samples:

1. 4" section of line post with specified vinyl coating.
2. 12" x 12" section of vinyl fence fabric.

E. Provide a copy of manufacturers’ 15-year warranty.

1.5. JOB CONDITIONS:

A. All job conditions in Section 312201 apply.

B. Construction Review: Notify the Architect when fence and gates are staked out.

1.6. QUALITY ASSURANCE:

A. Manufacturer: Company having manufacturing facilities in the United States with five (5) years experience specializing in manufacturing of chain link fence products.

B. Fence Contractor: Contractor having five (5) years experience installing similar projects in accordance with ASTM F567.

C. Tolerances: ASTM current specification and tolerances apply and supersede any conflicting tolerance.

D. Single source: To ensure system integrity, obtain the chain link system, framework, fabric, fittings, gates and accessories from a single source.

1.7. WARRANTY:

A. Provide manufacturer's standard limited warranty that its chain link fence system is free from defects in material and workmanship including cracking, peeling, blistering and corroding for a period of fifteen (15) years from the date of purchase.

2.0 PART 2. PRODUCTS

2.1. GENERAL:

A. Vinyl Chain Link Fence and Gates: Shall conform to Chain Link Fence Manufacturer's Institute specifications. See drawings for sizes of posts and fabric.

B. All posts, rails, fittings, fabric and tension bars shall be vinyl coated galvanized steel, painting of these items will not be acceptable.

C. Color System: All posts, rails, fittings, fabric, hardware, and tension bars shall be black in compliance with ASTM F934.

D. Standard of quality: shall Color Bond II, Class 2b as manufactured by Merchant Metals, (888) 260-1600 or Architect approved equal.

2.2. CHAIN LINK FABRIC:

A. The base metal of chain-link fabric is composed of commercial quality medium high carbon, hot-dipped galvanized steel wire. Core wire tensile strength 75,000 psi.

B. The vinyl coating is securely fused over the galvanized steel wire by the Thermal Fusion process under pressure to 5,000 psi to insure a dense and impervious covering free of voids, having a smooth and lustrous surface appearance. The vinyl coating thickness, 6 mil (0.15 mm) to 10 mil (0.25 mm), zinc coating weight, and wire tensile strength conforms to ASTM F668 Class 2B. The wire shall be vinyl clad before weaving and is free and flexible at all joints. The mesh is measured by the distance between the wires forming parallel sides of the mesh. The height of the fabric, measured from the ends of the knuckles, has a permissible variation of plus or minus one inch.

C. Wire Coating: Only Plasticized Polyvinyl Chloride (PVC) with low temperature (-20 degrees C.) plasticizer, no fillers, extenders or extraneous matter, other than the necessary stabilizers and pigments are used. Colors are stabilized and have a light fastness that withstands a minimum WEATHER-O-METER exposure of 4,000 hours without any deterioration (Test Equipment Operating Light and Water Exposure Apparatus Carbon-Arc Type) ASTM-D 1499. The vinyl covering, in addition, resists attack from prolonged exposure to diluted solutions of most common mineral acids, sea water and diluted solutions of most salts and alkali.

D. Fabric is knuckled at both selvages (top and bottom). Any twisted salvage will be rejected.

Usage	Mesh Size	Break Load of Wire	Thermally Fused -Vinyl Coated Core Wire Gauge

Standard	2" (50 mm)	1290 lbF	9 ga. [0.148" (3.76 mm)]

2.3. STEEL PIPE FRAME WORK:

A. Steel pipe Type I: ASTM F1043 Group IA, ASTM F1083 standard weight schedule 40 hot-dip galvanized pipe having a zinc coating of 1.8 oz/ft² (550 g/m²) on the outside and 1.8 oz/ft² (550 g/m²) on the inside surface. Exterior of pipe to have ASTM F1043 PVC thermally fused color coating, minimum thickness 10 mils (0.254 mm) to 15 mils (0.38 mm). Regular Grade: Minimum steel yield strength of 30,000 psi (205 MPa) [all sizes]

B. Top, Intermediate and Bottom Rails: Top rail is thermally fused vinyl coated galvanized steel pipe in 21 foot lengths jointed by 7" inches long sleeves, vinyl clad, to run continuously along top of fence. Bottom and intermediate rails shall conform to specifications for top rail and are jointed at line posts with vinyl clad boulevard clamps.

C. Line Posts: Line posts are thermally fused vinyl coated galvanized steel pipe. Posts are sufficient length to allow for installation as detailed and are spaced in the line of fence not farther apart than 10 feet.

D. Terminal and Corner Posts: Shall be thermally fused vinyl coated galvanized steel. Each post is of sufficient length to allow for a depth as detailed. Fabric is attached to the terminal post by means of vinyl coated tension bars and held by vinyl coated tension bands. Corner posts are placed at each change in direction or as directed by the Architect. All corner and terminal posts are braced with vinyl-clad galvanized steel 1.66 inch O.D. brace, rail, 10 feet long, with a diagonal 3/8 inch diameter truss rod, and attached to the first adjacent line post.

2.4. FITTINGS:

A. All fittings to be PVC thermally fused color coated having a minimum thickness of 0.006” (0.152 mm) per ASTM F626. PVC color to match fabric and framework. Moveable parts, nuts and bolts to be field coated with PVC liquid touch up after installation.

B. Post caps: ASTM F626 galvanized pressed steel, malleable iron, or aluminum alloy weather tight closure cap for tubular posts. Provide one cap for each post. For top rail, provide line post loop tops to secure top rail.

C. Rail ends: Galvanized pressed steel per ASTM F626, for connection of rails to post using a brace band.

D. Top rail sleeves: 7” (178 mm) PVC coated galvanized steel sleeve per ASTM F626 that allow for expansion and contraction of rail.

E. Wire ties: 9 gauge (0.148") (3.76 mm) vinyl coated galvanized steel wire for attachment of fabric to line posts and rails. Tie wire PVC coated and in compliance with ASTM F626. Color to match fabric color.

F. Brace and tension (stretcher bar) bands: ASTM F626 galvanized 12 gauge (0.105") (2.67mm) pressed vinyl coated steel by 3/4" (19mm) formed to a minimum 300 degree profile curvature for post attachment. Secure bands using minimum 5/16" (7.94 mm) galvanized carriage bolt and nut.

G. Tension (stretcher) vinyl coated galvanized steel bars: One piece lengths equal to 2 inches (50 mm) less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (4.76 mm x 19 mm) per ASTM F626. Provide tension (stretcher) bars where chain link fabric is secured to the terminal post.

H. Truss rod assembly: PVC coated galvanized steel minimum 5/16" (7.9mm) diameter truss rod with pressed steel tightener, in accordance with ASTM F626.

I. Carriage bolts and nuts: Galvanized of commercial quality but not vinyl coated. Provide PVC touchup paint to color coat all nuts and bolts, when fence is completed.

2.5. CHAIN LINK SWING GATES:

A. Swing gates: Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780 then over coated with liquid PVC to match frame. The gate frame members are to be spaced no greater than 8' 0" (2.44 m) apart horizontally or vertically. Exterior members to be 1.900" (48.3 mm) OD pipe, interior members when required shall be 1.660" (42.2 mm) OD pipe. PVC coated pipe to be [Grade 1 ASTM F1083] per section 2.3. Chain link fabric to match specification of fence system. Fabric to be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" (304.8 mm) on center and tied to the horizontal and interior members 12" (304.8 mm) on center using 9 gauge vinyl coated galvanized steel ties per section 2.4.

B. Hinges: Hot dip galvanized powder coated pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180°.

C. Latch: Powder coated galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.

D. Double gates: Provide powder coated galvanized drop rod with center gate stop pipe or receiver to secure inactive leaf in the closed position. Provide powder coated galvanized pressed steel locking latch, requiring one padlock for locking both gate leaves, accessible from either side.

E. Keeper to secure open leafs: Provide galvanized gate hold back keeper for each gate leaf over 5' (1524 mm) wide. Gate keeper shall consist of mechanical device for securing

free end of gate when in full open position. Verify with Owner and Architect prior to installing.

F. Latch, hinges, moveable parts shall be field coated with liquid PVC.

G. Gate posts: PVC color coated Grade 1 pipe ASTM F108 per section 2.3.

2.6. CONCRETE FOOTINGS:

A. Shall be 4,500 psi as specified in Section 32 13 01, 2.3, 2.4.

3.0 PART 3. EXECUTION

3.1. SITE EXAMINATION AND PREPARATION:

A. Ensure property lines and legal boundaries of work are clearly established.
B. Survey of fence location to be provided by Site Contractor.

C. Clearing: The Site Contractor shall clear, grub and remove vegetation/debris for the fence installation area.

D. Verify areas to receive fencing are completed to final grade with finished elevations shown on the drawings.

3.2. CHAIN LINK FRAMEWORK INSTALLATION:

A. Install chain link fence system in accordance with ASTM F567, manufacturer's instructions, and Chain Link Fence Manufacture's Institute specifications.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.

C. Space line posts uniformly maximum ten (10’) feet on center.

D. Excavation: Drill holes of diameters and spacings shown, for post footings in firm, undisturbed or compacted soil.

1. Excavate hole depths as detailed when in firm, undisturbed soil. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
2. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the site, as directed.

E. Setting Posts: Remove all loose and foreign materials from sides and bottoms of holes.

1. Center and align posts in holes. Install posts plumb, in neat, straight lines, and with minimal waviness of top railing.

2. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
3. Trowel finish tops of footings, and dome surface to direct water away from posts. Extend footings for posts as detailed.
4. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with curing material, or other acceptable method.

F. Concrete Strength: Allow concrete to attain at least 75% of its minimum 28-day compressive strength, but in no case sooner than 7 days after placement, before rails, tension bands or fabric is installed. Do not stretch and tension fabric and wires, and do not hang gates until the concrete has attained its full design strength.

G. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.

H. Bracing: Install horizontal brace and truss assembly at mid-height or above for fences 6’ (1829 mm) and over at each fabric connection to the terminal post. The diagonal truss rod is installed at the point where the brace rail is attached to the terminal post and diagonally down to the bottom of the adjacent line post. Place the truss rod in tension by adjusting the turnbuckle.

I. Top rail: Install in lengths of 21’ (6.400 m). Connect ends with sleeves forming a rigid connection, allow for expansion and contraction.

J. Center Rails: Install mid rails between line posts and attach to post using rail end or line rail clamps. A center rail is required for fabric height 8'-0" and over.

K. Bottom Rails: Install bottom rails between posts and attach to post using rail end or line rail clamps.

L. Fasteners: Peen ends of bolts or score threads to prevent removal of nuts. Paint all exposed surfaces, nicks or scratches, nuts and bolts, with liquid black PVC touch up paint.

3.3. CHAIN LINK FABRIC INSTALLATION:

A. Fabric: Install fabric on security side or play side for athletic facilities as directed by the Architect, pull fabric taut; thread the tension bar through fabric and attach to terminal posts with tension bands spaced maximum of 15” (381 mm) on center and attach so that fabric remains in tension after pulling force is released. Install fabric so that it is above finish grade as detailed.

B. Secure fabric using wire ties to line posts at 12" on center and to rails and braces 12" on center. Tie wire shall be secured to the fabric by wrapping it two (2), 360 degree turns around the chain link wire pickets. Cut off any excess wire and bend back so as not to protrude so as to avoid injury if a pedestrian may come in contact with the fence.

3.4. CHAIN LINK GATE INSTALLATION

A. Swing gates: Installation of swing gates and gate posts shall be per ASTM F567. Direction of swing shall be as shown on drawings and/or as directed by the Owner. Gates shall be hung plumb in the closed position with minimal space from grade to bottom of gate leaf. Double gate drop bar receiver shall be set in a minimum concrete footing 12" diameter by 48" deep. Gate leaf holdbacks shall be installed on all double gates and all gate leafs greater than 5' (1524 mm) in width as directed by the Owner, if required.

3.5. CLEAN UP:

A. During the contract and at intervals as directed by the Architect and as chain link fence, backstop and gate installation is completed, clear the site of all extraneous concrete, gravel, fence material or debris. Leave the site in a clean, safe, well draining, neat condition.

END OF SECTION 32 31 01

SECTION 32 92 01 SODDED LAWNS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the lawn work is shown on the drawings. The lawn work limits equal the Contract Limit Line except as noted on the drawings. Non-paved, non-roofed areas within the Contract Limit Line shall receive five (5") inches settled depth of topsoil and lawn sod. Existing lawn areas that are not disturbed require no additional work. Lawn types as shown on the drawings are defined as follows:

1. Lawn: Strip and stockpile topsoil, remove debris, replace 5" topsoil and sod.

B. Lawn work includes, but is not limited to, the following:
1. Placing and spreading stockpiled topsoil
2. Importing, placing, and spreading topsoil
3. Sod bed preparation and placing
4. Sodding lawns
5. Fertilizing
6. Maintenance: See watering, mowing, fertilizing, core aerating, weed control, grow in and other specific requirements.
7. Clean Up

C. Provide materials, labor, equipment, and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation (Topsoil Stripping)

B. Section 312201 - Site Earthwork

1.3 REFERENCES

A. ASTM D4972 - Standard Test Method for pH of Soils

B. ASTM D5268 - Standard Specification for Topsoil Used for Landscaping Purposes

C. ASTM D422 and D1140 - Standard Test Method for Particle Size Analysis of Soils

D. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effect

E. ASTM F1647 - Standard Test Method for Organic Material Content of Athletic Field Rootzone Mixes.

F. ASTM F1632 - Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sportsfield Rootzone Mixes

G. ASTM F2060 - Standard Guide for Maintaining Cool Season Turfgrasses on Athletic Fields

H. National Turfgrass Federation, Inc.

I. National Turfgrass Evaluation Program (NTEP).

J. Cornell Universities: Sportsfield Management Guidelines

K. Turfgrass Producers International: Guideline Specifications to Turfgrass Sodding, latest edition.

1.4 SUBMITTALS: (See Section 311201, 1.5)

A. Furnish name of Landscape Contractor or Nurseryman to perform lawn work and a list of completed projects including contact information for each project demonstrating compliance with applicable qualification requirements outlined in 1.5 "Quality Assurance" of this specification section.

B. Provide Material Certificates and MPD for:
1. Sod species and source, location for sod producer
2. Limestone
3. Fertilizers

C. Provide Topsoil Test Report (for Onsite and Imported Topsoil): Submit test results from Architect approved independent testing laboratory on their letterhead. Report shall:
1. Certify soil texture, organic content, and particle size analysis.
2. Chemical analysis testing nitrogen, phosphorus, potassium, calcium, magnesium, cation exchange capacity, base saturation percentages, micronutrients, and acidity (pH).
3. Provide timing and rates of soil additives, liming and fertilizers. (Materials and procedures regarding soil amendments and fertilizers specified in this section are approximate.) Adjust all soil amendments to comply with test results based on actual soil tests and as directed by the Architect at no additional cost to the Owner.

D. Provide letter on Contractor’s letterhead certifying that only topsoil from the above tested source was used on the project.

E. Provide schedule for review and approval as outlined under "Sequence and Scheduling" of this specification section.

1.5 QUALITY ASSURANCE

A. General Lawn Contractor: Work shall be contracted to a single, established Landscape Contracting or Nursery firm having sufficiently experienced crews, supervisor(s), specialized equipment, and an excellent record of performance on completed lawn and projects of comparable size, scope, and quality. Provide expert turfman to direct the work in the field on a regular, daily basis. The expert turfman shall be employed by the same company engaged in the installation of the lawn and athletic field work for a minimum of five (5) years.

B. Sod Standards: Comply with the Turfgrass Producers International: Guideline Specifications to Turfgrass Sodding, latest edition.

C. Testing: If required by the Architect for poor lawn grow in, engage an Architect approved independent, qualified New York State testing service and turfgrass specialist to evaluate Contractor grow in practices and materials used. Pay for all testing/inspection services, materials, and manpower to correct lawn areas as approved by the Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod:
1. Cut, deliver, and install sod within a 24-hour period. Sod cutting and shipping shall be coordinated with the sod installers.
2. Do not harvest or transport sod when moisture content may adversely affect sod survival.
3. Protect sod from sun, wind, and dehydration prior to installation.
4. Do not tear, stretch or drop sod during handling and installation.
5. Store sod materials at site in an orderly manner at location(s) acceptable to the Architect.

B. Fertilizer:
1. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place as approved by the Architect.

1.7 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Lawn Work:
1. Perform lawn work after planting, fine grading and other work affecting the ground surfaces in the lawn work areas has been completed satisfactorily.
2. Where practical, the Owner will provide a connection to the water system such as, but not limited to, existing yard hydrants, building hose bibs, etc. If this source is insufficient, not available or practical to provide a source of sufficient water to meet the requirements herein, the Contractor shall secure a water source sufficient to meet the water requirements herein such as, but not limited to, municipal hydrants, water truck, etc. at no additional cost to the Owner.
3. Contractor shall provide all watering equipment and appurtenances such as, but not limited to, meters, backflow preventer, labor, hoses, sprinklers, irrigation, and watering equipment.

4. Calendar dates for sodding under "Sequence and Scheduling" of this specification section shall apply.
5. Place sod only when ground surface is free of mud, frost, snow and ice.
6. Protect newly sodded lawns from vehicles, vandalism, or trespass. Provide temporary fencing or barriers as required.

C. Construction Review:
1. Upon completion of topsoil spreading and sod bed preparation, notify Architect to review work.
2. The Architect may review fine graded areas by the Contractor to check for surface smoothness and general compliance with grading requirements. Fill or cut by hand raking or other acceptable means to achieve smooth, even well-draining lawn surfaces free of "bird baths" and breaks in grade as directed by the Architect at no additional expense to the Owner.
3. Review of any fine graded lawn areas by Architect shall not alleviate the Contractor of his responsibility for conforming to the required grades as shown on the drawings, nor be misconstrued as final acceptance of lawn work.

1.8 SEQUENCING AND SCHEDULING

A. Schedule: Prior to construction, provide a schedule which addresses the following lawn thresholds involving erosion control stabilization and competitive use of playfields:
1. Sodding Installation: The Contractor may invoice for 50% of the approved schedule of value breakdown at the time of acceptable installation.

a. Unless otherwise directed in writing by the Architect, sod lawns from April 1 to May 15, and from August 15 to October 1. Sodding between May 16 and August 14 is not acceptable unless adequate water supply is available and applied to the turfgrass as required herein and approved by the Architect.
b. Proceed with and complete sodding as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.

2. Substantial Completion: The Contractor may invoice for 25% of the approved schedule of value breakdown at the time of substantial completion as described in Part 3, "Standards For Substantial Completion Of Lawns" of this specification section. At this time, the Architect may issue the Notice of Termination to satisfy the NYS DEC stabilization requirements. The date of substantial completion is anticipated approximately 60 days after lawn installation presuming all Contractor maintenance operations have been vigorously performed.
3. Final Acceptance: The Contractor may invoice for the final 25% of the approved schedule of value breakdown at the time of final acceptance as described in Part 3, "Standards For Final Acceptance Of Lawns" of this specification section. The date of final acceptance is anticipated approximately 30 days after substantial completion presuming all Contractor maintenance operations have been vigorously performed.
4. Owner Maintenance: After final acceptance of the lawns, the Owner will maintain for 1 to 3 growing seasons to reach competitive maturity and beyond per ASTM F2060.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Source: Provide from off site, Architect approved source, when stripped, stockpiled, and amended quantity is inadequate to provide five (5") or eight (8") inches settled depth of topsoil for all lawn areas at no additional cost to the Owner.

B. Texture and Content: Provide topsoil conforming to the following:
1. Soil texture and content:

a. Sandy loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material. Topsoil shall be entirely free of dense material, hardpan, clay, stones over 3/4" in diameter, sod, or any other objectionable foreign material, including but not limited to, glass, debris, toxins, hazardous wastes and chemicals (such as atrizene or muriatic acid within the past seven (7) years) that may be injurious to humans, animals and plant materials.

b. Organic Matter: Containing not less than 5% or more than 10% organic matter in that portion of a sample passing a 1/4" sieve when determined by the wet combustion method on a sample dried at 105 degrees F.

2. pH Value: Containing a pH value within the range of 6.0 to 7.0 on that portion of the sample which passes a 1/4" sieve.
3. Soluble salt content: Not higher than 500 parts per million.
4. Sieve Analysis for general lawn work: Shall be screened or rock picked to meet the following gradation:

Sieve Designation	% Passing
3/4"	100
1/4"	97-100
No. 200	20-50 (of the 1/4" sieve)

5. Sieve Analysis for Athletic Field lawn work: Shall be mechanically screened by an onsite screening facility provided by the Contractor prior to placing and spreading. Athletic field topsoil shall meet the above sieve requirements.

C. No lawn shall be sodded on topsoil that has been chemically treated until sufficient time has elapsed to permit dissipation of all toxic materials. The Contractor shall assume full responsibility for any loss or damage to turfgrass sod or the inability to grow a sufficient stand of grass from sod, as indicated herein, arising from improper use of chemicals or due to failure to allow sufficient time to permit dissipation of toxic residues, whether or not such materials are specified herein.

2.2 SOD

A. Sod shall conform to NYSDOT Item 713-14 and be approved nursery grown mineral soil sod with 80% Tall Fescue and 20% Kentucky Bluegrass blend with a minimum (4) varieties. Muck grown sod is NOT acceptable. Installation of plastic netting is NOT acceptable.

B. Provide well-rooted, healthy sod, free of diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density, and free of weeds, undesirable grasses, stones, roots, thatch and extraneous material viable and capable of growth and development when planted. Sod is considered free of weeds when less than five (5) weeds are found per one hundred (100 s.f.) square feet.

C. Thickness of Cut: Furnish sod machine cut at a uniform soil thickness of 0.60 inch at the time of cutting and of supplier's standard width, length, and thickness: uniformly 1" to 1-1/2" thick with clean cut edges. Measurement of thickness shall exclude top growth and thatch. Mow sod before stripping.

D. Mowing Height: Before stripping, sod shall be mowed uniformly at a height of 1 to 1-1/2 inches.

E. Thatch: Sod shall be relatively free of thatch, up to 1/2 inch allowable (un-compressed).

F. Pad Size:
1. For General Lawn: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 1/2 inch on width and plus or minus 5% on length. Broken pads and torn or uneven ends will not be acceptable.
2. For Athletic Fields and Other Such Large Areas: Sod shall be thick-cut "big" rolls of 250 s.f. Maximum allowable deviation from standard width and lengths shall be plus or minus 1/8" on width and plus or minus 1/2% on length. Broken and torn or uneven rolls will not be acceptable.

G. Strength of Sod Sections: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section.

H. Standard of Quality: Shall be Premium Sod supplied by Batavia Turf (585) 548-2552, Sky High Turf Farms (315) 687-6510, Saratoga Sod Farm (518) 664-5038, Lakeside Sod (716) 741-2877 or Architect approved equal.

2.3 LIMESTONE

A. Shall be ground limestone in the producer's standard bags containing not less than 85% total carbonates and conforming to the following gradations:

Sieve Designation	% Passing
No. 100	50-100
No. 20	100

B. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

2.4 FERTILIZER

A. For Starter Fertilization: Immediately prior to sodding, fertilize with a commercial starter fertilizer, granular, non-burning product, with not less than 90% organic slow acting, micro nutrients and 1% iron, guaranteed analysis commercial fertilizer. Fertilizer ratio shall be: (1-2-1). Apply at a rate of 0.33 - 0.66 lbs of nitrogen (N) per 1,000 sf.

B. For Subsequent and Final Fertilizations: Apply commercial fertilizer, poly coated granular non-burning product with not less than 90% organic slow acting, guaranteed analysis
1. For Spring and Fall Lawn Work: Fertilizer ratio shall be: (3-0-1). Apply at rate of 1.5 - 2 lbs nitrogen (N)/1,000 s.f.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify limits of lawn and other types of ground cover materials in the field with drawings. Also, any imported and screened topsoil areas. Notify Architect of discrepancies prior to proceeding with lawn work.

B. Examine finish surfaces, grade, topsoil quality, and depth.

C. Do not start lawn work until unsatisfactory conditions are corrected to the satisfaction of the Architect.

3.2 SPREAD TOPSOIL

A. Limit preparation to areas which will be immediately sodded.

B. Perform topsoil spreading operations only during dry weather.

C. To insure a proper bond with the topsoil, disc, harrow, decompact, or otherwise scarify and loosen the lawn subgrade to a depth of five (5") inches before spreading topsoil.

D. Spread topsoil to ensure a minimum settled depth of five (5") inches in lawn areas.

3.3 PREPARE GENERAL LAWN AREAS

A. Perform a pH test, sieve, and nutrient analysis of the topsoil and advise the results to the Architect prior to adding limestone or other soil amendments. Soil amendments shall be

uniformly incorporated into the top five (5") inches of topsoil by discing, harrowing or other approved methods.

B. Remove debris and stones 3/4" or larger by handpicking, fine tooth aluminum grading rakes, and mechanized stone picker. When topsoil has hardened, cultivate soil to a five (5") inch depth by plowing, discing, harrowing, or otherwise scarifying and loosening the topsoil.

C. Grade lawn areas to a smooth, free draining even surface with a loose, moderately coarse texture. Scarify, rake, level, and roll with a light static roller as necessary to obtain true, even lawn surfaces and fill depressions as required to drain. Correct irregularities in the surface resulting from tillage operations to prevent formation of depressions or water pockets.

D. Cultivate soil to provide a firm bed of minimum of five (5") inches deep, free of clods, stones, or foreign matter over 3/4" in diameter from the top of soil. Do not move heavy objects except necessary lawn making equipment over the lawn areas after the soil is prepared unless it is again loosened and graded. Remove stones and all debris greater than one 3/4" in diameter during cultivation. Level undulations and irregularities in the surface.

E. For pH correction provide adjusted rate of application as recommended in Topsoil Test Report submittal. For low pH correction: Add ground limestone at the rate indicated by the soil test. For high pH correction: Materials and application rates shall be determined by appropriate soil tests.

F. Place starter fertilizer at the rate of 0.33 - 0.66 lbs. of nitrogen (N) per 1,000 sf. and mix into full depth of topsoil.

G. Rake area with fine toothed aluminum grading rake before placing sod to obtain a smooth surface at the proper elevation. Drag area with a wood float to level out minor humps and hollows. Beds shall have a smooth friable uniform surface, free of areas ponding water.

3.4 SODDING

A. Notify Architect that sod bed is ready for review as specified in Job Conditions. Obtain Architect's approval prior to sodding.

B. Moistening the Soil: During periods of higher than optimal temperature for species being specified and after unevenness in the soil surface has been corrected, the soil shall be lightly moistened immediately prior to laying the sod.

C. Sod immediately after preparation of bed and Architect's approval.

D. Lay sod to form a solid mass with tightly-fitted joints in strips parallel to contours. Butt ends and sides of sod strips. Do not overlap edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with finish grade of adjacent curbs, pavements, drainage structures and lawn areas.

E. Do not lay dormant sod or install sod on soil surfaces that are hot, dry, saturated or frozen.

F. When sodding slopes, install initial row of sod in a straight line, beginning at bottom of slope. Place subsequent rows parallel to and lightly against previously installed row.

G. Sod strips laid in drainageways must meet the finished grades shown on the drawings.

H. Sod abutting existing lawn shall meet flush with top of sod pad (soil and thatch). Remove excess topsoil as necessary to meet flush.

I. Stake sod in lawn swales and on lawn slopes 3H to 1V (horizontal to vertical) and steeper to prevent slippage. Use two (2) biodegradable stakes per square yard of sod. Stakes are to have their flat sides against the slope and be driven flush with sod surface.

J. Roll with light static lawn roller to ensure contact with subgrade.

K. As sodding is completed in anyone section, water sod thoroughly to a depth sufficient to ensure the underside of the new sod pad and topsoil immediately below the pad is thoroughly wet. Contractor is responsible to ensure there is an adequate water supply available prior to installation. Do not allow sod to dry out.

3.5 MAINTENANCE

A. Maintenance by Contractor begins as soon as lawns are sodded. Protect lawns from drought, washout and wind erosion. In general, maintain new installed lawn areas, including watering, fertilizing, core aerating, spot weeding, overseeding, mowing, applications of herbicides, fungicides, insecticides, and re-sodding until a full, uniform, healthy, vigorous stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the Architect. Specifically:

1. Watering Sodded Lawns:

    a. First Week: Soil on sod pads shall be kept moist. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least four (4") inches.

2. Second and Subsequent Weeks: Contractor shall provide water to the lawns as required to maintain adequate moisture, in the upper four (4") inches of soil, necessary for the promotion of deep root growth until final acceptance. After 2nd mowing, water two (2) times weekly until thoroughly established.
3. Protect: Protect lawn areas against trespass, vandalism and routine pedestrian traffic and Owner maintenance traffic by temporary fencing or other means.
4. Repair: Repair, rework, resod and overseed (as originally specified for that area) areas that have washed out, eroded, do not germinate and are vandalized or otherwise damaged. Overseeding rates are to be adjusted to 6 lbs. of seed per 1,000 s.f.
5. Mow: Initial mowing shall begin when the blade height reaches 2" and the soil will bear the weight of the lawn mower. Use mowers with low impact tires. For the first 3 mowings cut the grass blades to 1.5 inches. After that mow the grass when it reaches a height of about 3.5" to a height of about 2.5". Never remove more than 1/3 of the grass

blade at any one mowing. A minimum of three (3) to five (5) mowings are required (approximately once per week after the initial germination period to final acceptance). Notify the Architect of dates in writing as mowing is performed. Excess clippings shall be carefully raked so as not to remove healthy grasses, and removed.

6. Core Aerating: Between mowings three (3) and four (4), core aerate lawns about three (3") inches on center minimum three (3") inches deep to ensure aggressive root growth. This will require multiple passes at different directions to achieve 16 to 20 holes 3/4" to 1" diameter per square foot. Sweep scattered plugs off paved areas onto adjacent lawn areas. Pulverize plugs during subsequent mowing operations. Provide additional core aerating after the 10th mowing as directed by the Architect to expedite the lawn maturation process. Moisten field by thoroughly watering the topsoil profile, several days in advance of coring to facilitate proper penetration of the topsoil.
7. Fertilizer: Immediately after core aerating, between mowings three (3) and four(4), apply subsequent fertilizer at the rate of 1.5-2 lbs./1,000 s.f. Apply a final fertilizer just prior to final acceptance at the same application rate.
8. Weed Control: When infestation of weeds or crabgrass develops, treat infestation by hand weeding or herbicides control appropriate to the area. Furnish and install weed chemical control as recommended by manufacturer. Herbicides controls must be acceptable to the Owner. Obtain and pay for permits. Use as directed by the manufacturer and applicable laws, codes, ordinances and regulatory requirements. Under NO circumstances is it acceptable to seed or overseed over Nutsedge, Crabgrass or other grassy/broadleaf weeds.

B. Maintenance by the Contractor continues through the certificate of substantial completion to final acceptance by the Architect as described below. Maintenance by Owner begins after final acceptance of the lawn.

3.6 STANDARDS FOR SUBSTANTIAL COMPLETION OF LAWNS: Review to determine substantial completion of lawns will be made by the Architect, upon request. Provide notification at least five (5) working days before requested review date.

A. Lawn areas will be substantially complete provided requirements, including maintenance, have been complied with. A healthy, vigorous, uniform, partially mature stand of lawn is established free of weeds, undesirable grass species, disease, and insects. With proper watering and maintenance as indicated herein, this should culminate after an approximate 60-72 day period for initial germination with average temperatures above 40□F. Grass roots shall have matured to a minimum of 1½" depth as determined by the Architect when core samples are taken.

B. Lawn areas shall not have more than 10% dead/bare spots.

C. Contractor shall provide a written copy of all maintenance activities performed up to this date.

D. The architect will prepare a written punch list of items which need correction prior to final acceptance.

3.7 STANDARDS FOR FINAL ACCEPTANCE OF LAWNS: Review to determine final acceptance of lawns will be made by the Architect, upon request. Provide notification at least five (5) working days before requested review date.

A. Lawn areas will be acceptable provided requirements, including maintenance, have been complied with. A healthy, vigorous, uniform, full stand of lawn is established free of weeds, undesirable grass species, disease, and insects. Grass roots shall have matured to a minimum of 2" depth as determined by the Architect when core samples are taken.

B. Any lawn which contains disease, more than 1% dead/bare spots, or any dead/bare area greater than one (1) square foot shall be rejected and the unacceptable area(s) repaired as originally specified at no additional cost to the Owner.

C. In the event the Contractor fails to complete the punch list items within a 30 day period with average temperatures of 40□F after the time of Substantial Completion, the Contractor shall be liable to the Owner for any additional costs including those charged by the Architect.

D. Contractor shall provide a written copy of all maintenance activities performed during the contract up to final acceptance of lawns.

3.8 CLEAN UP

During the contract and at intervals as directed by the Architect and as lawn work is completed, clear the site of extraneous materials, rubbish, and debris. Leave the site in a clean, safe, neat, well-draining condition.

END OF SECTION 32 92 01

SECTION 33 40 01 - STORM DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the storm drainage is shown on the drawings.

B. Storm drainage work includes, but is not limited to:
1. Trenching, backfilling and compaction
2. Piping, jointing and fittings
3. Connection(s) to other storm system(s)
4. Adjusting existing storm structures and other utilities
5. Storm Water Management Trench (SMT)
6. Quality Control Testing and Submittals
7. Clean Up

C. Provide materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 311201 - Site Preparation

B. Section 312501 - Erosion, Sediment and Pollution Control

C. Section 312201 - Site Earthwork: For Elaboration of Shoring and Bracing, Dewatering, Backfilling, Compaction and Field Quality Control Testing.

D. Section 321201 - Asphalt Paving

E. Section 321301 - Site Concrete

1.3 REFERENCES

A. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity Flow Applications.

1.4 SUBMITTALS:

A. Manufacturer's Product Data (MPD) required for:
1. Pipe, joints and fittings
2. Stormwater Management Trench for Pipes and Geotextiles

B. Quality Control Submittals:
   1. Provide trench drain as-built survey as described in "Quality Assurance" of this specification section.
   2. Provide a list of completed projects including Owner's contact information for each project, demonstrating compliance with applicable "Experience Requirements" specified in "Quality Assurance" of this specification section.
   3. Provide Infiltration Testing Report(s) for infiltration basins, infiltration trenches, drywells and bio-retention areas as described in "Quality Assurance" of this specification section. Stormwater facility design may be adjusted by Architect depending on results of tests.

1.5 QUALITY ASSURANCE

A. When trench drain installation is complete verify the elevation of the trench drain by survey method with shots taken at ten (10') feet on center. Plot points and review with Architect prior to proceeding further.

B. Drainage Contractor Experience Requirements:
   1. Submit business name, business owner(s) name(s), business address, telephone number, website and/or email address signed by the Contractor/Subcontractor who meets the qualifications set forth in this specification and is proposed by the Contractor to perform the Drainage for this Project.
   2. Provide a list of at least four (4) Drainage work projects of comparable size, scope and quality completed successfully by the proposed Contractor/Subcontractor within the past three (3) years that includes the date completed, project Owner's name and current contact information, including telephone numbers and email addresses.

1.6 JOB CONDITIONS

A. Job conditions in Section 312201 apply.

B. Plan and execute piping work so that trenches are not opened for more than two hundred (200') feet in advance or left unfilled more than one hundred (100') feet behind. No overnight open excavation is permitted.

C. CERTIFICATION OF STORM SYSTEM: The storm system must be installed and certified by a licensed County Plumber when required by municipal code or state law.

D. CONSTRUCTION REVIEW: Notify the Architect when the storm system is approximately 25%, 50% and 95% complete.

1.7 SUBSTITUTIONS

A. Contractor is responsible for design of any substituted structures, systems or units in Section 334001 by a NYS licensed engineer. Submit to Architect for approval.

B. If a product is being submitted as a substitution to the specified product; the the Prime Contractor shall submit and request a product material substitution with his/her bid. The Prime Contractor shall at a minimum provide the following for review by the Architect and Owner:
   1. All submittals as specified herein
   2. Product comparison
   3. Cost Information (including proposal of change in Contract Sum)
   4. Contractor's certification that proposed substitution complies with requirements in the Contract Documents
   5. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

PART 2 - PRODUCTS

2.1 BACKFILL

A. Backfill for pipes, Stormwater Management Trenches (SMT), drainage structures, and drywells shall be as specified in Section 312201.

2.2 STORM STRUCTURE APPURTENANCES

A. Precast Concrete Adjustment Rings: Shall be square or round depending on structure. Built in accordance to ASTM C478, and made of 5,000 psi concrete and reinforced steel, meeting ASTM A615 Grade 60, as manufactured by Fort Miller, Zeiser Wilbert, Jefferson Concrete or Architect approved equal.

B. Steps: Shall be copolymer polypropylene plastic reinforced with 1/2" diameter grade 60 steel as manufactured by M.A. Industries or Architect approved equal.

C. Mortar: Shall be lime, cement, and clean sand, 1:1:3 measured by volume, meeting ASTM C1107.

D. Coal Tar Sealer: Shall be used to coat the inside and outside of installed precast risers. Standard of quality shall be Hydralastic 836 as manufactured by W. R. Meadows, (800) 342-5976 or Architect approved equal.

E. Locking Device: For structures shall be Type E counter sunk bolts (minimum of two per cover). Standard of quality shall be "McGard Intimidator" lock bolts as manufactured by Neenah Foundry Company or Architect approved equal.

2.3 PIPING

A. High Density Polyethylene Pipe (HDPE): Shall be heavy duty dual wall, high density polyethylene (HDPE) pipe conforming to ASTM F2648 for 4" to 60" pipe with a smooth inner wall, annular corrugations, "n" flow rating of 0.012, and HS-20 loading capability with minimum one (1') foot cover for 4" to 48" pipe and two (2') foot cover for 6-" pipe. Joint

couplings for pipe shall be connected using a bell &spigot joint, meeting AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil tight and gaskets, when applicable, shall meet the requirements of ASTM F477. Standard of quality shall be N-12 Mega Green ST IB pipe as manufactured by Advanced Drainage Systems, Inc., 800-821 6710, or Architect approved equal.

2.4 STORM WATER MANAGEMENT TRENCH

A. 4" to 10" Pipe: Shall be flexible, heavy duty, corrugated interior and exterior, perforated (or slotted) polyethylene pipe meeting requirements ASTM F-667 for 4" to 10" diameters. Standard of quality shall be ADS with prefabricated snap fittings as manufactured by Advanced Drainage Systems, Inc., (614) 457-3051 or Architect approved equal. Size pipe(s) as noted on drawings.

B. 12" to 24" Pipe and Fittings: Shall be heavy duty polyethylene (HDPE), corrugated interior and exterior, perforated pipe meeting requirements AASHTO M252, AASHTO M294, Type C. Standard of quality shall be ADS with prefabricated fittings as manufactured by Advanced Drainage Systems, Inc., (614) 457-3051 or Architect approved equal. Size pipe(s) as noted on drawings.

C. 4" to 12" Fittings: Shall be injection molded fittings with a smooth interior and exterior meeting requirements AASHTO M252 for 4" to 10" diameters, and ASTM M294 or ASTM F2306 for 12" diameter. Standard of quality as manufactured by Advanced Drainage Systems, Inc., (614) 457-3051 or Architect approved equal. Size pipe(s) as noted on drawings.

D. Backfill: Shall be clean, washed No. 1 stone as indicated in Section 312201.

E. Soil Separation Fabric: Shall be a commercially manufactured non- woven polypropylene filter fabric. Standard of quality shall be Mirafi 140N as manufactured by TenCate or Architect approved equal.

PART 3 - EXECUTION

3.1 CONNECTIONS TO OTHER STORM SYSTEM

A. Connections to existing Storm Systems:
   1. Coordinate with the Municipality and other agencies having jurisdiction. Notify governing agency in writing a minimum of two (2) weeks prior to anticipated date of connection so that field procedures and installation can be reviewed by a representative of the Municipality. Copy letter to Architect.
   2. Locate accurately per drawings. Verify inverts and sizes. Notify Architect of any discrepancies immediately, prior to installation.
   3. Make connections securely, watertight and as detailed. Provide all necessary couplers and fittings to make connections.

3.2 TRENCHING AND BACKFILL

A. Reference: Refer to Section 312201 for elaboration of shoring and bracing, supporting, rock, dewatering, and backfilling.

B. Trenching:
   1. Remove material encountered to the depth shown on drawings and with a maximum width of fourteen (14") inches and a minimum of nine (9") inches each side of conduit springline as detailed. Provide safe shoring, sheeting, and bracing. Remove before backfilling. Backfill excess or over excavation as described in Section 312201 to proper line and grade. Compact to 95% density.
   2. When unsatisfactory soil materials are encountered at design elevations, immediately notify the Architect in writing via email. Continue as directed by the Architect. When conditions are not a result of Contractor's negligence, additional excavation may be directed by the Architect and paid for as a Change Order on a unit price basis in accordance with specification Section 312201.

C. Water: Remove from trenches; drain trenches and/or provide sump pits and pumping equipment as necessary to keep trenches stabile and dry at no additional cost to the Owner.

D. Soft Material in Trench Bottom: Dry out and stabilize or remove and replace with imported granular backfill material to achieve firm, stable foundation at no additional cost to the Owner.

E. Rock: Remove boulders and rock within one (1'-0") foot of pipe. Provide one (1'-0") foot of granular backfill between rock and conduits at no additional cost to the Owner.

F. Backfill: Conform to details on drawings and as specified. Compact backfill to a minimum 95% of optimum density.

3.3 ADJUSTING EXISTING UTILITIES

A. Adjust existing utilities as necessary to maintain utility service and meet finished grade conditions. Existing utilities include but are not limited to; hydrants, water valves, gas valves, electric pull boxes and manholes, storm drainage structures, cable and telephone markers, fiber optic cables, sanitary cleanouts and manholes, and guy wires.

3.4 PIPE LAYING

A. Shall be in accordance with ASTM D2321 and pipe manufacturer requirements.

B. Bed pipe in granular backfill or concrete as shown on drawings, compact under springline of pipe to assure firm support. Align pipe to line and grade given in plan and profile. Set batter boards or set by laser level.

C. Pipe joints shall be made using the flexible gaskets specified. Clean bell end of any debris and lubricate. Remove protective wrap from gasket. Do not allow lubricated section to touch dirt or backfill. Foreign matter could adhere to surface and compromise joint integrity. Push together

pipes so that the gasket is firmly seated in the socket. Always push spigot end into bell, not bell end into spigot.

D. Place backfill around pipes to equal depths on both sides as work progresses.

E. Attach flared end sections as detailed to pipe outlets, draw up bolts tight to provide firm anchorage.

F. "Lamp" pipes to check for misalignment and breakage after backfilling has been completed. Replace pipes deviating more than 1/2" from line or grade at no additional cost to the Owner.

3.5 STORM WATER MANAGEMENT TRENCH

A. Use only pipe which is undamaged and flexible (have not been exposed to direct sunlight for more than six (6) months causing brittleness, cracking or splitting prior to placement). Pipe shall be stored for at least twenty-four (24 hrs.) hours in an area having a minimum temperature of fifty (50) degrees F.

B. Trenching: Remove material encountered to the depth shown on the drawings. Provide shoring, sheeting, and bracing as necessary for safety; remove before backfilling.

C. Install continuous envelope of soil separation fabric around the backfill up to subgrade of finish material. Fill stone to proper elevation and wrap top. Overlap fabric minimum twenty-four (24") inches at top and joints. Secure fabric joints to prevent separation and infiltration of adjacent materials and separation of fabric.

D. Install pipe sloped as shown on drawings.

E. Compact backfill to maximum density of adjacent materials.

3.6 FIELD QUALITY CONTROL

A. Density Testing: Perform all density testing for piping trenches and structure backfill as indicated in Section 312201.

3.7 CLEAN UP

A. During the contract and at intervals as directed by the Architect and as storm drainage is completed, clear the site of pipe, trench and backfill material, stone, concrete and debris. Leave the site in a clean, safe, well draining, neat condition.

B. Clean drainage structures, storm water management trenches and pipes: Clean out sediment, rubbish, construction debris, and foreign objects thoroughly, immediately prior to final acceptance.

END OF SECTION 33 40 01