SOUTH FIRE DISTRICT

445 RANDOLPH ROAD
MIDDLETOWN, CT 06457

SOUTH FIRE DISTRICT BUILDING RENOVATIONS Phase II

FOR BID
100% Submission

October 4, 2023

VOLUME-3

SITE AND CIVIL

ARCHITECT:

Landmark Architects, P.C.
100 Riverview Center, Suite 204
Middletown, CT 06457
P: 860-346-1333

FACILITIES ENGINEER:

INNOVATIVE ENGINEERING SERVICES, LLC
33 North Plains Industrial Road
Wallingford, CT 06492
P: 203-467-4370
F: 203-793-7729

CIVIL ENGINEER & LANDSCAPE ARCHITECT:

CARDINAL ENGINEERING SERVICES
180 Research Parkway
Meriden, CT 06450
203-238-1969

ENVIRONMENTAL ENGINEER:

ENSAFE
1233 Silas Deane Highway
Wethersfield, CT 06109
P: 860-665-1140

STRUCTURAL ENGINEER:

RICHARD A. SAMBOR, PE
139 High Ridge Road
Avon, CT 06001
P: 860-673-9604

TABLE OF CONTENTS

ARCHITECTURAL & STRUCTURAL SPECIFICATIONS

SECTION 101423

BUILDING SIGNS

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide all material, labor, equipment, and services necessary to furnish and deliver work of this section as shown on the Drawings, as specified and as required by job conditions including, but not limited to the following:

1. Concrete Foundation
2. Masonry Piers

1.2 RELATED SECTIONS

A. Section 310010 – Earthwork
B. Section 321300 – Site Concrete

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and mounting details for each sign type and copy specified. Include sign designs, dimensions, copy style, and copy heights.

1. For signs supported or anchored to permanent construction provide setting drawings for anchor bolts and other anchors to be installed under other sections.

B. Product Data: Catalog sheets, specifications, and installation instructions for each sign type and mounting type specified.

C. Samples:

1. Full size of each sign type and copy type specified including mounting accessories. These samples will be returned and, if approved, may be used in the Work.
2. Color Samples: Manufacturer's standard colors for sign material and finishes specified.

D. Quality Control Submittals:

1. Sign Fabricator Qualification Data: Certified statement from the fabricator indicating the capacity and number of years products similar to those specified for the Work have been produced.

1.4 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: The firm manufacturing the signs shall have been regularly producing signs similar to those specified for the Work, for a minimum of 5 years. The firm shall also have sufficient production capacity to produce the quantity of sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver sign units to Site with protective covering in place.

B. Leave protective covering on sign units until completion of installation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Empire Digital Signs, 200 Ridge Rd Suite 212, Rochester, NY 14615, Phone 585.435.0740, www.empiredigitalsigns.com or Approved Equivalent

2.2 SPECIFICATIONS

A. Double-faced sign includes live sign area and masonry or faux-masonry piers which structurally support live sign area.

B. LIVE SIGN AREA

1. Live sign area refers to any graphical or material area of the sign except the structural masonry piers. The live sign area includes a static lightbox with text that reads “SOUTH FIRE DISTRICT” above a built-in LED display. These features are present on both sides of the double-faced sign.

C. STATIC LIGHTBOX

1. Static lightbox contains “SOUTH FIRE DISTRICT” text in a flat or three-dimensional form on a plain background or material which makes text easy to read and identify from a distance. The text area of the sign is visually separated from the LED display below it.

“SOUTH FIRE DISTRICT” font is sans-serif and in accordance with the Americans with Disabilities Act.

D. LED DISPLAY

1. LED display is weatherproof and waterproof. LED display has a pixel pitch of 12mm or better with a viewing distance of approximately 30-50 feet. LED display includes full-color capabilities.

2. LED display utilizes wifi, radio frequency, cellular cloud-based software or underground cables to display text, images, and other graphic content as communicated through an underground ethernet cable or a wireless device mounted on building with unobstructed view of the sign.

3. LED display supports multiple file formats, including standard image and text files such as PNG, JPG, MOV files, or comes equipped with independent message-creation software to create and display original images or text.

E. WIFI CONNECTION – Must be able to connect to building's WiFi at the location shown on the plan.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine surfaces to receive the signs for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. MASONRY PIERS

1. Masonry or faux-masonry piers structurally support the sign.
2. Masonry of faux-masonry matches in color and texture the appearance of the main structure's masonry. Masonry or faux-masonry piers are ornamented at cap and base with appropriate detail to match the main structure.

B. Install the work of this Section in accordance with the sign manufacturer's printed installation instructions, except as otherwise indicated or specified.

C. Secure sign units to surfaces and locations as recommended by the Sign Manufacturer.

END OF SECTION 101423

SECTION 311001 - SITE WORK – GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide site preparation in accordance with the Contract Documents and coordinated with work by others. Work of this Section shall conform to the requirements of the General Conditions, Supplementary Conditions, and Special Requirements.

1.2 SCOPE

Work may include preparatory work that must be performed prior to performing the work of other Sections. This work includes, but is not limited to, the following:

A. Installation of soil erosion control measures as detailed on the project plans.
   1. Cleaning site of debris, grass, trees, and other plant life in preparation for site or building earthwork.

B. Protection of existing structures, trees, or vegetation indicated on Contract Documents to remain.
   1. Stripping topsoil from areas that are to be incorporated into limits of project and where so indicated on Construction Drawings.
   2. Stockpile topsoil on site for later use in fine grading and final planting areas as indicated on Construction Drawings.
   3. Demolition of those existing site improvements required to be removed for the installation of proposed site improvements. Demolition debris to be disposed of off-site by the Contractor in an approved manner.

C. Related Work Specified In Other Sections:
   1. Submittals: Division 1 – Section 013300
   2. Earthwork: Section 310010
   3. Erosion Control: Section 312513

1.3 QUALITY ASSURANCE

A. Comply with the applicable Building Code and standards listed under Section 014200.

B. Construct temporary erosion control systems as shown on Construction Drawings, or as required at the direction of the Architect and/or Engineer, to protect adjacent properties and water resources from erosion and sedimentation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Tree Pruning Compound: Waterproof, antiseptic, elastic and free of kerosene, coal tar, creosote, and other substances harmful to plants.

B. Herbicides: A chemical or a combination of chemicals, which, according to the manufacturer's label, will kill stumps and roots. Deliver herbicides to the site in original manufacturer's containers indicating type and percentage of chemical, and application instructions.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection

1. Prevent damage to buildings, pavement, pipes, conduits, poles and other structures above and below ground that are adjoining or included in the contract area. Repair damage resulting from the contractor's negligence.
2. Protect existing trees and shrubs not to be removed. Cut back to point of branching all broken branches and skinned areas. Treat exposed wood with tree pruning compound.
3. Store materials and equipment in cleared areas away from tree roots. Prevent employees and equipment from trampling over woodland, existing planting, and established lawns.
4. Locate and identify existing utilities that are to remain and protect from damage.
5. Conduct operations with minimum interference to public or private access and facilities. Maintain ingress and egress at all times and clean or sweep roadways daily as required by the City of New Haven or governing authority. Dust control shall be provided with sprinkling systems or equipment provided by Contractor.
6. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed, it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
7. Provide traffic control as required, in accordance with the U.S. Department of Transportation's "Manual on Uniform Traffic Control Devices" and applicable state highway department requirements.

3.2 REMOVALS

A. Clear areas required for access to site and execution of work.

B. Required removal items include , but are not limited to:

1. Existing bituminous pavements
2. Concrete flatwork and curbing for utility and apron installations
3. Fences
4. Existing foundation wall and footings
5. Segmental retaining wall (partial removal for installation of new retaining wall system)
6. Debris and unsuitable soils as encountered during excavation activities

C. Unless otherwise indicated on Construction Drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid ponding of water. Satisfactory fill material shall be placed in accordance with Section 310010.

D. Remove grass, trees, plant life, stumps, and other construction debris from site to dump site that is suitable for handling such material according to state laws and regulations.

3.3 PRUNING

A. Prune trees where indicated of undesirable wood with the resulting crown shaped to the natural habit of the tree. Remove all damaged branches, diseased/dead branches, and branches interfering with healthy growth. Scar trace bark wounds as directed. All cuts shall be cleanly made with sharp tools, flush with the parent trunk or limb. Paint cuts over three (3) inches in diameter with tree pruning compound.

3.4 EROSION CONTROL

A. Soil erosion control measures shall be furnished, installed, and maintained by the Contractor as indicated on the project plans. The Contractor shall also furnish, install and maintain additional control measures not shown on the plan that may be required by the Engineer.

3.5 CLEAN UP

A. Dispose of all diseased Elm wood within four (4) days after cutting by burning or by other methods approved by the Connecticut Department of Energy & Environmental Protection.

B. Remove and dispose of all logs, tree trimmings, and debris from property. Leave work area in a neat uncluttered condition.

END OF SECTION 311001

SECTION 31 00 10 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Site Work General: Section 310001.

B. Erosion Control: Section 312513.

C. Asphalt Paving: Section 321216.

D. Lawns & Grasses: Section 329219.

1.2 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.

1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd. Concrete building foundations and concrete slabs, not indicated, with a volume greater than 1.0 cu yd shall be classified as rock.
    a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition, which can be removed with an excavator or backhoe, equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
    b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
3. Subgrade Surface: Surface upon which subbase or topsoil is placed.
4. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
5. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
6. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at “Optimum Moisture Content” when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
8. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
9. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Owner’s Representative.

10. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line shall be considered the same.

1.3 SUBMITTALS

A. Product Data:
   1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.

B. Samples: Submit samples as follows. Take the samples in the presence of the Owner's Representative, and submit to the Owner's Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:
   1. Select Granular Material: 50 - 60 lb. (Two Samples).
   2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
   3. Selected Fill: 40 - 50 lb.
   4. Cushion Material: 30 lb.
   5. Crushed Stone: 30 lb

C. Quality Control Submittals:
   1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Owner's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
   2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
   3. Other Aggregates: Name and location of source and soil laboratory test results.

1.4 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary steel fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements: When freezing temperatures are predicted, do not excavate to final required elevations for pipe, conduit or equipment requiring concrete work unless concrete can be placed immediately. Retain enough earth over the bottom elevation of excavations to prevent frost penetration.

C. Cold Weather Requirements:
   1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.

2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Owner's Representative and the following procedures shall be followed:
   a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement.
   b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
   c. At the end of the workday, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Owner's Representative.
   d. Following workday, remove the insulated blankets and/or strip the area of all frozen material as specified previously.
   e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 - PART 2 PRODUCTS

2.1 MATERIALS

Note: All materials shall conform the applicable sections of Form 818 – State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction.

A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified in Section M.02.01 of form 818 – Grade A.

B. Subbase Course: Comply with the gradation and material requirements specified in Section M.02.02 of form 818 – Grade B.

C. Processed Aggregate: Comply with the gradation and material requirements specified in Section M.05.01 of form 818.

D. Bedding Material: Comply with the gradation and material requirements specified in Section M.08.01-21 of form 818.

E. Coarse Aggregate
   1. No. 1 Coarse Aggregate: Crushed Stone that complies with material requirements of Section M.02.01 of Form 818 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.7	90-100
1/4 inch	6.35	0-15

2. No. 2 Coarse Aggregate: Crushed Stone that complies with material requirements of Section M.02.01 of Form 818 and meets the following gradation.

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

F. Stone Dust: Comply with the gradation and material requirements of Section M.01.01 of Form 818 and identified in the grading table as "dust." The material used shall not be reclaimed material.

G. Marker Tape: FL Industries Blackburn/Holub's Type YT6, or Seton Nameplate Corporations Type 6 ELE, imprinted with message suited to item buried below.

2.2 GEOTECHNICAL FABRICS

A. Filter Fabric (GeoTextile)

1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
2. Separation for foundation drains, underdrains, undercuts: GeoTex 801, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.

PART 3 - PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

A. Clear and grub the site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.2 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service: Shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five feet laterally beyond the structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Utilities located outside the limits specified above may be abandoned in place provided their ends are adequately plugged as described below.

1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

3.3 EXCAVATION

A. Excavate earth as required for the Work.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified in the Contract Drawings contact the Owner's Representative.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).

1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Owner's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.

F. Footings and Foundations: The foundation-bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.

G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:

1. Interior Floors: 6-inches unless otherwise indicated.
2. Exterior Slabs and Steps: 12-inches unless otherwise indicated.

H. Pipe Trenches and/or Bell and Spigot Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe.

1. Trench in Rock: Excavate an additional 6 inches below bottom of pipe for bed of cushion material under the piping.

I. Conduit, Cable, Tubing and Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.

J. Underground Storage Tanks: Excavate as required to install tank and to accommodate special backfill.

K. Open Ditches: Cut ditches to cross sections and grades indicated.

L. Pavement: Excavate to subgrade surface elevation.

M. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Engineer.

1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls shall be reported immediately to the Engineer before any concrete or backfilling Work commences.

N. Notify the Owner's Representative upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Owner's Representative will be made on 3 working days notice.

3.4 DEWATERING

A. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

B. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.5 PLACING FILTER FABRIC

A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on filter fabric.

D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.6 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Remove all asphalt pavement in its entirety from areas requiring the placement of fill or break up old pavements to a maximum size of four inches. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.

B. Excavations: Backfill as promptly as practicable, but only after approval by the Owner's Representative. Do not backfill with excavated material unless it meets the requirements of this Section.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.

1. Place fill and backfill against foundation walls and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum six-inch thick (loose depth) layers.
2. For Open Graded Stone/Clean Stone (Item B-12, No. 1 crushed stone, No. 2 crushed stone, etc.) in access of six inches: Material must be wrapped in separation fabric.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer. Place backfill against walls of structures containing basements or crawl spaces only after the first floor structural members are in place.

E. Under Exterior Concrete Slabs and Steps:

1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place 12 inches of select granular material over subgrade surface.

F. Under Interior Concrete Slabs:

1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place six inches of select granular material over subgrade surface.

G. Under Pavements and Walks:

1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
2. Subbase Material: Place as indicated.

H. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.

I. Plastic Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.

J. Copper Tubing and Steel Gas Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, six inches on both sides, and 4 inches over top of pipe. Complete balance of backfill as specified.

K. Rigid Non-Metallic Conduit: Except where concrete encasement is required, place cushion material a minimum of four inches deep under conduit, four inches on both sides, and 12 inches over top of conduit. Complete balance of backfill as specified.

3.7 COMPACTION

A. All materials with exception of open graded stone (No. 2 Coarse aggregate, No. 1 Coarse aggregate, Item B-12, etc.):

1. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than three percent drier or more than two percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
    a. Structures (entire area within ten feet outside perimeter): 95 percent.
    b. Concrete Slabs and Steps: 95 percent.
    c. Landscaped Areas: 90 percent.
    d. Pavements and Walks: 95 percent.
    e. Pipes and Tunnels: 95 percent.
    f. Pipe Bedding: 95 percent.
2. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be re-compacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved

B. Open graded Stone: Place material in maximum twelve inch lifts. Each lift shall be raked smooth and compacted through several passes of a walk behind vibratory roller. Compaction Testing is not required.

3.8 GRADING

A. Rough Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of four inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks and Pavements: Place and compact subbase material as specified. Shape surface of areas to required line, grade and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
3. Building Slabs: Grade subbase material smooth and even, free of voids, compacted as specified to within 1/4 inch above or below required subbase elevation.

3.9 RESTORATION

A. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

3.10 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from State property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

B. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to approved areas. Contractor is responsible for disposing excess material.

3.11 FIELD QUALITY CONTROL

A. Compaction Testing: Notify the Owner's Representative at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by the Owner's Representative to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Owner's Representative. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.12 PROTECTION

A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION 310010

SECTION 31 25 13 - EROSION CONTROL

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310010

B. Site Work: Section 310001

1.2 REFERENCES

A. Erosion and Sediment Control Guidelines: Conform to the latest edition of "2002 Connecticut Guidelines for EROSION and SEDIMENT CONTROL" by Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Energy and Environmental Protection (CTDEEP). Refer to these guidelines for construction and maintenance of all items (Temporary and Permanent Structural, Vegetative and Biotechnical) included in the Storm Water Pollution and Prevention Plan (SWPPP).

B. Storm Water Management: Conform to the latest edition of "Connecticut Stormwater Quality Manual" prepared by the Connecticut Department of Energy and Environmental Protection.

1.3 RESPONSIBILITY

A. Install and maintain the temporary storm water and diversion control items as shown on the drawings before starting any grading or excavation and maintain compliance of all Storm Water Pollution Plan/SPDES regulations. Provide any temporary sediment and erosion control measures that may be required within limits of the work, including any staging areas, throughout construction in conformance with the plan, and as directed by the Owner's Representative. Place the permanent control practices required before the removal of the temporary storm water diversion and control items.

B. During construction, conduct operations in such a manner as to prevent or reduce to a minimum any damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations which become polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.

C. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.

D. The Contractor shall adhere to all requirements of the Storm Water Pollution Prevention Plan as presented on the plans. Comply with all applicable CTDEEP regulatory requirements.

E. The Contractor will submit copies of certificates documenting that on-site workers have completed a CTDEEP endorsed Erosion & Sediment Control training as required by General Permit DEEP-WPED-GP-015.

1.4 DESCRIPTION

A. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing soil and erosion control measures as shown on the contract documents or as ordered by the Owner's Representative during the life of the contract to provide erosion and sediment control.

B. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion. These are used during construction to prevent offsite sedimentation. Temporary structural measures shall include check dams, construction road stabilization, stabilized construction entrance, dust control, earth dike, level spreader, perimeter dike/swale, pipe slope drain, portable sediment tank, rock dam, sediment basin, sediment traps, silt fence, storm drain inlet protection, straw/hay bale dike, access waterway crossing, storm drain diversion, temporary swale, turbidity curtain, water bars or other erosion control devices or methods as required.

C. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include debris basins, diversion, grade stabilization structure; land grading, lined waterway (rock), paved channel, paved flume, retaining wall, riprap, rock outlets, and stream bank protection or other erosion control devices or methods as required.

D. Vegetative measures shall include brush matting, dune stabilization, grassed waterway, vegetating waterway, mulching, protecting vegetation, seeding, sod, straw/hay bale dike, stream bank protection, temporary swale, topsoil, and vegetating waterways.

E. Biotechnical measures shall include wattling (live fascines, brush matting, brush layering, live cribwall, and branchpacking) vegetated rock gabions, live staking, tree revetment, and fiber rolls.

F. Weekly inspections will be completed by the Owner's Representative. Comply with and correct all deficiencies found as a result of these inspections. At the end of the construction season when soil disturbance activities will be finalized or suspended until the following spring, the frequency of the inspections may be reduced. If soil disturbance is completely suspended and the site is properly stabilized, a minimum of monthly inspections must be maintained. The stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Weekly inspections must resume no later than March 15.

1.5 DEFINITIONS – TEMPORARY STRUCTURAL MEASURES

A. Check Dam: Small barrier or dam constructed of stone, bagged sand or gravel to reduce velocity of flow.

B. Construction Road Stabilization: Stabilization of construction roads to control erosion.

C. Stabilized Construction Entrance: A stabilized pad of aggregate underlain with geo-textile where traffic enters a construction site to reduce or eliminate tracking of sediment to public roads.

D. Dust Control: Prevent surface and air movement of dust from disturbed soil surfaces.

E. Earth Dike: A temporary berm or ridge of compacted soil, located to channel water to a sediment-trapping device.

F. Level Spreader: A non-erosive outlet for concentrated runoff to disperse flow uniformly across a slope.

G. Perimeter Dike/Swale: A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area to prevent runoff from entering a disturbed area and preventing sediment-laden runoff from leaving a construction site.

H. Pipe Slope Drain: A structure placed from the top of a slope to the bottom of a slope to convey runoff without causing erosion.

I. Portable Sediment Tank: A compartmented tank to which sediment laden water is pumped to retain sediment before pumping the water to adjoining drainage ways.

J. Rock Dam: A rock embankment located to capture sediment.

K. Sediment Basin: A barrier constructed across a drainage way to intercept and trap sediment.

L. Sediment Traps: A control device formed by excavation to retain sediment at a storm inlet or other points of collection.

M. Silt Fence: A barrier of geo-textile fabric installed on contours across the slope to intercept runoff by reducing velocity. Replace after 1 year.

N. Storm Drain Inlet Protection: A semi-permeable barrier installed around storm inlets to prevent sediment from entering a storm drainage system.

O. Straw/Hay Bale Dike: Intercept sediment-laden runoff by reducing velocity. Replace after 3 months.

P. Access Waterway Crossing: A structure placed across a waterway to provide circulation for construction purposes.

Q. Storm drain Diversion: The redirection of a storm drain line or outfall channel for discharge into a sediment-trapping device.

R. Temporary Swale: A temporary excavated drainage swale.

S. Turbidity Curtain: A flexible, impenetrable barrier used to trap sediment when construction occurs within water bodies or along a shoreline.

T. Water Bars: A ridge or channel constructed diagonally across a sloping road or right-of-way.

1.6 DEFINITIONS – PERMANENT STRUCTURAL MEASURES

A. Diversion: A parabolic or trapezoidal swale with a supporting ridge on the lower side constructed across a slope to intercept and convey runoff to stable outlets at non-erosive velocities.

B. Debris Basin: A barrier or dam constructed across a waterway to form a basin for catching and storing sediment or debris that gives protection downstream.

C. Grade Stabilization Structure: A structure to stabilize the grade by providing channel linings that can withstand high velocities.

D. Lined Waterway (rock): A waterway lined with stone to dispose of high velocity runoff.

E. Paved Channel (concrete): A waterway lined with concrete to dispose of high velocity runoff.

F. Paved Flume: A concrete lined channel to convey water down a steep slope.

G. Retaining Wall: A structural wall constructed to prevent soil movement down steep slopes.

H. Riprap: A layer of stone designed to protect slopes that are subject to erosion.

I. Rock Outlets: Rock placed at the outlet end of culverts, conduits or channels.

J. Stream Bank Protection: Stabilization of eroding stream banks through use of riprap, gabions or pre-cast concrete units.

1.7 DEFINITIONS – VEGETATIVE MATERIALS MEASURES

A. Brush Matting: Hardwood brush layered along a stream bank with a grid of stakes and wire. This acts as a mulch for seedlings established in the bank.

B. Dune Stabilization:

C. Grassed or Vegetating Waterway: A parabolic or trapezoidal channel below adjacent ground level stabilized by vegetation to convey water without causing erosion.

D. Mulches: Hay, straw, wood cellulose, fiber mats, flexible growth medium and other materials approved by the Owner's Representative.

E. Protecting Vegetation: Protecting trees, shrubs, ground cover and other vegetation from damage.

F. Temporary Seeding: Erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

G. Permanent Seeding: Grasses established and combined with shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.

H. Sod: Used where a quick vegetative cover is required.

I. Straw/Hay Bale Dike: Intercept sediment-laden runoff by reducing velocity. Replace after 3 months.

J. Stream Bank Protection: Stabilization of eroding stream banks through use of vegetation.

K. Temporary Swale: A temporary excavated drainage swale.

L. Topsoil: Placed before permanent seeding or sod is installed.

1.8 DEFINITIONS – BIOTECHNICAL MATERIALS MEASURES

A. Vegetative Rock Gabions: A combination of vegetation and rock gabions for slope stabilization. Live branch cuttings are layered through the gabion protruding beyond the face of the gabion.

B. Live Fascines: Bundles of branches staked into shallow trenches, which are then filled with soil. They are oriented along a contour and placed in multiple rows.

C. Brush Matting: Hardwood brush layered along a stream bank with a grid of stakes and wire. This acts as a mulch for seedlings established in the bank.

D. Live Staking: Large stakes sharpened at the bottom end and forced vertically into the ground.

E. Brush Layering: Stabilize slope areas above the flow line of stream banks. Long branches are placed with cut ends into a terraced slope.

F. Live Crib Wall: A combination of vegetation and structural elements used along streams where flowing water is a hazard. Layers of logs are alternated with long branches protruding out between them.

G. Tree Revetment: Used for bank stabilization by placing tree trunks and branches overlapped and anchored to absorb energy, reduce velocity and capture sediment.

H. Branch Packing: Alternates live branch cuttings and tamped backfill to repair small localized holes in slopes. Used for areas less than 4’ deep and 6’ wide.

I. Fiber Roll: A coconut fiber, straw, or excelsior woven roll encased in a netting of jute, nylon, or burlap to dissipate water energy and provide a medium for introduction of herbaceous vegetation. Anchor into a bank and provide suitable backfill behind the roll where vegetation can be planted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plant Materials for biotechnical slope protection: Locate stands of specified species and obtain approval to harvest material from these stands or obtain from managed production beds that are maintained for commercial distribution. Install all plant materials within 8 hours of cutting or provide proper storage.

1. Shrub willows: “Streamco” purpleosier willow and “Bankers” dwarf willow.
2. Redosier Dogwood

B. Seeding: Permanent see Section 02930

2.2 COMPANIES – TEMPORARY STRUCTURAL

A. Mirafi, 365 South Holland Drive, Pendergrass, GA, 30567, (888) 795-0808, www.mirafi.com.

B. North American Green, 14649 Highway 41 North, Evansville, IN 47725, (800) 772-2040, www.nagreen.com.

C. Siltdam Inc., P.O. Box 960, Brockton MA, 02303, (800) 699-2374, www.spilldam.com.

D. Nedia Enterprises, Inc., 22187 Vantage Pointe Place, Ashburn, VA 20148, (888) 725-6999, www.nedia.com.

E. Belton Industries, 5600 Oakbrook Parkway, Norcross GA., 30093, (800) 225-4099, www.beltonindustries.com.

F. KriStar, 1219 Briggs Ave., Santa Rosa, CA 95401, (800) 579-8819, www.kristar.com.

G. Rolanka International Inc., 155 Andrew Drive, Stockbridge GA 30281, (800) 760-3215, www.rolanka.com.

H. Apex Resources Inc., 12910 Shelbyville Road, Louisville, KY 40243 (888) 677-2739, www.apexr.com.

I. MonoSol, LLC, 707 E. 80th PL., Merrillville, IN 46410 (800) 237-9552, www.terraloc.com.

2.3 COMPANIES – BIOTECHNICAL

A. Rolanka International Inc., 155 Andrew Drive, Stockbridge GA 30281, (800) 760-3215, www.rolanka.com.

B. Nedia Enterprises, Inc., www.nedia.com.

C. Kristar (800) 579-8819.

PART 3 - EXECUTION

3.1 WORK AREAS

A. The Owner's Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Owner's Representative may increase or decrease this area of erodible earth material exposed at one time as determined by his analysis of project, weather and other conditions. The Owner's Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor's demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.

B. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.

C. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall, apply rye grass at a rate of 1 lb/ 1000 sq.ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5

lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/ 1000 sq. ft. or wood fiber hydromulch at the manufacturer's recommended rate. Hay or straw shall be anchored.

D. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.

E. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.

F. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION 312513

SECTION 321216 - ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310010.

1.2 STANDARDS

A. State of Connecticut, Department of Transportation (CTDOT): Standard Specifications for Roads Bridges and Incidental Construction – Form 818.

1.3 SUBMITTALS

A. Product Data: Manufacturer's name, specifications, and installation instructions, for each item specified.

B. Quality Control Submittals:
   1. Plant name and location of asphalt concrete supplier.

1.4 PROJECT CONDITIONS

A. Environmental Requirements: As noted in Section 4.06.03 of CTDOT – Form 818

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphalt Concrete Paving: Conform to Section 4.06 of form 813 - Hot Mix Asphalt.

B. Asphalt Cement Tack Coat.

PART 3 - EXECUTION

3.1 ASPHALT CONCRETE PAVING

A. Construct asphalt pavement in accordance with Section 4.06.03 of Form 818.

B. Apply asphalt cement tack coat at the recommended rate between all Asphalt Concrete Paving Courses and for the paving fabric.

END OF SECTION 321216

SECTION 321300 - SITE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide all materials, labor, equipment, and services necessary to furnish and deliver work of this Section as shown on the Drawings, as specified and as required by job conditions including, but not limited to, the following:

1. Concrete curbs.
2. Concrete Sidewalks.
3. Concrete Driveway aprons
4. Concrete steps with concrete cheekwalls.
5. Concrete footings for site improvements.
6. Miscellaneous concrete slabs and pads.
7. Concrete Light Pole Foundations

1.2 RELATED SECTIONS

A. Section 310010 – Earthwork.

1.3 STANDARDS

A. State of Connecticut, Department of Transportation (CTDOT): Standard Specifications for Roads Bridges and Incidental Construction – Form 818.

1.4 QUALITY ASSURANCE

A. Codes and standards: All work shall be done in accordance with all local governing regulations having jurisdiction. Unless otherwise specified herein, in Division 3, or by local ordinance, all work shall be done in accordance with the latest edition of ACI Building Code 318, ACI Manual of Standard Practice 315, and ACI Specifications for Structural Concrete 301.

B. Workmen: all workers shall be thoroughly trained and experienced in the necessary crafts, and completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.5 SUBMITTALS

A. Submit under provisions of Division 1 – General Requirements.

B. In accordance with the General Requirements, submit samples, materials certifications, manufacturer's product data and test reports as hereinafter required.

C. Submit concrete mix designs.

1.6 JOB CONDITIONS

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

B. Provide flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete materials: comply with requirements of applicable Section s of Article M.03.01 of Form 818 for concrete materials, admixtures, bonding materials, curing materials, and others as required.

B. Concrete mix, design and testing: comply with requirements of applicable sections for concrete mix design, sampling, and testing, and quality control Form 818, and as herein specified.

C. Design mix to produce normal weight concrete, consisting of portland cement, aggregate, air-entraining admixture and water to produce the following properties:
   1. Compressive strength: 4,000-psi minimum at 28 days.
   2. Slump range: 2" - 4".
   3. Air content: 5% - 7%.

D. Forms: steel, wood or other suitable material 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. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

E. Welded wire mesh: welded plain cold drawn steel wire fabric conforming to ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to the Architect.

F. Reinforcing bars: deformed bars of new billet steel conforming to ASTM A 615, grade 60, unless otherwise shown.

G. Water: clean water suitable for drinking purposes and free from injurious amounts of mineral and organic substances.

H. Joint filler: pre-molded, non-extruding joint filler conforming to ASTM D-1751, 1/4" and 1/2" thick as required.

I. Sub-base course: Stone and gravel materials conforming to the requirements of CTDOT Standard Specs Section

J. Base course: Processed aggregate conforming to the requirements of CTDOT Standard Specs Section

K. Filter fabric: Conform of CTDOT – Form 818.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the subgrade and the conditions under which site concrete is to be installed. Installation shall not proceed until all unsatisfactory conditions, if any, have been corrected.

3.2 SUBGRADE PREPARATION

A. Remove loose material from compacted subgrade surface immediately prior to placing concrete.

B. Grade and prepare subgrade to smooth surface parallel to finish grade and to proper elevation. No humps or hollows will be permitted. Roll with a 3-wheel power roller weighing not less than 10 tons.

C. Remove soft and yielding materials, which will not compact readily when rolled or tamped. Replace with crushed stone, gravel, or other approved materials. Ram or roll until level with adjacent grade.

D. Check elevations and position of all utility structures, valves, etc. that lie within the areas to receive concrete pavements. Make or have made any adjustments required to properly line up and set these elements with regard to the finish work.

E. Subgrade shall be smooth, hard and dry, prior to installation of the sub-base course. Notify the Architect following completion of subgrade preparation to allow for inspection and compaction testing. Do not proceed with installation of the sub-base course until approval by the Architect.

3.3 INSTALLATION OF SUB-BASE COURSE

A. Sub-base course: install to requirements of CTDOT 818 Standard Specs Section

B. Thickness of compacted sub-base course shall be as detailed. Sub-base courses greater than 6” in thickness shall be placed and compacted in two courses of equal depth.

3.4 INSTALLATION OF BASE COURSE

A. Base course: install to requirements of CTDOT Standard Specs Section

B. Thickness of compacted base course shall be as detailed.

C. Finished base course shall be thoroughly compacted and moistened as required.

3.5 FORM CONSTRUCTION

A. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to the following tolerances:
   1. Top of form units: not more than 1/8" in 10'.

2. Vertical face: not more than 1/4" in 10' on longitudinal axis.

C. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage to the finish surface.

3.6 REINFORCEMENT

A. Storage: bars and mesh shall be free from scale, oil, ice and structural defects, and kept in this condition on the job site. Bars and mesh shall be stored out of contact with the ground.

B. Appliances: adequate chairs and other devices shall be used to maintain proper elevation of bars and mesh reinforcing at all times. All chairs and other devices shall be galvanized. Continuous mesh reinforcing shall be lapped at least one wire space.

C. Preparation: all reinforcing steel within the limits of 1 days pour shall be in place and firmly wired before concrete pouring starts. Bending of bars by use of heat will not be permitted.

D. Placement: locate, place, and support reinforcement in accordance with all applicable requirements of ACI-318-77.

3.7 CONCRETE PLACEMENT – GENERAL

A. Placement of concrete shall be according to the accepted standards of the A.C.I.

B. Do not place concrete until subgrade and forms have been checked for line and grade. Moisten subgrade as required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they have been brought to the required grade and alignment.

C. Place concrete using methods, which prevent segregation of the mix and with as little re-handling as possible. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing dowels and joint devices.

D. Deposit and spread concrete in a continuous operation between joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

3.8 JOINT PLACEMENT

A. General: construct expansion, score (weakened plane/contraction) and construction joints as detailed, as shown on the Drawings and in accordance with the accepted practice of the A.C.I. Provide bridging where necessary to pour concrete panels in sizes as indicated on the Drawings.

B. All joints shall be constructed true to line with face perpendicular to surface of the concrete unless otherwise specified or detailed. Construct transverse joints at right angles to the centerline.

C. Score (weakened plane/contraction) joints: provide score joints, sectioning concrete into areas as detailed and as shown on the Drawings. Construct joints 1/4" wide by depth as detailed by grooving top portion of fresh concrete with a recommended cutting tool and finishing with a jointer.

D. Construction joints: place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.

E. Construct joints as shown, or if not shown, use standard metal key-way-section forms.

F. Expansion joints: provide and install pre-molded joint filler for expansion joints abutting curbs, inlets, structures, walks, walls, other fixed objects and as shown on the Drawings. Locate expansion joints at 20' o.c., or as detailed.

G. Extend joint fillers full width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer is used, place top of joint filler flush with finished concrete surface.

H. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

I. Protect the top edge of joint filler during concrete placement with wood strip, metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

3.9 CONCRETE PAVEMENTS, SLABS AND PADS

A. Install sub-base and base courses over previously prepared subgrade. Thoroughly compact sub-base and base courses and moisten.

B. Construct and install forms as required and detailed.

C. Place concrete. Consolidate, tamp, screed and finish true to line. Provide joints as detailed.

D. Round edges of pavements and all joint edges with an approved tool. Eliminate tool marks on concrete surface.

E. Finish horizontal surfaces as detailed and as shown on the drawings.

3.10 CONCRETE CURBS

A. Construct as detailed at locations as shown on Drawings. All concrete curbs that occur adjacent to concrete pavements shall be constructed integrally with pavements as detailed.

B. Accurately place and brace formwork with tops at finish elevations and curved sections on the true radii with radial joints.

C. Locate 1/2" expansion joints as shown on the Drawings or at 15' maximum intervals and wherever curbing abuts walls, structures, existing curbing, etc.

D. Finish exposed surfaces as detailed.

3.11 CONCRETE STEPS

A. Construct to details at locations as shown on the Drawings.

B. Accurately place and brace formwork with tops at finish elevations. Check proper pitch on treads to ensure positive drainage.

C. Install gravel base course in one course over previously prepared subgrade. Thoroughly compact gravel base course and moisten.

D. Place reinforcement as detailed and required.

E. Place concrete. Consolidate, tramp, screed, and finish true to line.

F. Provide score, construction, and expansion joints as detailed and required.

G. Install stair tread nosings as detailed and as per manufacturer's recommendations.

H. Finish all surfaces as detailed.

3.12 CONCRETE FINISHING – HORIZONTAL SURFACES

A. General: after striking off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and re-float repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing as detailed. Methods defined as follows:

1. Light broom finish: draw a fine-hair broom across concrete surface in direction as detailed. Repeat operation if required, to provide a fine line texture acceptable to the Architect.
2. Heavy broom finish: draw a stiff-bristled broom across concrete surface in direction as detailed. Repeat operation if required, to provide a coarse, non-slip finish, acceptable to the Architect.
3. Rubbed finish: rub exposed concrete surfaces with a wood or rubber float to achieve a uniform, gritty texture.

E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

3.13 CONCRETE FINISHING – FORMED SURFACES

A. Smooth rubbed finish: wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced. No cement grout shall be used other than the cement paste drawn from the concrete itself by the rubbing process. Smooth rubbed finish shall be produced on newly hardened concrete no later than the day following form removal.

B. Related unformed surfaces: strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.14 CURING

A. General: protect concrete so that the temperature at the surface will not fall below 50 degrees F., and there will be no loss of moisture from concrete surfaces for a period of seven days. Cover concrete surfaces with approved kraft paper, burlap, or polyethylene sheeting.

B. At Contractor's option, and only with approval by the Architect, a colorless liquid membrane curing compound may be applied. Apply as directed by manufacturer's recommendations.

3.15 REPAIRS

A. Where new site concrete has been cracked or damaged, remove the entire panel/section wherein the damage occurs and install a new panel/section. No patching is permitted.

B. Patching/repairing of surface defects (honey-combed areas, etc.) may be permitted if damaged areas are not extensive. Repair work must meet with the approval of the Architect.

3.16 PROTECTION

A. Protect concrete from damage until acceptance of the work. Exclude traffic from pavement for at least 14 days after placement. No construction traffic is permitted.

B. Sweep concrete pavements and wash all concrete surfaces free of stains, discolorations, dirt and other foreign materials just prior to final inspection.

C. Protection of finished work is the responsibility of the Contractor until final acceptance of all work by the Architect. All damaged work shall be replaced by the Contractor at no additional cost to the Contract Sum.

3.17 CLEAN-UP

A. Keep grounds clean of rubbish caused by work and of unused materials at all times. Dispose of rubbish off-site.

B. Remove unused materials and equipment. Leave area clean.

END OF SECTION 321300

SECTION 321723

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUBMITTALS

A. Samples:
   1. Paint: One pint, each type. Include the manufacturer's label with product analysis.

B. Quality Control Submittals:
   1. Certificates: Affidavit required under Quality Assurance Article.

1.02 QUALITY ASSURANCE

A. Certification: Affidavit by the paint applicator, certifying that the materials comply with the current regulatory requirements in effect at the time products were delivered and applied.

1.03 PROJECT CONDITIONS

A. Perform the painting operations after working hours, on weekends or at such time so as not to interfere with the flow of traffic. Provide temporary barriers to prevent vehicles from driving over newly painted areas.

B. Apply paint on dry pavement surface, when the air temperature is above 40 degrees F.

PART 2 PRODUCTS

2.01 MATERIALS

A. Paint: DOT Section 640-2, yellow or white as indicated, or if not indicated as directed. Delete reference to Glass Beads.

B. Rapid Dry Paint:
   1. Aexcel Corp., www.aexcelcorp.com, 72W-A042 White, 72Y-A082 Yellow
   2. Sherwin-Williams, www.swpavementmarkings.com, TM2152 White, TM2153 Yellow, TM2224 Blue.
   3. Franklin Paint Company, Inc., www.franklinpaint.com, 2014 White, 2015 Yellow.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove dust, dirt, and other foreign material detrimental to paint adhesion.

B. Mark layout of stripes and lines with chalk or paint.

3.02 APPLYING PAVEMENT MARKING

A. Apply paint in accordance with DOT Section 640-3.02, except as follows:
   1. Delete references to Glass Beads.

END OF SECTION

SECTION 32 91 20 - TOPSOIL

PART 1 - GENERAL

1.1 SUBMITTALS

A. Samples:

1. Topsoil for Testing: In the presence of the Architect's Representative, take a 5 lb sample from each 1,000 cu yds of topsoil to be used on the project. Submit to the Architect or Engineer the laboratory test results for the organic matter, Ph value, and gradation. These tests will be performed and signed by a certified soils laboratory.

1.2 QUALITY ASSURANCE

A. Topsoil used on this project shall be tested, and approved before placement.

B. Secure approval before stripping topsoil from a borrow area or delivering topsoil to the project site.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Source: Provide topsoil from areas from which no topsoil has been taken previously and from areas, which are producing, or have produced fair to good yield farm crops without unusual fertilization for a minimum period of 10 years, or from arable or cultivable areas supplied with good normal drainage.

B. Provide topsoil conforming to the following:

1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
2. Containing not less than 4 percent nor more than 20 percent organic matter in that portion of a sample passing a 1/4 inch sieve when determined by the wet combustion method on a sample dried at 105 degrees C.
3. Containing a Ph value within the range of 4.5 to 7 on that portion of the sample, which passes a 1/4 inch sieve.
4. Containing the following gradations:

SIEVE DESIGNATION	PERCENT PASSING
1 inch	100
1/4 inch	97 - 100
No. 200	20 - 65 (of the 1/4 inch sieve)

2.2 LIMESTONE

A. Provide ground limestone in the producer's standard bags containing not less than 90 percent of calcium and magnesium carbonates equivalent to not less than 45 percent of the mixed oxides of calcium and magnesium and conforming to the following gradations:

SIEVE DESIGNATION	PERCENT PASSING
No. 100	50 - 100
No. 20	100

PART 3 - EXECUTION

3.1 SPREADING TOPSOIL

A. Perform topsoil-spreading operations only during dry weather.

B. To insure a proper bond with the topsoil, harrow or otherwise loosen the subgrade to a depth of 3 inches before spreading topsoil.

C. Spread topsoil directly upon prepared subgrade to a minimum depth measuring 4 inches after natural settlement in areas to be seeded. In sodded areas, the thickness of the topsoil after natural settlement plus the sod shall equal 4 inches. Smooth out unsightly variations, bumps, ridges, and depressions, which will hold water. Remove stones, litter, or other objectionable material. Finished surfaces shall conform to the contour lines and elevations indicated on the drawings or as directed by the Architect or Engineer.

3.2 SPREADING LIMESTONE

A. Spread ground limestone evenly over the topsoiled surface. Incorporate limestone within the top 2 inches of soil prior to finish raking.

B. Apply limestone at the following rate per 1,000 sq ft of topsoil area, corresponding to the hydrogen ion concentration (Ph) shown by the soil chemical analysis:

PH	RATE (pounds)
4.5 to 5.0	150
5.0 to 5.5	100
5.5 to 6.0	50
6.0 to 6.8	25
over 6.8	0

END OF SECTION

SECTION 329219 - LAWS AND GRASSES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all materials, labor, equipment, and services necessary to furnish and deliver work of this Section as shown on the Drawings, as specified and as required by job conditions including, but not limited to, the following:

1. Topsoil testing.
2. Soil amendments and fertilizing.
3. Planting.
4. Seeding.
5. Maintenance.

1.2 RELATED WORK

A. Earthwork: Section 310010

B. Topsoil: Section 329120.

1.3 STANDARDS

A. All landscaping work shall be done by a single firm specializing in landscape work.

1.4 QUALITY CONTROL

A. General: Furnish certificates of inspection of landscape materials, to accompany shipments, as required by governmental authorities. Comply with applicable federal, state, county, and local regulations governing landscape materials.

B. Contractor qualifications: Engage an experienced contractor who has successfully completed landscape installations similar in scope and complexity to this project.

C. Do not make substitutions. If specified landscape material is not obtainable, submit to Architect, proof of non-availability and proposal for use of substitute material. When authorized, adjustment of contract amount will be made.

D. Analysis and standards: For standard products, submit manufacturer's certified analysis. For other materials, submit analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists and/or the American Association for Laboratory Accreditation, wherever applicable or as further specified.

E. Furnish Vendor's certified statement of composition, mixture and percentages of purity, germination, weed seed, other crop seed and other inert ingredients for each grass seed species required.

F. Provide nursery-grown trees, shrubs, and ground covers grown in recognized nurseries in accordance with good horticultural practice. Provide only healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions or disfigurement.

G. All plant material shall comply with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock", latest edition.

H. Inspection: When all plant materials have been located at their place of growth, the Contractor shall submit a written request to the Architect to perform an inspection for compliance with requirements for name, variety, size, and quality. The Contractor shall be present with the Architect during inspection at the nursery. Material which does not comply with all requirements will be rejected. The Architect's obligation to perform plant material inspections at the place of growth shall be limited to 2 days. (16 hours, including travel time. The Contractor shall be responsible for the extra costs incurred by the Architect for the inspection of plant materials in excess of this amount. The Architect will bill the Owner for these extra costs. The Owner will backcharge these extra costs to the Contractor. At the Architect's option, plant material may be inspected after delivery to the project site. Plant materials that do not meet requirements shall be rejected and replaced. Plant material that may have been approved at the place of growth, but has declined in health or has been damaged during delivery to the project site, shall be rejected and replaced.

1.5 SUBMITTALS

A. Refer to Section 013300.

B. Certification: Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendors certified analysis for soil amendments and fertilizer materials. Submit seed vendors certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species. Submit other data substantiating that all other materials comply with specified requirements.

C. Planting Schedule: Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

D. Warranty: submit written warranty signed by the landscape installer agreeing that they will:

1. Warrant all plant materials unconditionally for 1 year from the date of final acceptance.
2. Replace any plant material that is diseased or in unhealthy condition at no additional cost to the contract sum.
3. Warrant deciduous material to break dormancy if planted in the dormant season.
4. Warrant perennials to show signs of healthy growth by May 15 to June 1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by the Architect. Do not bend or bind-tie trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.

D. Container Grown Stock: Do not remove container grown stock from containers until planting time.

1.7 JOB CONDITIONS

A. General: Cooperate with other contractors and trades in and adjacent to the landscape work area. Examine drawings, which show the development of the entire site and become familiar with the scope of other work required.

B. Utilities: Determine location of underground utilities and perform work in a manner, which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Architect before planting.

D. Planting Time: Plant or install plant materials during normal planting seasons for each type of landscape work required unless otherwise authorized by the Architect.

E. Coordination With Lawns: Plant trees and shrubs after final grades are established, and prior to planting of lawns, unless otherwise acceptable to the Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.8 PLANT MATERIAL WARRANTIES

A. Lawns: Warranty lawns through the specified maintenance period, and until final acceptance.

B. Trees, Shrubs, and Groundcovers: Warranty trees, shrubs, and groundcovers for a period of one year after final acceptance against defects, including death and unsatisfactory growth, except for defects resulting from neglect by the Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond the Landscape Contractor's control.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Limestone: Natural ground limestone containing not less than 85% of total carbonates, ground so that not less than 90% passes a 10 - mesh sieve and not less than 50% passes a 100 - mesh sieve.

B. Lawn Fertilizer: Complete fertilizer containing Nitrogen (N), Phosphate and Potash in ratio 10-20-10. Fertilizer shall be uniform in composition, dry and free flowing and suitable for application with standard fertilizer equipment. Fertilizer shall be delivered in bags or suitable containers, each fully labeled with manufacturer's guaranteed analysis. Fertilizer which has become damaged or caked will be deemed unsuitable for use, and unacceptable to the Architect.

C. Plant Fertilizers:

1. For all trees except ericaceous materials (Hollies, etc): "MycorTree Tree Saver Transplant" mycorrhizal transplant inoculant as manufactured by Plant Health Care, Inc. (800-421-9051) Apply at the rate of 3 ounces per inch of tree caliper incorporated into the backfill mixture per manufacturer's recommendations.
2. For all shrubs except ericaceous materials (rhododendrons, azaleas, etc.): "Roots", "Healthy Start" or other approved organic starter fertilizer and soil conditioner. Submit product data for approval.
3. For all ericaceous materials: "Hollytone" or approved substitute. Submit product data for approval.

D. Seed Mulch: Straw. Straw shall be oats, wheat, rye or other approved crop, free of noxious weeds.

E. Seed: Provide fresh, clean, new crop grass seed complying with the tolerance for purity and germination established by the Official Seed Analysists of North America. All seed shall have been tested within the 6 months immediately preceding the date of sowing such material on this job. Seed mixtures shall not contain more than 2.5% weed seed. Seed containing prohibited or restricted noxious weeds will not be accepted. Seed shall be of the species, percentage, minimum purity and minimum germination as stated below.

1. Grass seed mix for general lawn areas shall be as follows:

Percentage By weight	Species	Percent Purity	Percent Germination
10%	North Star Kentucky Bluegrass	98%	80%
35%	*Victory Chewings Fescue	98%	85%
25%	*Jasper Creeping Red Fescue	98%	85%
30%	*Cutter Perennial Ryegrass	97%	90%

Note: Species marked with an asterisk shall be high endophyte. Sowing rate for general lawn areas shall be 220 pounds per acre.

F. Plant Material: Names shall agree with the nomenclature of "Standardized Plant Names" American Joint Committee of Horticultural Nomenclature, 1942 Edition.

G. Size and grading shall conform to ANSI Z60.1 "American Standard for Nursery Stock".

H. Quality shall be typical of species or variety, with normal well developed branches and vigorous root systems. Plants shall be free of fibrous defects, disfiguring knots, sun-scald injuries, abrasions of the bark, plant disease, insect eggs, borers, and all forms of infestation.

I. Plants shall be nursery-grown, and shall have been growing under the same climatic conditions as the location of this project for at least two years prior to date of planting on this project.

J. For measurement, a plant shall be dimensioned as it stands in its normal position. Trees: calipered 6" above ground. Stock furnished: fair average of minimum and maximum sizes specified. Large plants cut back to sizes will not be accepted.

K. Label at least one tree, shrub and groundcover of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

L. Plant Bed Mulch: Shredded hardwood or cedar mulch, free from deleterious materials and suitable for top dressing of trees, shrubs and plants. Submit sample to the Architect for approval prior to use.

M. Tree Wrap: New 6-inch wide burlap or Krinkle Kraft paper 30.30.30.

N. Stakes: 6 foot long, 2”x 2” sawn hardwood or cedar posts.

O. Hose: New 2 ply reinforced garden hose.

P. Wire: #12 gage, pliable and galvanized.

Q. Anti-desiccant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION MEETING

A. The Landscape Contractor shall attend a pre-construction meeting with the Architect prior to the commencement of any landscaping work. Contact the Architect at least 14 days in advance of the anticipated start of landscape work to schedule and coordinate the pre-construction meeting.

3.2 INSPECTION

A. Examine the conditions under which landscape work is to be performed. Landscape work shall not proceed until all unsatisfactory conditions, if any, have been corrected.

B. Examine the grades and ensure their accuracy with the contract documents. If any discrepancy exists, contact the Architect immediately, and do not proceed with any work until all discrepancies have been resolved.

3.3 SOIL AMENDMENTS

A. Amendments: Vary application rates of soil amendments specified hereinafter, as directed, to obtain optimum conditions for seeding and planting.

3.4 PLANTING OPERATIONS

A. Layout: Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's acceptance before start of planting work. Make adjustments as may be requested.

B. Preparation: In preparing plants for moving, all precautions customary in good practice shall be taken and workmanship that fails to meet the highest standards shall be rejected. All plants shall be dug to retain as many fibrous roots as possible. The size of the ball of balled and burlapped, and balled and platformed plants shall be at least 12 inches in diameter for every inch of maximum caliper size specified. The ball shall be a solid ball of earth securely held in place by burlap and stout rope; oversized or exceptionally heavy plants are acceptable if the size of the ball or spread of the roots is proportionately increased. Loose, broken or fabricated balls of earth will be rejected.

C. For delivery, all plants shall be packed, transported, and handled with utmost care to ensure protection against injury.

D. After delivery and until planted, all plant materials shall be properly maintained and protected. If planting is delayed more than 6 hours, set trees and shrubs in shade, and protect from weather and mechanical damage. Set balled and container stock on ground and cover ball/container with soil, peat moss, plant bed mulch, etc., and keep roots moist.

E. No plant material shall be planted until inspected and approved. Any rejected plant material shall be immediately removed from the site and replaced with acceptable plant material at no extra cost.

F. Plant material shall be planted, in general, during "normal" standard nursery planting seasons and at such times as are approved by the Architect.

G. Planting: Beds of topsoil, previously spread, shall be reworked until they are friable, free from debris, accurate to line and grade and otherwise suitable for planting operations.

H. Planting Depth: Inspect the root ball of all trees to determine if excess earth has accumulated above the root crown. Carefully remove by hand all excess earth above the root crown. Prune and remove all roots that have become established above the root crown. Trees shall be planted such that the root crown is visible at the top of the root ball.

I. Plant nursery-stock plumb. Do not loosen or damage balls of earth of balled and burlapped plants during planting operations or remove containers from container stock until just prior to planting. Prune large fleshy roots that are bruised or broken with a single clean cut prior to planting.

J. Plant pits shall have vertical sides, unless otherwise directed. The depth of the excavated plant pits shall be such that the root ball sits on undisturbed, existing soil. If over excavation of the plant pit occurs, backfill the pit and thoroughly compact the material prior to installation of the plants.

K. Refer to the planting details for required width of plant pits.

L. Backfill for plant materials shall be a mixture of 1/3 topsoil, 2/3 excavated subsoil and fertilizer as hereinafter specified.

M. In plant beds of closely spaced shrubs, the Contractor will be permitted to excavate the entire bed to required grade, place the plants, and then complete the backfilling procedures.

N. For individual tree and shrub plantings, place plant in hole. Cut away rope from top of root crown and peel away burlap from top 1/3 of root ball. For trees that are delivered with wire baskets, remove top ½ of wires. Place and firm backfill material around tree ball in 6 inch to 8 inch lifts; thoroughly settle each layer with water.

O. Fertilize plant materials as follows:

1. Trees: Incorporate specified fertilizer into backfill mixture in accordance with the manufacturer's recommendations.
2. Ericaceous Trees: Broadcast fertilizer around plant ball in accordance with the manufacturer's recommendations.
3. Shrubs: Broadcast fertilizer onto shrub bed in accordance with the manufacturer's recommendations prior to placement of mulch.

P. Mulch all tree and shrub pits and entire area of shrub and ground cover beds. Shredded bark mulch shall be placed 3" deep. Cultivate and rake over area. Form saucers around tree and shrub pits. Neatly edge plant and ground cover beds.

Q. Stake/guy trees securely as detailed and in accordance with standard practice. Take care that stakes and guy wires will not create pedestrian and vehicular hazards.

R. Prune: Prune deciduous trees and large shrubs. Preserve natural shape and character of the plant. Remove, in general, 1/4 to 1/3 of wood by thinning branches. Do not cut leaders. Remove soft wood, sucker growth and broken, dead or badly bruised branches. Make pruning cuts with sharp and clean tools.

S. Spray: Spray plant material with approved anti-desiccant, using approved power sprayer and for applying adequate film over trunks, branches and leaves. Use anti-desiccants in strict accordance with manufacturer's directions. Deliver to site in manufacturer's sealed containers.

T. Wrap: Securely wrap tree trunks of deciduous trees from ground to height of lowest branch.

U. Water: Water plants thoroughly during and after planting operations as weather conditions require for entire maintenance period.

3.5 SOIL AMENDMENTS WITHIN SEEDED AREAS

A. Soil Amendments: Using an approved applicator or other suitable device, spread limestone evenly over areas to be seeded. Application rate of limestone shall be as required to correct soil acidity to the optimum pH for seeding (pH 6.5) based upon topsoil test results. Notify Architect of topsoil test results for pH. Cultivate and mix limestone uniformly to a depth of 6" with a chisel plow or other approved equipment.

3.6 FINE GRADING

A. After topsoil has been spread, rake up large stiff clods, hard lumps, roots, litter, other foreign matter and stones larger than ½" in any dimension. Remove from the premises or dispose where directed in a satisfactory manner. Do not finish grade during unsuitable weather.

B. Fine Grading: Final grades shall be within 0.1 ft. of required elevations.

3.7 SEEDING OPERATIONS

A. Inspection: Notify the Architect to perform an inspection of topsoil conditions prior to seeding. Seeding operations shall not proceed until all unsatisfactory conditions, if any, have been corrected. No seeding is to be done until the site has been brought to proper elevations and all underground work has been completed. No seeding is to be performed until written approval of topsoiling, fine grading and seed bed preparation has been received from the Architect.

B. Scope: Seed general lawn areas as shown on the drawings, and all other topsoiled areas that are not indicated for other plantings and/or seeding.

C. Schedule: Seed shall be sown only between August 15 and September 15, and only during periods when weather conditions are favorable, unless otherwise approved by the Architect.

D. Fertilizing: Apply fertilizer (10-20-10) at 440 pounds per acre and incorporate to a depth of 1" +/- with a spike tooth harrow or other suitable equipment.

E. Seeding: Using a cultipacker seeder (Brillion or equal), distribute seed over all general lawn areas. Total seed quantity shall be divided into two equal portions and the seeding shall be performed in two passes over the area with the second pass being at a 75-degree angle to the first pass.

F. Mulch: Mulch all seeded areas immediately after seeding. Spread clean straw mulch evenly over seeded areas at the rate of 1-1/2 tons per acre.

3.8 PLANT MATERIAL MAINTENANCE DURING ESTABLISHMENT PERIOD

A. Commencement: Begin maintenance of all plant material immediately after each plant installation. Maintain planted trees, shrubs, and groundcovers until final acceptance, but in no case less than 30 days after substantial completion.

B. Inspection: Inspect plants at least once a week during the installation period and perform needed maintenance operations promptly.

C. Substantial Completion: Shall be granted when inspection by the Architect shows that all new plant materials have been furnished and satisfactorily installed.

D. Maintenance Operations: Maintain plant materials by watering (one deep soaking per week minimum) pruning, cultivating, weeding and other operations as required for healthy plant growth. The Landscape Contractor is responsible for providing water from off-site sources if none is available at the project site. Restore planting saucers. Tighten and repair stake and guy supports, and reset trees and shrubs to proper grades or vertical position as required. Replace or restore damaged wrapping. Spray as required to keep materials free of insects and disease. Fertilize all plants at least once during the establishment period. Remove burlap from top 1/3 of root ball as detailed.

E. Plant Replacements: Remove and replace dead, unhealthy and damaged trees immediately upon discovery and/or as identified by the Architect. Replace stakes, guys, wraps and eroded plant saucers as required. Replace with plants of the same species and sizes as originally specified, unless directed otherwise.

3.9 LAWN MAINTENANCE

A. Maintenance Period: Lawn maintenance shall begin immediately following seeding operations. Maintain lawns for a period not less than 90 days, or longer as required to establish an acceptable lawn area and receive final acceptance from the Architect. If lawn areas are seeded in the fall and the maintenance period is not completed prior to turf dormancy, or the turf is not ready for final acceptance, continue maintenance operations the following spring until an acceptable lawn is established.

B. Protection: Protect newly seeded areas from disturbance by equipment and other construction activities throughout the entire maintenance period and until final acceptance.

C. Maintenance Operations: Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations, such as rolling, regrading and reseeding as required to establish a smooth, acceptable lawn, free of eroded or bare areas. At a minimum, perform the following operations:

1. Watering: During the period of germination and early seedling development, apply ¼ acre inch of water per day using 3 sets (intervals) to keep the surface moist and to maintain soil moisture at or near field capacity.
2. Mowing: Begin mowing the grass seedlings when they reach a height of 2". Mow with a reel mower set at a mowing height of 1-1/2" (bench setting) in which the clip of the reel matches the mowing height. The reel blades and bedknife are to be kept sharp and evenly matched to provide a clean cut. The Contractor shall be responsible for all mowing operations throughout the maintenance period and until final acceptance.
3. Fertilizing: Fertilize the new seedlings with 10-10-10 fertilizer grade 2 weeks after seeding. (See schedule below.) Fertilize at a rate of 440 pounds per acre to supply 44 pounds of nitrogen, phosphate and potassium per acre respectively. All of the nitrogen is to be in a water-soluble form. Another grade of fertilizer with the same ratio may be used in place of the 10-10-10 with the rate adjusted to supply the same amount of nitrogen, phosphate and potassium noted above.

D. Apply additional fertilizer applications using IBDU (31-0-0) in conformance with following schedule:

Weeks After Seeding	Fertilizer Grade	Fertilizer Rate (lbs per acre)
2 weeks	10-10-10	440
4 weeks	31-0-0	142
6 weeks	31-0-0	106
8 weeks	31-0-0	106

E. Overseeding (if required): Overseed bare and eroded areas and all other areas that do not present a thick growth of dense turf. Overseed with specified seed mix.

F. Weed Control (as required): Apply approved herbicide at manufacturer's recommended rates to control and eliminate weed growth.

3.10 INSPECTION AND FINAL ACCEPTANCE – LAWNS

A. At the end of the required maintenance period, notify the Architect to perform an inspection of lawns. Acceptable lawns shall exhibit a uniform stand of dense turf, true to grades as shown with no depressions, free of weeds and stones in excess of ½" and with no bare or eroded areas. Upon confirmation that all areas meet these requirements, the Architect shall grant final acceptance.

B. If final acceptance is not granted, continue maintenance operations as necessary to correct all deficiencies identified during final inspection.

3.11 FINAL ACCEPTANCE - PLANT MATERIALS

A. Inspection: When all landscape work is completed, including maintenance during the plant establishment period, inspection shall be made by the Architect upon written request of the Contractor. Notice requesting inspection shall be submitted at least 5 days prior to the anticipated date.

B. Final Acceptance: When all work has been satisfactorily completed, it shall receive final acceptance by the Architect. Final acceptance shall be granted based upon satisfactory completion of the following:

1. All plant materials have been accepted and the required number of replacements are in place.
2. All plant beds and saucers are cleanly edged, properly mulched and free of weeds.
3. All stakes and guy wires are in good condition.
4. Plant materials have been fertilized.
5. Remedial measures as directed by the Architect have been carried out to ensure plant survival.

C. Remedial Work: When inspected landscape work does not comply with requirements or is deficient in some manner, perform corrective measures, and continue specified maintenance until reinspection and final acceptance. Remove rejected plants and materials promptly from project site.

3.12 PLANT MATERIAL MAINTENANCE DURING WARRANTY PERIOD

A. Duration: Shall begin immediately following final acceptance. Perform maintenance operations described herein throughout the 1 year warranty period.

B. Inspections: Inspect the project site monthly, or at more frequent intervals during the planting seasons, to ensure that plant material is healthy and conditions are favorable for proper plant growth.

C. Notification: Notify the Architect of dates of inspections. Following each inspection, submit to the Architect written documentation of the status of plant material and corrective or maintenance operations that have been performed.

D. Plant Replacements: Plants which die or become unhealthy, or appear to be in an impaired condition during the maintenance period, shall be removed and replaced. Replacements shall be made immediately upon discovery if made during normal planting seasons, or as soon as seasonal conditions permit if made outside of normal planting seasons.

E. Watering: Water landscaping at intervals as necessary to maintain good color and sturdy growth of plant materials.

F. Pruning: Prune or head back plants in keeping with the nature and character of plants. Establish radial branching orientation and eliminate narrow V-shaped forks, cross-over branching and branches that rub against each other.

G. Weed Control: Control weed growth in plant beds by manual removal or by application of herbicides. Application of all herbicides shall be made by licensed applicators in strict conformance with the manufacturer's written instructions.

H. Pest and Disease Control: Control pests and plant diseases by application of chemicals. Application of all pesticides and other chemicals shall be made by licensed applicators in strict conformance with the manufacturer's written instructions. Spray or dust using appropriate insecticide, miticide and fungicide and as necessary to maintain plants in healthy and vigorous growing condition.

I. Staking and Guying: Inspect all stakes and guy wires a minimum of 2 times during the maintenance period. Perform required adjustments to prevent girdling or chafing of bark. Stakes and guy wires shall be removed at the end of the maintenance period and prior to final inspection.

J. Fertilizing: Within 2 weeks prior to the end of the maintenance period, apply an approved commercial fertilizer at the rate recommended by the manufacturer uniformly over all planted areas.

K. Mulching: All plant beds shall be refreshed as necessary with new mulch materials a minimum of 2 times during the maintenance period, with one application occurring within 2 weeks prior to the end of the maintenance period.

3.13 MAINTENANCE AND WARRANTY COMPLETION

A. Inspection: At the end of the required maintenance and warranty period, submit a written request to the Architect to make an inspection of landscaping work. Final end of maintenance and warranty period inspection shall be made in the presence of the Contractor.

B. Maintenance and Warranty Completion: If all landscape work has been satisfactorily completed, the work will be accepted and the maintenance and warranty periods will end 1 year from final acceptance. When work is found to be unsatisfactory or deficient in any manner, perform corrective actions and continue maintenance period at no additional cost to the contract sum.

3.14 CLEAN UP AND PROTECTION

A. General: During landscape work, keep pavements clean and work area in an orderly condition.

B. Protection: Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

C. Clean Up: Prior to final acceptance, remove all debris and rubbish accumulated as a result of this work, and dispose of off-site.

END OF SECTION 329219

SECTION 334613

FOUNDATION DRAINS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications including dimensions, strength, and installation instructions for each type of pipe and respective fittings.

1.3 QUALITY ASSURANCE

A. Each length of pipe and each fitting shall be marked in accordance with the applicable ASTM Designation.

PART 2 PRODUCTS

2.1 DRAINAGE PIPE AND FITTINGS

A. Corrugated Polyethylene Pipe (4 and 6 inch Diameter, Solid and Perforated) and Fittings for Building Underdrains and Discharge Lines:
   1. Pipe Classification: AASHTO M252 Type S.
   2. Material Classification: ASTM D 3350.
   3. Property Description: Cell Class 324420C.
   4. Pipe Size: 6 inches diameter unless otherwise indicated.
   5. Perforation Size: 9/16 by 1/16 inch slots; minimum inlet area 2.4 inches per lineal foot of pipe.
   6. Joint Couplings: External snap couplers with gaskets for solid wall; external snap couplers without gaskets for perforated pipe.
   7. Acceptable Manufacturer: Hancor, Inc., P.O. Box 1047, Findlay, OH 45839, (419) 424-5200.

B. Smoothwall Polyethylene Pipe (4- and 6-inch Diameter, Solid and Perforated) and Fittings for Building Underdrains and Discharge Lines:
   1. Pipe Classification: ASTM F 810.
   2. Material Classification: ASTM D 3350.
   3. Property Description: Cell Class 324420 C & E.
   4. Pipe Size: 6 inches diameter unless otherwise indicated.
   5. Perforation Size: 1/2 inch diameter on 3 inch centers, 3 rows.
   6. Bell-and-Spigot Joints.

7. Acceptable Manufacturer: Hancor, Inc., P.O. Box 1047, Findlay, OH 45839, (419) 424-5200.

C. PVC Pipe (4 and 6 inch Diameter, Solid and Perforated) and Fittings for Building Underdrains and Discharge Lines:
1. Pipe Classification: ASTM D 2729.
2. Material Classification: ASTM D 1784.
3. Property Description: Cell Class 12454B, 12454C, or 13343C.
4. Pipe Size: 6 inches diameter unless otherwise indicated.
5. Perforation Size: 1/2 inch diameter on 3 inch centers, 3 rows.
6. Joints: Solvent cement or elastomeric gasket.
7. Acceptable Manufacturer: National Pipe Co., 3421 Vestal Road, Vestal, NY 13850, (607) 729-9381.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect all pipe and fittings before laying in trench. Remove defective pipe and fittings from the Site.

B. Do not backfill until installed piping has been inspected by the Owner's Representative.

3.2 BASIC REQUIREMENTS

A. Plastic Pipe:
1. Install pipe in accordance with the manufacturer's recommendations and as specified in ASTM D 2321.
2. No. 2 course aggregate shall be used for bedding and backfill to the depth shown on the drawings for perforated pipe.
3. Cushion material shall be used for bedding and backfill to the depth shown on the drawings for non-perforated pipe.

3.3 INSTALLATION

A. Lay pipe to indicated line and grade with firm uniform bearing throughout its length.
1. Lay pipe with a uniform pitch between high and low points.
2. Position bells upstream.
3. Provide sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with bedding material and tamp.
4. Install perforated pipe with perforations down.

B. Joints:
   1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
   2. Assemble elastomeric-gasket joints in accordance with the pipe manufacturer's recommendations and ASTM D 3212.
   3. Assemble solvent-cement joints in accordance with ASTM D 2855.
   4. Assemble other joints in accordance with the pipe manufacturer's recommendations.

C. Bends: Use two 45 degree fittings for each 90 degree turn.

D. Branch Connections: Use standard wye fittings for connections at drain line intersections.

3.4 CLEANOUTS

A. Install a wye and 1/8 bend, or a long sweep 1/4 bend, in the foundation drain line at each location indicated on the drawings. Position hub of bend vertically.

B. Encase fitting in a concrete (3000 psi) pad. Cast concrete 6 inches thick under and on all sides to the top of the fitting.

C. Extend cleanout piping to grade with a one-piece 4 inch pipe terminating with a spigot end. Install deck plug in accordance with manufacturer's instructions flush with grade. Encase deck plug with a cast-in-place concrete (3000 psi) pad 24 inches square by 6 inches deep.

3.5 CONNECTIONS

A. Make connections to drains by inserting a wye fitting with standard adapters for the particular type of pipe.

END OF SECTION 334613

SECTION 344113

PARKING LOT SIGNS

PART 1 GENERAL

1.1 SUBMITTALS

A. Shop Drawings: Show shop drawings, not necessarily to scale, but sufficient enough in detail to show color, wording, lettering size and style, overall sign size, construction details and installation details for each type of sign.

1.2.1 STANDARDS

A. State of Connecticut, Department of Transportation (CTDOT): Standard Specifications for Roads Bridges and Incidental Construction – Form 818.

PART 2 PRODUCTS

2.1 TRAFFIC SIGNS

A. Construction Materials: Comply with the applicable requirements of DOT Form 818.

B. Posts: Galvanized steel.

PART 3 EXECUTION

3.1 INSTALLATION

A. Erect signs in their designated locations, as indicated and in accordance with the approved shop drawings and the applicable requirements of DOT Form 818.

B. Protect surfaces and finishes from abrasion and other damage during handling and installation.

C. Replace damaged or faulty signs.

END OF SECTION 344113