TOWN OF NEWTOWN, CONNECTICUT

INVITATION TO BID

Sealed bids will be received at the office of the Financial Director, **3 Primrose Street**, Newtown, Connecticut 06470, until but no later than **11:00 am, Monday, October 17, 2016:**

Cover: **PARKING ENHANCEMENTS-DICKINSON PARK**

The Purchasing Authority of the Town of Newtown reserves the right to accept or reject any or all options, bids or proposals; to waive any technicality in any bid or part thereof, and to accept any bid deemed to be in the best interest of the Town of Newtown. The Town of Newtown is an Affirmative Action Employer-MBE/WBE are encouraged to bid. Specifications and bid documents may be obtained at www.newtown-ct.gov under the Purchasing Department.

E. Patricia Llodra
First Selectman

Robert G. Tait
Financial Director

PURCHASING AUTHORITY

TOWN OF NEWTOWN PURCHASING AUTHORITY
INSTRUCTIONS TO BIDDERS

1. Submit bids in a sealed envelope plainly marked to identify the particular bid. It is the sole responsibility of the bidder to see that the bid is in the hands of the proper authority prior to the bid opening time. Bidders may be present at the opening of the bids.

2. Withdrawals of, or amendments to bids received later than the time and date specified for bid opening will not be considered.

3. The Purchasing Authority of the Town of Newtown reserves the right to accept or reject any or all options, bids, or proposals; to waive any technicality in any bid, or part thereof, and to accept any bid deemed to be in the best interest of the Town of Newtown, Connecticut.

4. Bids may be held by the Town of Newtown for a period not to exceed sixty (60) days from the opening of the bids for the purpose of reviewing the bids and investigating the qualifications of bidders prior to the awarding of the contract.

5. Bids must be submitted on the "Sealed Bid Request" form enclosed at the end of this packet. All items must be filled in (unit cost, trade-in for each unit, etc.). Failure to comply with this requirement will automatically void the bid.

6. Trade-ins, when indicated, will be listed on the Sealed Bid Request form. The Town of Newtown reserves the right to trade all, some or none of the vehicles listed as deemed in the best interest of the Town. Bidders may submit a bid on the new vehicles with or without trade-ins or may submit bids on the trade-ins only, either individually or by lot. Trade-ins must be detailed individually as indicated on the Sealed Bid Request form. Trade-ins may be used in determining the lowest responsible bid.

7. The Town may consider proximity of the vendor's service as a factor in determining lowest price and reserves the right to award in whole or part to one or more vendors.

8. The Town agrees to pay for all equipment within thirty (30) working days after the equipment has been accepted and claim (invoice) presented.

9. Bid Security when required must be by a **certified check, letter of credit or surety bond** for five percent (5%) of the total bid, payable to the Town of Newtown. If a surety bond is enclosed, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the Power of Attorney.

10. The Town of Newtown reserves the right to retain the bid security of Bidders to whom an award is being considered until either: (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all bids have been rejected.

11. Prior to awarding any contract exceeding $25,000.00 for the construction, alteration, or repair for any public building or public work, a 100% performance bond and a labor or materialmen's bond must be furnished by the person to whom the contract is awarded.

12. Performance Bond when required must be by a **certified check, letter of credit or performance bond** for one hundred percent (100%) of the total bid. When submitting a performance bond, bonds must be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

13. The successful bidder will be required to post a Certificate of Insurance, with the Town of Newtown named as additional insured, in an amount to be determined by the Town of Newtown.

TECHNICAL SPECIFICATIONS
FOR

PARKING LOT ENHANCEMENTS

DICKINSON MEMORIAL PARK
NEWTOWN, CT

AUGUST 17, 2016

ISSUED FOR CONSTRUCTION

Prepared by
Stantec Consulting Services, Inc.

Stantec

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SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition and/or deduction to the Contract Sum to incorporate the alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, hardware, and/or similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, the Town shall notify each party involved, in writing, of the status of each alternate. Town shall indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: The Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Deduct alternate No. 1 (Skate park parking lot area) – Remove bituminous pavement removals and base compaction, placement of 3" of new pavement, new bituminous curbs, line striping, and drainage structures as shown on the plans and details, and all associated labor, work and materials needed to install a new parking lot.

1. Deduct sediment and erosion control measures
2. Deduct removal of existing bituminous pavement
3. Deduct removal of existing bituminous curb
4. Deduct compacting existing base
5. Deduct placing 3" of asphalt
6. Deduct drainage improvements
7. Deduct line striping
8. Deduct signage
9. Include as part of these deducts, all items incidental to or required for a complete installation whether or not indicated as part of this alternate

B. Deduct alternate No. 2 (Tennis court parking lot driveway) – Remove bituminous pavement reclamation, removals, minor grading, base compaction, placement of 3" of new pavement, new bituminous curbs and drainage structures as shown on the plans, and all associated labor, work and materials needed to install a new driveway.

1. Deduct sediment and erosion control measures
2. Deduct reclamation of existing bituminous pavement
3. Deduct removal of existing bituminous curb
4. Deduct minor grading
5. Deduct compacting existing base
6. Deduct placing 3" of asphalt
7. Deduct drainage improvements
8. Deduct line striping
9. Deduct signage
10. Include as part of these deducts, all items incidental to or required for a complete installation whether or not indicated as part of this alternate

C. Deduct alternate No. 3 (Tennis court parking lot area) – Remove bituminous pavement reclamation, removals, minor grading, base compaction, placement of 3" of new pavement, new bituminous curbs and drainage structures, line striping and signage, as shown on the plans, and all associated labor, work and materials needed to install a new driveway.

1. Deduct sediment and erosion control measures
2. Deduct reclamation of existing bituminous pavement
3. Deduct removal of existing bituminous curb
4. Deduct grading
5. Deduct compacting existing base
6. Deduct placing 3" of asphalt

7. Deduct drainage improvements
8. Deduct line striping
9. Deduct signage
10. Include as part of these deducts, all items incidental to or required for a complete installation whether or not indicated as part of this alternate

END OF SECTION 01 23 00

SECTION 02 41 13

SITE DEMOLITION AND REMOVALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

1.02 SUMMARY

A. The work of this Section includes the following:

1. Site demolition and removals as indicated on the Drawings.

1.03 RELATED SECTIONS

A. Section 31 25 00 - Erosion and Sediment Controls

1.04 PROJECT CONDITIONS

A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect site improvements on adjoining properties and on Owner's property to remain.
2. Restore damaged improvements to their original condition, as acceptable to property owners.

C. Review and verify all limits of items to be removed with the Owner and Landscape Architect prior to commencing clearing and grubbing operations.

D. Inspection: Verify existing condition of all plant material scheduled for clearing and grubbing removal. Do not proceed with any work that will result with unsafe conditions causing a continuing or permanent hazard. Ascertain that all work scheduled for clearing and grubbing can be safely accomplished in a proper time period.

E. Benchmarks: Protect all survey monuments, benchmarks, and property boundary pins. Replace if destroyed by Contractor's operations at no cost to the Owner. Contractor to provide temporary offsets to benchmarks during clearing & grubbing and construction and provide new monuments as part of this construction.

F. Permits/Fees: Coordinate with appropriate utility companies and pay any connection and/or disconnect fees and permits as necessary.

G. Salvaged Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

H. Provide 48 hours notice prior to conducting any site clearing and grubbing operation.

I. Contact Call Before You Dig Services (1-800-922-4455) prior to commencing any demolition operations.

1.05 EXISTING SERVICES

A. General: Indicated locations are approximate. Contractor is responsible for determining exact extent and locations before commencing Work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

A. Demolish site features shown on the plans.

B. Clear and grub areas as indicated on the plans.

C. Remove trees and stumps in areas indicated on the plans.

D. Take care not to damage any features that are to remain. Repair existing features to remain that are damaged by demolition operations.

E. All demolished features will become the property of the contractor except as noted.

3.02 DISPOSAL

A. All waste material shall be disposed of legally off site.

B. Suitable excess earth materials, as determined by the Engineer, will remain on site in a location directed by the Town representative and/or Engineer.

C. No burning or burying on-site will be allowed.

END OF SECTION 02 41 13

SECTION 03 30 00

PORTLAND CEMENT CONCRETE (SITE)

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. "Form 816" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes specifications for cast-in-place and precast concrete.

1.03 RELATED SECTIONS

A. Section 31 23 16 - Earthwork

B. Section 33 40 00 - Storm Drainage

1.04 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.05 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For concrete pavement mix.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials. Contractor shall pay for all testing of concrete materials.

D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Applied finish materials (i.e., traffic paint).
6. Joint fillers.

1.06 QUALITY ASSURANCE, CAST IN PLACE CONCRETE

A. Materials and methods of construction shall comply with the following standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI)
3. State of Connecticut DOT Standard Specifications (Form 816)

B. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source. Do not change source of brands of cement, aggregate materials, or batching plant during course of work.

E. ACI Publications: Comply with all ACI requirements unless modified by the requirements of the Contract Documents.

1.07 QUALITY ASSURANCE, PRE-CAST CONCRETE

A. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in manufacturing precast structural concrete units similar to those indicated for this Project and with a record of successful in-service performance.

1. Assumes responsibility for engineering precast structural concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings by a qualified professional engineer.
2. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of precast structural concrete that are similar to those indicated for this Project in material, design, and extent.
3. Participates in PCI's Plant Certification program and is designated a PCI-certified plant.

B. Design Standards: Comply with **ACI 318** and the design recommendations of PCI MNL 120, "PCI Design Handbook—Precast and Prestressed Concrete."

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of precast concrete units and are based on the specific types of units indicated. Other fabricators' precast concrete units complying with requirements may be considered.

PART 2 PRODUCTS

2.01 FORMS

A. Conform to Article 8.11.03-3 and 9.21.03-3 of Form 816, latest revision.

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

2.02 REINFORCING MATERIALS

A. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.

B. Plain, Cold-Drawn Steel Wire: ASTM A 82.

C. Steel Welded Wire Fabric: ASTM A 185.

D. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

E. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.

1. Use supports with sand plates or horizontal runners where base material will not support chair leg.

F. Bending: All reinforcement shall be bent cold. Only competent mechanics shall be employed for cutting and bending, and proper appliances shall be provided for such work. The reinforcement shall be bent to the shapes shown on the plans.

1. Bends for stirrups and ties shall be made around a pin having a diameter not less than two times the minimum thickness of the bar.

2. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness of the bar,

3. Except that for bar larger than one inch the pin shall not be less than eight times the minimum thickness of the bar. Reinforcement shall be formed to the dimensions indicated on the plans before it is embedded in the concrete.

G. Splices: All Splicing shall be as specified in American Concrete Institute (ACI) Building Code.

H. Placing and Fastening: Placing and Fastening shall be as specified in ACI Standards. Before any concrete is placed, all mortar shall be cleaned from the reinforcement. No concrete shall be poured until the Engineer has inspected the placing of the reinforcing metal and permission to place concrete is granted. All concrete placed in violation of this provision shall be rejected and removed.

2.03 CONCRETE MATERIALS

A. General: Use the same brand and type of cementious material from the same manufacturer throughout the Project.

B. Concrete: Conform to the requirements of Form 816-2004, Article M.03.01, Class "A" "C" or "F" and ASTM C-94. Batch mixing at project site not acceptable.

C. Compressive strength: Min. 3,000 psi at 28 days unless otherwise noted on the Plans.

D. Entrained air: 4 to 6%.

E. Reactive aggregates and calcium chloride are not allowed.

F. Water: Potable.

2.04 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.05 CURING MATERIALS

A. Conform to Article 4.01.03, Item F7 "Curing", Form 816-2004.

2.06 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

2.07 CONCRETE MIX

A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.

B. Proportion mixes to provide normal-weight concrete with the following properties:

1. Compressive Strength (28-Day): Min. 3000 psi or as shown on Plans.

2. Slump Limit at Point of Placement: 2 to 4 inches.

3. Air Entrainment of Between 4-6%. Air entrainment agent shall conform to ASTM C260.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.08 EXPANSIONS JOINTS

A. Premolded joint filler: ASTM D-994, premolded, resilient, non-extruding, joint filler, as distributed by A. H. Harris, New Britain, CT or approved equal.

1. Expansion joint filler shall be preformed bituminous cellular type conforming to the requirements of ASHTO M213.

2. Thickness: as indicated on the drawings.

3. Depth: to match concrete section

B. Joint Sealer (for non-colored concrete): Two component polyurethane elastomeric type complying with FS-TT-S-00227, self-leveling, designed for foot traffic, as manufactured by SIKA, Pecora, or approved equal.

1. Color to match finished/cured concrete. Final selected color to be approved by Engineer.
2. Provide backer rod and primer per manufacturer recommendation.

2.09 RELATED MATERIALS

A. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Epoxy Adhesive:
   a. Burke Epoxy M.V.; The Burke Co.
   b. Resi-Bond (J-58); Dayton Superior.
   c. Euco Epoxy System #452 or #620; Euclid Chemical Co.
   d. Concresive Standard Liquid; Master Builders, Inc.
   e. Rezi-Weld 1000; W.R. Meadows, Inc.
   f. Sikadur 32 Hi-Mod; Sika Corp.
   g. R-600 Series; Symons Corp.

PART 3 - EXECUTION

3.01 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement in conformance with Section 322316, Earthwork.

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

3.02 EDGE FORMS AND SCREED CONSTRUCTION

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

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

3.03 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

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

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

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

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

3.04 JOINTS

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

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

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

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

3. Provide tie bars at sides of pavement strips where indicated.

4. Use a bonding agent or epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

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

1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.

2. Extend joint fillers full width and depth of joint.

3. Terminate joint filler shall be recessed 1/2 inch (12 mm) below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

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

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

   a. Radius: 1/4 inch (6 mm).

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4 inch (6 mm).

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen subgrade or base surfaces.

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

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at project site, or during placement.

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

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices. Do not over consolidate concrete.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Engineer.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations.

J. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

L. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

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

M. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Chilled mixing water or chopped ice may be used to control temperature,

provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Finishing: Conform to Article 4.01, Form 816.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

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

D. Curing Methods: Conform to Form 816-2004, Article 4.01.

3.08 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (9 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).

8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.09 PAVEMENT MARKING

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

B. Allow concrete pavement to cure for 28 days and shall be dry before starting pavement marking.

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

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Testing shall be at the discretion of the Owner.

B. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article. Testing shall be at the discretion of the Owner.

C. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.

6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each

additional 50 cu. yd. (38 cu. m). One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.

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

8. When total quantity of a given class of concrete is less than 50 cu. yd. (38 cu. m), Engineer may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.

10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as the sole basis for approval or rejection.

F. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

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

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

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

END OF SECTION 03 30 00

SECTION 10 14 53

SITE SIGNAGE

PART 1 GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions, and Division 1 – General Requirements apply.

1.02 SECTION INCLUDES

A. Provide and install site signage as shown on the drawings and as specified herein, including but not limited to the following:

1. Traffic signs.
2. Accessible parking signs and bollards.
3. Signage accessories.

1.03 RELATED SECTIONS

A. Section 32 12 00 - Bituminous Concrete Pavement and Markings

B. Section 03 30 00 - Portland Cement Concrete (Site)

1.04 REFERENCES:

A. "Form 816" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.05 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.

B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.

C. Samples for Verification: For each type of sign, include the following samples to verify color selected:

1. Panel Signs: Full-size Samples of each type of sign required.
2. Approved samples will be returned for installation into Project.

D. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain each sign type through one source from a single manufacturer.

B. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1.07 COORDINATION

A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

PART 2 PRODUCTS

2.01 PANEL SIGNS

A. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.

B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 5005-H15.

1. Edge Condition: Square cut.
2. Corner Condition: Rounded to radius indicated.

C. Graphic Content and Style: Provide sign copy that complies with requirements indicated on Drawings and specified herein for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.

2.02 PANEL SIGN TYPES

A. Traffic Signs:

1. Material: Conform to Form 816, Article 12.08.02 - Materials for Aluminum Sheet.
2. Background Color and Material: Conform to Form 816, Article M18.13 - Sign Face - Sheet Aluminum.
3. Copy Color and Material: Conform to Form 816, Article M18.13 - Sign Face - Sheet Aluminum.
4. Sign Posts: Conform to Form 816, Article M18.14 - Metal Sign Posts.
5. Mounting: Conform to Form 816, Article M18.15 - Sign Mounting Bolts.

B. Accessible Parking Signs:

1. Material: 0.080-inch aluminum.
2. Background Color and Material: Blue, conforming to Form 816, Article M18.13 - Sign Face - Sheet Aluminum.
3. Copy Color and Material: White, conforming to Form 816, Article M18.13 - Sign Face - Sheet Aluminum.
4. Sign Posts: Conform to Form 816, Article M18.14 - Metal Sign Posts.
5. Mounting: Conform to Form 816, Article M18.15 - Sign Mounting Bolts.

C. Symbols of Accessibility: Provide 6-inch high symbol fabricated from opaque nonreflective vinyl film, 0.0035-inch nominal thickness, with pressure-sensitive adhesive backing suitable for both exterior and interior applications.

2.03 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.04 SHEET ALUMINUM FINISHES

A. Sign finish and color shall conform to Form 816, Article M18.13 - Sign Face - Sheet Aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

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

B. Verify that items provided under other sections of Work are sized and located to accommodate signs.

C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.

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

3.02 INSTALLATION

A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.

3.03 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 53

SECTION 12 93 15

STEEL PIPE BOLLARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract including General and Supplementary Conditions, and General Requirements apply to work specified in this Section.

1.02 SECTION INCLUDES

A. Under this item, the Contractor shall furnish, galvanize and erect all permanent steel pipe bollards, in accordance with the plans, specifications, and directions of the Engineer.

1.03 RELATED SECTIONS

A. Section 03 30 01 - Portland Cement Concrete (Site)

1.04 SUBMITTALS

A. Product Data: Manufacturer's catalog cuts, specifications and technical data indicating material compliance and specified options, including the following information:

1. Detailed specification of construction and fabrication shop drawings.

2. Shop Drawings shall indicate pertinent dimensions, general construction, component connections, anchoring methods, hardware and installation procedures.

3. Provide technical information for cleaning of steel, galvanizing products and application.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Permanent Steel Pipe Bollard shall be as manufactured by All City Play Equipment, Brooklyn, NY, Boundary Fence, Jamaica, NY, Bayside Fencing, Inc., Brooklyn, NY;

B. or approved equal.

2.02 MATERIALS

A. All fittings and hardware shall be of the materials listed in the following schedule:

PART	MATERIAL
Post Caps	Malleable Iron - 3/16" thick
Drive Pins and Set Screws	Stainless Steel, 18-8
Flange	Pressed Steel

"U" Bolts	Pressed Steel, Extra Heavy-3/4" X 1/2"

B. Malleable iron castings shall be hot dipped galvanized in accordance with ASTM Serial Designation A-153.

C. Pressed steel fittings and appurtenances shall be hot dipped galvanized in accordance with ASTM Serial Designation A-123.

D. Posts: Posts shall be extra heavy galvanized steel pipe, 4" O.D. and shall conform to ASTM Serial Designation A-120, Schedule 80, except that pipe shall be unthreaded and untested for water pressure.

E. Sleeves: Sleeves shall be standard weight galvanized steel pipe, 5" I.D. and shall conform to ASTM Serial Designation A-120, Schedule 80, except that pipe shall be unthreaded and untested for water pressure.

2.03 **Galvanizing:** Steel pipe, pipe fittings and all hardware shall be galvanized.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The posts for fixed bollards shall be set in concrete footings as shown on the plans or as directed by the Engineer. Once erected, steel pipe of the fixed bollard shall be filled with average concrete.

B. All posts and sleeves shall be set plumb and true to line and grade. Any post and sleeve not set true to line and grade shall be removed and replaced at the Contractor's expense. Bending posts to make them plumb will not be permitted.

3.02 **TOUCH-UP & REPAIR:** For minor damaged caused by installation or transportation, clean damaged area, then:

A. On damaged galvanized surfaces, apply organic zinc repair paint complying with ASTM A780. Galvanizing repair paint shall have 65 percent zinc by weight. Thickness of repair paint shall be not less than that required by ASTM A123.

3.03 PROTECTION/CLEAN UP

A. Protect work of this Section from damage and make repairs as required.

B. Protect all work until acceptance of the project. Replace bollard if damaged prior to acceptance.

C. Clean up all debris from installation procedures.

END OF SECTION 12 93 15

SECTION 31 11 00

SITE CLEARING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

1.02 SUMMARY

A. The work of this Section includes the following:

1. Clearing and grubbing of tree stumps, shrubs, brush and other plant material as indicated on the Drawings and directed by the Landscape Architect.

1.03 RELATED SECTIONS

A. Section 02 41 13 - Site Demolition

B. Section 31 25 00 - Erosion and Sediment Controls

1.04 PROJECT CONDITIONS

A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect site improvements on adjoining properties and on Owner's property to remain.

2. Restore damaged improvements to their original condition, as acceptable to property owners.

C. Review and verify all limits of items to be removed with the Owner and Landscape Architect prior to commencing clearing and grubbing operations.

D. Inspection: Verify existing condition of all plant material scheduled for clearing and grubbing removal. Do not proceed with any work that will result with unsafe conditions causing a continuing or permanent hazard. Ascertain that all work scheduled for clearing and grubbing can be safely accomplished in a proper time period.

E. Benchmarks: Protect all survey monuments, benchmarks, and property boundary pins. Replace if destroyed by Contractor's operations at no cost to the Owner. Contractor to provide temporary offsets to benchmarks during clearing & grubbing and construction and provide new monuments as part of this construction.

F. Permits/Fees: Coordinate with appropriate utility companies and pay any disconnect fees and permits as necessary.

G. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

H. Provide 48 hours notice prior to conducting any site clearing and grubbing operation.

I. Contact Call Before You Dig Services (1-800-922-4455) prior to commencing any clearing and grubbing operations.

1.05 EXISTING SERVICES

A. General: Indicated locations are approximate. Contractor is responsible for determining exact locations before commencing Work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 SITE CLEARING

A. General: Remove tree stumps, shrubs, grass, and other vegetation, asphalt surfaces, stone and gravel, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.

B. Clearing and Grubbing: Clear site of shrubs, and other vegetation, except for those indicated to be left standing.

1. Completely remove stumps, roots, and other debris protruding through ground surface.

2. Fill depressions caused by clearing and grubbing operations with suitable material, unless further excavation or earthwork is indicated.

a. Place fill material in horizontal layers not exceeding 6 inches (150 mm) loose depth, and thoroughly compact each layer to a density equal to adjacent original ground. Topsoil in field areas shall be placed in accordance with Section 312316 - Earthwork.

b. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

3.02 POISON IVY REMOVAL

A. Carefully remove all poison ivy vines within the project site. Do not burn the grubbed plants as the oils of the plant are very volatile and become airborne in the smoke infecting those nearby.

1. Workmen shall wear appropriate clothing that sufficiently covers all exposed areas of skin during removal operations. Workmen who have or who believe they may have a severe allergic reaction to the chemicals produced by poison ivy plants shall not be required to work in areas where poison ivy is prevalent.

2. Apply Round-Up or approved equal to the leaves of all visible plants with a low pressure applicator. Apply to other areas as directed. Follow manufacturers guidelines for application rates.

3. Cut roots of poison ivy plants one inch below the ground after a period of time as recommended

by the manufacturer after initial application, or when the Engineer determines that the plant is sufficiently dead. Plant material not sufficiently dead in the opinion of the Engineer shall receive a second application of "Round-Up".

4. Remove dead plant material from trees by carefully cutting stalk at 2' intervals or as directed. Care shall be taken not to remove bark from the existing trees. Coat remaining plant stump with "Round-Up".

5. Bag and seal vines in recyclable bags and dispose of legally.

3.03 PROTECTION OF EXISTING IMPROVEMENTS/UTILITIES

A. General: Retain and protect all existing and adjacent improvements, structures and utilities designated to remain.

B. Time: For the duration of the work.

C. Replace: Any existing improvements or utilities scheduled to remain which are removed erroneously or damaged beyond satisfactory repair, in kind, as approved by the Architect and Owner, and as per utility requirements.

3.04 PAVEMENT REMOVAL

A. Demolish and remove from the site all bituminous concrete pavement, gravel areas and concrete pavement/curbs as indicated to be removed on the Drawings. Sawcut pavement and curbing limits as required.

3.05 DISPOSAL OF WASTE MATERIALS

A. Prior to beginning any construction activities at the site, the Contractor shall submit the proposed off-site disposal location to the Engineer for review and written approval.

B. Burning on Owner's Property: Burning is not permitted on Owner's property.

C. Removal from Owner's Property: Remove waste materials and unsuitable or excess topsoil from Owner's property.

END OF SECTION 31 11 00

SECTION 31 22 13

FORMATION OF SUBGRADE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 DESCRIPTION OF WORK

A. Work Included: Preparation of subgrade beneath all bituminous pavement and gravel surfaces. The work of formation of subgrade shall be performed at the plane coincident with the bottom most base or subbase material as shown on the Drawings.

1.03 RELATED WORK

A. Section 31 23 16 - Earthwork

B. Section 31 23 33 - Trenching

1.04 QUALITY ASSURANCE

A. Testing: Compaction tests may be required by the Owner and will be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All re-testing in these areas shall be paid for by the Contractor.

B. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests as required by the Contract Documents and as directed by the Engineer and to allow adequate time for the proper execution of said tests.

1.05 PROJECT CONDITIONS

A. West Nile Virus Precautions: To stem the spread of West Nile Virus, the Contractor shall closely monitor the work of this section to prevent water from collecting and/or ponding within or adjacent to the work for any length of time, thereby reducing the opportunities for mosquitoes to breed.

B. Dust Prevention: Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site in conformance with Form 816, Article 9.42.01 - 9.42.03 or Form 816, Article 9.43.01 - 9.43.03.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. As selected by the Contractor.

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

A. Comply with Form 816, Article 2.09.03.

END OF SECTION 31 22 13

SECTION 31 23 16

EARTHWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes the following: All excavating, not included under other sections, required for grading, trenching, paving, curbs, construction and reconstruction of structures, or any other subsurface structures. The Contractor shall place, compact and dispose of excess excavated materials in accordance with the plans, specifications and directions of the Engineer.

1. Unclassified Excavation shall include the removal of existing pavements, curbs, earth, boulders, buried timber, broken concrete pieces, existing foundations (e.g. concrete block), brick and other materials of any nature that may be encountered.

2. The Contractor shall construct and place fill and backfill material in accordance with this specification.

3. The Contractor shall saw cut existing pavements and/or saw cut existing curbs in accordance with the plans, specifications and direction of the Engineer.

1.03 DEFINITIONS

A. "Suitable Material" or "Acceptable Material"

1. ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen material, vegetation and other deleterious material.

2. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man made origin, including mixtures thereof, are considered acceptable materials.

B. "Unacceptable Material" - ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT.

1.05 QUALITY ASSURANCE

A. Material Standards: As defined in Form 816 inclusive of all supplements.

B. Testing: Compaction tests may be required by the Owner and will be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All re-testing in unsatisfactory areas shall be paid for by the Contractor.

C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests as required by the Owner and to allow adequate time for the proper execution of said tests.

1.06 PROTECTION

A. Dust Control: Use all means necessary to control dust on and near the construction areas caused by the Contractor's performance of the work in conformance with Form 816.

1.07 PROJECT CONDITIONS

A. West Nile Virus Precautions: To stem the spread of West Nile Virus, the Contractor shall closely monitor the work of this section to prevent water from collecting and/or ponding within or adjacent to the work for any length of time, thereby reducing the opportunities for mosquitoes to breed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Backfill, Fill and Embankment Materials: Any acceptable material.

B. Subbase and Base Material: Conform to Form 816, Section M.02.02 - Subbase.

C. Compacted Gravel Base: Conform to Form 816, Section M.02.01 - Granular Fill and Section M.02.06 - Gradation 'C'.

D. Bedding Material: Sand or sandy soil, all of which passes a 3/8" sieve, and not more than ten percent (10%) passes a No. 200 sieve.

E. Pipe Bedding: All backfill material for piping shall conform to ASTM C-33 paragraph 9.1 for quality and soundness. This material shall consist of washed pea gravel ranging from 1/8-inch to ¾-inch in diameter, or washed stone crushings between 1/8-inch and ½-inch in diameter or a material which has been approved by the tank or pipe manufacturer. Not more than 3 percent of the aggregate shall pass a No. 8 sieve.

F. Gravel Backfill: Well graded gravel conforming to Form 816, M.02.01 except, M.02.06 Grading C, not Grading A, shall be provided. Use bank run gravel backfill for all excavations where indicated on the plans or wherever specified

2.02 BORROW SOIL FILL

A. Conform to Section 31 23 23.

2.03 WARNING TAPE

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 EXECUTION

3.01 GENERAL

A. The entire area of work shall be brought to the required lines and grades by excavation and filling. Excavated materials, acceptable in the opinion of the Engineer, shall be used in making embankments and filling the low areas of the work, and at such places as the Engineer may direct.

B. Excavate to the limits shown on the Drawings to subgrade level. Compact subgrade level before placing fill, base or subbase materials.

C. Construct base course to required depths and elevations below all walls, curbs, gravel surfaces and bituminous concrete.

D. Construct bedding course below all drainage and utility structures.

E. Place suitable/ acceptable material below all lawn and landscaped areas. No rocks larger than 2 inches in any dimension shall be placed within 4 inches of the finished grade.

3.02 COMPACTION REQUIREMENTS

A. Compact soil to not less than the following percentages of maximum dry density according to ASTM 1557:

1. Under foundations, concrete pads, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

2. Under lawn or unpaved areas: see Section 329113 - Topsoil.

3.03 EXCAVATION

A. Protect Structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Any damage to existing structures or utilities that occurs as a result of the Contractor's operations shall be corrected by the Contractor at no additional cost to the Project.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion and control measures to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties and watercourses, in accordance with the Sediment and Erosion Control Plan, details and as directed by the Engineer.

D. Subgrade: All soft, boggy, clayey or other objectionable material below the proposed subgrade elevation shall be removed, and the area refilled with acceptable material.

E. Boulders: The Contractor shall remove all boulders, stone or pieces of concrete, lumber, iron or other material that project above subgrade. Any stone larger than two (2) cubic feet in volume shall not be placed within two (2) feet of the finished surface.

F. Excavating for Foundations: All excavations shall be cut accurately to required lines and dimensions for work on drawings and shall be large enough to provide adequate clearance for the proper execution of the work.

G. Bottoms of Excavations: Level the bottoms of all excavations, to receive footings or other work supported on soil, accurately, to the lines and levels shown on the plans or as directed by the Engineer.

Where excavation for a foundation has been carried below the indicated level by error, fill the space between the incorrect and required depth with concrete at no additional cost to the Owner.

H. Storage and Placement: All those excavated materials which in the opinion of the Engineer are suitable for backfill shall be stored or placed within the limits of the Contract, where directed by the Engineer.

I. Surplus: All surplus materials and materials not suitable for backfill shall be placed within the site as directed by the Engineer. No additional payment will be made for this, but the cost thereof shall be deemed included in the price bid.

J. Shoring: Wherever necessary to maintain the banks of excavation in a safe and stable condition, the Contractor shall furnish and install temporary sheet piling or planks, braces and shores of good sound timber of adequate strength, and shall remove such piling or shoring as the foundation work progresses.

Sheeting and bracing of a type approved by the Engineer, shall be installed when the Contractor's employees are required to enter into excavations which exceed four (4) feet in depth.

The foregoing shall include the construction and removal of sheeting and bracing, the excavation and maintenance of temporary ditches, and the furnishing and operation of pumps or other appliances needed to properly drain the work. No direct compensation will be made for this work, but payment therefore shall be deemed included in the price bid.

K. Inspection: When the excavations have been carried to the required depth as shown on the drawings, the Contractor shall do no more work until after inspection by the Engineer, who shall order the foundation or other work to proceed, or further excavation, as the conditions indicate and no foundation or other work shall be done until the excavations have been approved by the Engineer.

L. Bailing and Draining: The Contractor shall furnish all materials, appliances and labor required to keep the site of the work free form water, ice and snow during construction.

M. Utilities and Services: When any sewer, water, gas, electric or other utility service connections are encountered in the excavation operations, the service shall not be interrupted or disturbed by the Contractor unless called for on the plans and/or directed by the Engineer. It is the Contractor's responsibility to detect and protect existing utilities (to remain) from damage during construction. The Contractor shall locate buried utilities, to the best of his ability, using electronic probes, or other methods, prior to the start of excavation. The Contractor shall then proceed cautiously and perform hand excavation, as necessary, to protect the utility as directed by the Engineer, at no extra cost to the Owner. If a utility is inadvertently damaged, it is the Contractor's responsibility to restore that utility to operating condition, equal to that existing prior to damage. The Contractor shall remain at the site with the damaged utility until it has been restored and there is no danger to the public (i.e. exposed live electrical wires, etc.).

Should the Contractor need to cut off utilities or services during the performances of the work, he shall notify the City Department or Utility Company owning or controlling services, to cut off these services. It is the Contractor's responsibility to provide sufficient advance notice to the Utility Company so that work not be delayed. The cost of any such delay in work shall be solely borne by the Contractor.

Any services cut off or interrupted by the Contractor's operations shall be restored at the Contractor's expense.

3.04 FILL

A. Remove all vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstructions, and deleterious materials from the ground surface prior to placing fills. Unsuitable subgrade material as determined by the Engineer may be removed in accordance with Section 3.3 D of this Specification.

B. Fill and Compacting shall be carried out as directed by the Engineer, and shall be constructed in successive horizontal layers not over 6 inches in depth. It shall be spread by a "Bulldozer", or other acceptable methods, and shall be thoroughly compacted by rolling with a self-propelling roller weighing not less than ten (10) tons and completed to the satisfaction of the Engineer. In places where the character of the material makes the use of this roller impracticable or where drains or other construction may be damaged a lighter one may be substituted, or the area shall be compacted by vibratory tamping, all with the approval, and to the satisfaction of the Engineer.

C. All hollows and depressions which develop during the process of rolling and compacting shall be filled with acceptable material, and the subgrade shall again be compacted. This process of filling and compacting shall be repeated until no depressions develop.

D. Plow, strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

E. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.

3.05 BACKFILL

A. After inspection and approval of foundations and other work which is to be covered by backfill, the excavated voids shall be filled with clean excavated material, puddled and rammed solid every 6" of depth.

B. After areas and trenches have been excavated and structures constructed therein, the spaces around and above them shall be carefully backfilled with acceptable material. Backfill shall be placed on both sides of structures to approximately the same elevation at the same time. All backfill shall be thoroughly tamped and rammed in place in layers not over six (6) inches in depth, using rammers of a weight acceptable to the Engineer. If directed by the Engineer, the backfill shall be thoroughly saturated with water as it is placed.

C. Backfilling around manholes, catch basins and dry wells shall not take place until the mortar has hardened and the possibility of movement is slight. Backfilling shall take place uniformly around all sides of the structure.

D. When sheeting is being withdrawn, all cavities left thereby shall be filled with acceptable material, tamped in place so as to fill all voids thoroughly. Backfill inside of sheeting shall be placed before sheeting is removed.

3.06 UTILITY TRENCHES

A. See Section 312333 - Trenching.

3.07 SAW CUTTING

A. All saw cutting shall be carried out to the full depth of the pavement, curb or concrete walk to be cut. Saw cutting shall be done to accurate, neat and straight lines marked previous to commencement of work. Saw cutting shall be done with approved power saws specifically designed and manufactured for such a purpose. Compressor, backhoe or spade-cutting of the pavement will not be allowed.

END OF SECTION 31 23 16

SECTION 31 23 17

UNCLASSIFIED EXCAVATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes the following:

1. All excavation, not included under other sections, required for grading, trenching, paving, curbs, construction and reconstruction of structures, such as subsurface structures or any other structures. The Contractor shall place, compact and dispose of excess excavated materials in accordance with the plans, specifications and directions of the Engineer. Unclassified Excavation shall be defined as the removal of below grade improvements such as existing asphaltic and concrete pavement and curbs, earth, boulders, buried timbers, broken concrete pieces, concrete and unit masonry foundations e.g. concrete block, brick and other materials of any nature, that may be encountered.

2. The Contractor shall saw cut existing pavements and curbs in accordance with the plans, specifications and direction of the Engineer.

3. Additional Unsuitable Excavation.

4. Test Pit to uncover existing subsurface utility locations.

1.03 SUBMITTALS

A. Submit certification from an independent testing laboratory approved by the Engineer showing that all base, subbase and subgrade material comply with the specified requirements.

B. Perform field tests or submit certification from an independent testing laboratory approved by the Engineer that all subgrade soils below proposed concrete foundations comply with the specified minimum allowable bearing capacity.

PART 2 PRODUCTS

2.01 DEFINITIONS

A. *"Suitable Material"*

1. ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen material, vegetation and other deleterious material

2. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man made origin, including mixtures thereof, may be considered suitable material with the written approval of the Engineer.

B. *"Unsuitable Material"*

1. ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH and PT.
2. Any material containing vegetable or organic matter, such as muck, peat, or organic salt, or that contains man-made deposits of industrial waste, sludge or landfill.
3. Topsoil shall be considered unsuitable material for construction below pavements or structures.

C. *"Subgrade"* - Surface upon which subbase, base, bedding material or topsoil is placed.

D. *"Subbase"* - Select granular material which is placed beneath base material.

E. *"Base"* - Fragmented stone material which is placed immediately beneath pavement or concrete structures.

2.02 MATERIALS

A. All materials shall comply with Section 31 23 16 - Earthwork.

PART 3 EXECUTION

3.01 GENERAL

A. The entire area of work shall be brought to the required lines and grades by excavation and filling. Excavation materials suitable in the opinion of the Engineer, shall be used in making embankments and filling the low areas of the work, and at such places as the Engineer may direct.

B. Excavate to the limits shown on the Drawings to subgrade level. Compact subgrade level before placing fill, base or subbase materials.

C. Construct subbase course to the required depths and elevations as shown on the Drawings below all pavements.

D. Construct base course to the required depths and elevations as shown on the Drawings below all pavements, walks, steps, concrete slabs and foundations.

E. Construct bedding course below all drainage, sanitary and utility structures to the limits as shown on the Drawings.

F. Place suitable material below all lawn and landscaped areas. No rocks larger than 2 inches in any dimension shall be placed within 4 inches of the finished grade.

3.2 COMPACTION REQUIREMENTS

A. Compact soil to not less than the following percentages of maximum dry density according to ASTM 1557:

1. Under structures, concrete slabs, steps and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

2. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.

3. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material at 90 percent maximum dry density.

B. At a minimum, existing subgrade soils below proposed concrete foundations shall have an allowable bearing capacity of 2 tons per square foot. Subgrade material which can not meet this requirement shall be removed and replaced in accordance with Section 3.3 D of this specification.

3.03 EXCAVATION

A. Protect Structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Any damage to existing structures or utilities that occurs as a result of the Contractor's operations shall be corrected by the Contractor at no additional cost to the Project.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion and control measures prior to excavation to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties and watercourses.

D. Subgrade: All soft, boggy, clayey or other objectionable material as determined by the Engineer, shall be removed from below the proposed subgrade level and the area refilled with suitable material. Payment for "Additional Unsuitable Excavation" shall be on a "per unit" basis. The Engineer shall determine and approve the limits of additional excavation necessary.

E. Boulders: The Contractor shall remove all boulders, stone or pieces of concrete, lumber, iron or other material that project above the subgrade level. Any stone larger than two (2) cubic feet in volume shall not be placed within two (2) feet of the finished surface.

F. Excavating for Foundations: All excavations shall be cut accurately to required lines and dimensions for work on drawings and shall be large enough to provide adequate clearance for the proper execution of the work.

G. Bottoms of Excavations: The Contractor shall level the bottoms of all excavations, to receive footings or other work supported on soil, accurately, to the lines and levels shown on the plans or as directed by the Engineer.

Where excavation for a foundation has been carried below the indicated level by error on the part of the Contractor, he will be required to fill the space between the incorrect and required depth with suitable material at no additional cost to the Owner.

H. Storage and Placement: All those excavated materials which in the opinion of the Engineer are suitable for backfill shall be stored or placed within the limits of the Contract, where directed by the Engineer.

I. Surplus: All surplus materials and materials not suitable for backfill shall be removed from the site and disposed of by the Contractor. No additional payment will be made for this, but the cost thereof shall be deemed included in the price bid.

J. Shoring: Wherever necessary to maintain the banks of excavation in a safe and stable condition, the Contractor shall furnish and install temporary sheet piling or planks, braces and shores of good sound timber of adequate strength, and shall remove such piling or shoring as the foundation work progresses.

Sheeting and bracing shall be designed by a Professional Engineer licensed in the State of Connecticut, and approved by the Engineer, and shall be installed when the Contractor's employees are required to enter into excavations which exceed four (4) feet in depth.

The foregoing shall include the construction and removal of sheeting and bracing, the excavation and maintenance of temporary ditches, and the furnishing and operation of pumps or other appliances needed to properly drain the work. No direct compensation will be made for this work, but payment therefore shall be deemed included in the price bid.

K. Inspection: When the excavations have been carried to the required depth as shown on the drawings, the Contractor shall do no more work until after inspection by the Engineer, who shall order the foundation or other work to proceed, or further excavation, as the conditions indicate and no foundation or other work shall be done until the excavations have been approved by the Engineer.

L. Bailing and Draining: The Contractor shall furnish all materials, appliances and labor required to keep the site of the work free form water, ice and snow during construction.

M. Utilities and Services: Contact Call Before You Dig services for Connecticut (1.800.922.4455) to locate underground utilities prior to commencing site preparation operations a minimum of 2 days before beginning any work at the site. When any sewer, water, gas, electric or other utility service connections are encountered in the excavation operations, the service shall not be interrupted or disturbed by the Contractor unless called for on the plans and/or directed by the Engineer. It is the Contractor's responsibility to detect and protect existing utilities (to remain) from damage during construction. The Contractor shall locate buried utilities, to the best of his ability, using electronic probes, or other methods, prior to the start of excavation. The Contractor shall then proceed cautiously and perform hand excavation, as necessary, to protect the utility as directed by the Engineer, at no extra cost to the Owner. If a utility is inadvertently damaged, it is the Contractor's responsibility to restore that utility to operating condition, equal to that existing prior to damage. The Contractor shall remain at the site with the damaged utility until it has been restored and there is no danger to the public (i.e. exposed live electrical wires, etc.).

Should the Contractor need to cut off utilities or services during the performance of the work, he shall notify the appropriate Utility Company owning or controlling services, to cut off these

services. It is the Contractor's responsibility to provide sufficient advance notice to the Utility Company so that work not be delayed. The cost of any such delay in work shall be solely borne by the Contractor.

Any services cut off or interrupted by the Contractor's operations shall be restored at the Contractor's expense.

3.04 DE-WATERING

A. Provide all required channeling, piping, and pumping necessary to keep excavated areas clear of standing water. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Maintain site drainage at all times.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a de-watering system to keep subgrades dry and convey ground water away from excavations. Maintain until de-watering is no longer required.

C. Dispose with outfall to existing storm water systems. Prevent erosion or siltation of existing drainage systems by use of filter socks and other approved materials.

D. At completion of de-watering activities, remove temporary facilities and restore any damaged areas.

3.05 FILL

A. Remove all vegetation, topsoil, debris, wet and unsuitable materials, obstructions, and deleterious materials from the ground surface prior to placing fills. Unsuitable subgrade material as determined by the Engineer may be removed in accordance with Section 3.3 D of this Specification.

B. Fill and Compacting shall be carried out as directed by the Engineer, and shall be constructed in successive horizontal layers not over 6 inches in depth. It shall be spread by a "Bulldozer", or other acceptable methods, and shall be thoroughly compacted by rolling with a self-propelling roller weighing not less than ten (10) tons and completed to the satisfaction of the Engineer. In places where the character of the material makes the use of this roller impracticable or where drains or other construction may be damaged a lighter one may be substituted, or the area shall be compacted by vibratory tamping, all with the approval, and to the satisfaction of the Engineer.

C. All hollows and depressions which develop during the process of rolling and compacting shall be filled with suitable material, and the subgrade shall again be compacted. This process of filling and compacting shall be repeated until no depressions develop.

D. Plow, strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

E. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.

3.06 BACKFILL

A. After inspection and approval of foundations and other work which is to be covered by backfill, the excavated voids shall be filled with clean excavated material, puddled and rammed solid every 6" of depth.

B. After areas and trenches have been excavated and structures constructed therein, the spaces around and above them shall be carefully backfilled with suitable material. Backfill shall be placed on both sides of structures to approximately the same elevation at the same time. All backfill shall be thoroughly tamped and rammed in place in layers not over six (6) inches in depth, using rammers of a weight acceptable to the Engineer. If directed by the Engineer, the backfill shall be thoroughly saturated with water as it is placed.

C. Backfill adjacent to foundation walls shall be pneumatically compacted.

D. Backfilling around masonry manholes and catch basins shall not take place until the mortar has hardened and the possibility of movement is slight. Backfilling shall take place uniformly around all sides of the structures.

E. When sheeting is being withdrawn, all cavities left thereby shall be filled with suitable material, tamped in place so as to fill all voids thoroughly. Backfill inside of sheeting shall be placed before sheeting is removed.

When approved by the Engineer, sheeting may be cut-off and left in place to avoid settlement caused by extraction. The Contractor is responsible for any settlement that occurs to existing or new structures caused by sheeting removal operations.

3.07 SAW CUTTING

A. Saw cutting shall be done by competent workers in an approved manner to the satisfaction of the Engineer.

B. All saw cutting shall be carried out to the full depth of the pavement, curb or concrete walk to be cut. Saw cutting shall be done to accurate, neat and straight lines marked previous to commencement of work. Saw cutting shall be done with approved power saws specifically designed and manufactured for such a purpose. Compressor, backhoe or spade-cutting of the pavement will not be allowed.

C. Workmen shall wear safety clothing and eye protection while operating saw equipment and shall be thoroughly familiar in the safe operation of the equipment.

3.08 TEST PITS

A. The Contractor shall dig test pits at the locations shown on the Drawings or as directed by the Engineer.

B. Test pits shall be dug sufficiently in advance of any work in the vicinity of the test pit area, so that the information obtained may be used to proceed with the project without any delays. Any delay in the work due to the failure of the Contractor to provide test pit information in a timely manner will be borne solely by the Contractor.

C. All test pits shall be clearly outlined on the existing ground surface for approval by the Engineer before beginning any excavation. Contractor shall utilize the toll-free "Call-Before-You-Dig" number 2 days in advance to have existing utilities marked out on the ground prior to beginning any test pit excavations.

D. Excavation shall proceed slowly and carefully until such point that the likelihood of damage to the existing utility or structure, in the opinion of the Engineer, becomes too great. Excavation shall then proceed by hand until the utility or structure is uncovered.

E. The test pit shall remain open and barricaded until all appropriate measurements are taken, or until the Engineer has obtained the required data.

F. Backfilling of the test pit shall be done carefully in accordance with this Specification. Unsuitable backfill material shall be removed and replaced with suitable material. A minimum of 2 inches of temporary bituminous pavement shall be used to patch existing pavement areas.

G. Payment for test pits shall be included in the Contractor's Lump Sum Bid Price, for the test pits shown on the Drawings and for the sizes indicated. Payment shall include the cost of all labor, materials, tools and equipment, cutting of pavement, excavation, backfill, tamping, temporary pavement, barricades, hand excavation, dewatering, and any other work required to dig the test pit.

H. If the size of any test pit exceeds the dimensions given on the Drawings or if additional test pits are ordered by the Engineer which are not shown on the Drawings, then payment for the additional amount of excavation will be made at the Contractor's Unit Bid Price for Unclassified Excavation.

END OF SECTION 31 23 17

SECTION 31 23 23

BORROW SOIL FILL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

1.02 SUMMARY

A. This Section includes the following:

1. Providing borrow soil fill for lawns. Borrow soil fill may be excavation material produced from the building excavation as long as it meets the specification herein <u>or</u> is modified to meet the specification herein.

1.03 DEFINITIONS

A. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

B. Fill: Soil materials used to raise existing grades.

1.04 QUALITY ASSURANCE

A. Borrow Soil Fill:

1. Testing: Representative samples of borrow soil fill shall be completely analyzed/ tested to determine:

   a. Nutrient analysis using the Modified Morgan extractant for soil available P, K, Ca, and Mg.

   b. Soil pH.

   c. Organic content- determined by loss of weight on ignition.

   d. Particle size analysis - sand, silt, and clay - analysis shall be determined using the hydrometer or pipette methods of particle size analysis with size fractions based upon size limits established by USDA.

2. Before delivery of any borrow soil fill, furnish the Architect with a 5 gallon sample of material.

3. Borrow soil fill testing costs shall be borne by the Contractor.

4. Testing laboratory shall be:

   Soils Testing Laboratory
   Horticulture Storage Building
   University of Connecticut
   2019 Hillside Road
   Storrs, CT 06269

   Substitute laboratory may be used only if approved by the Owner and Architect.

1.05 SUBMITTALS

A. Submit borrow soil fill test results for approval.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each borrow soil material proposed for fill. Soil test verifying borrow soil composition and percentages of silt, sand, clay and organic matter.

2. Laboratory compaction curve according to ASTM D 698 for each borrow soil material proposed for fill and backfill.

3. Laboratory compaction curve according to ASTM D 1557 for each borrow soil material proposed for fill.

C. Modified Building Excavation Material: Excavated material must be tested before modification to determine the amounts and types of material to be added to comply with the specifications herein. Modified material must then be thoroughly mixed and then tested for compliance with requirements indicated above in 1.05.B.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on site earthwork.

B. Borrow Soil Fill material shall be soil material classified as a sandy loam soil that contains:

7 to 20% clay
more than 52 % sand
and the percentage of silt + (2 x % clay) = 30% or greater

<u>or</u>

less than 7% clay
less than 50% silt
more than 43% sand

PART 3 EXECUTION

3.01 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Do not store within drip line of remaining trees.

3.02 INSTALLATION AND ROUGH GRADING

A. Conform to Section 312316 - Earthwork.

END OF SECTION 31 23 23

SECTION 31 23 33

TRENCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 DESCRIPTION OF WORK

A. Work Included: Trenching, sheeting and dewatering as specified herein, and as needed for installation of storm drainage and appurtenances associated with the Work.

1.03 RELATED WORK DESCRIBED ELSEWHERE

A. Section 31 23 16 - Earthwork

B. Section 34 40 00 - Storm Drainage

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.

C. Comply with requirements and regulations of utility companies and governmental agencies having jurisdiction.

D. Refer to Section 31 23 16 - Earthwork for compaction requirements.

1.05 PROJECT CONDITIONS

A. Contact Call Before You Dig services for Connecticut (1.800.922.4455) to locate under- ground utilities prior to commencing site preparation operations a minimum of 2 days before beginning any work at the site.

B. West Nile Virus Precautions: To stem the spread of West Nile Virus, the Contractor shall closely monitor the work of this section to prevent water from collecting and/or ponding within or adjacent to the work for any length of time, thereby reducing the opportunities for mosquitoes to breed.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. As selected by the Contractor.

PART 3 EXECUTION

3.01 PROJECT CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed with the work of this section until unsatisfactory conditions are corrected.

B. Finish Elevations and Lines:

1. Locate and protect control points during progress of the Work.

2. Preserve permanent reference points during progress of the Work.

3. Do not change or relocate reference points or items of the Work without written approval from the Engineer.

3.02 EXECUTION

A. Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.

2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted. Inform Engineer of existing utility line before proceeding.

3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.

4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer for review and written direction before proceeding with modifications to the work. Do not proceed with permanent relocation of utilities until written direction is received from the Engineer.

B. Protection of Persons and Property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access to the work.

2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect existing structures, utilities, sidewalks, pavements, fences and other facilities from damage caused by trenching, settlement, lateral movement, washout, and other hazards created by operations under this Section. All existing features affected and/or damaged by

the work of this Section shall be brought back to their original conditions at no cost to the Owner.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and substructure work to an approved location by pumps, drains, and other approved methods.

2. Keep excavations and site construction free from water.

D. Dust Prevention:

1. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site in conformance with Standard Specifications.

E. Maintain access to the site at all times.

3.03 TRENCHING PROCEDURES

A. Trench Excavation:

1. Construction methods shall conform to Section 206 of Standard Specifications, where applicable.

2. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.

3. Clearance: 12 inches minimum each side of pipe or conduit.

4. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

5. Place and compact bedding material on rock or other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Rock in Trench Excavation:

1. Excavation of trench shall be as described in Standard Specifications, Article 203-3.05, under the "Rock Excavation".

C. Comply with pertinent provisions of Section 02300 - Earthwork.

D. Provide sheeting and shoring as necessary for protection of the Work and for the safety of personnel.

1. Prior to backfilling, remove all sheeting.

2. Do not permit sheeting to remain in the trenches except when field conditions or the type of sheeting or methods or construction such as the use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, portions of sheeting may be cut off and remain in the trench as approved by the Owner.

E. Miscellaneous:

1. Short sections of a trench may be tunneled, subject to approval of the Engineer, if the conductor conduit and backfill can be installed and compacted properly into such tunnel.

2. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill and compact the voids remaining after removal of the objects in accordance with Section 02300 at no additional cost to the Owner.

   a. If a void is below the subgrade for the utility bedding, use suitable earth materials and compact to a relative density of no less than 95%.

   b. If a void is in the side of the utility trench of open cut, use suitable earth or sand compacted or consolidated to a relative density of no less than 90%.

3. Excavating for appurtenances:

   a. Excavate for dry wells, hydrants and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.

   b. Over depth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as approved by the Engineer, and at no additional cost to the Owner.

4. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

5. Depressions:

   a. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.

   b. Except where rock is encountered, do not excavate below the depth indicated or specified.

   c. Where rock is encountered, excavate rock to a minimum over depth of 4" below the trench depth indicated or specified.

F. Where utility trenching, piping and/or conduit traverses public property and/or is subject to governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements and/or regulations as set forth by authority having jurisdiction, but in no case shall the depth be less than that shown in the Contract Documents.

G. Cover:

1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade:

   a. Storm drains: 18"
   b. Sewer pipes: 36"
   c. Raceways: 30"
   d. Water pipes: 48"
   e. Gas: 36"

2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, provided it will not interfere with the structural integrity of the slab or pavement.

3. Where the minimum cover is not provided, encase the pipes in concrete as indicated on the Drawings. Provide concrete with a minimum 28 day compressive strength of 3000 psi with entrained air 5 to 7 percent. Mechanically consolidate concrete.

3.04 BACKFILLING AND COMPACTION

A. Excavations shall be backfilled and compacted in accordance with Section 31 23 16.

END OF SECTION 31 23 33

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

B. "Connecticut Guidelines for Soil Erosion and Sediment Control", Connecticut Council on Soil and Water Conservation, May 2002, inclusive of all supplements and/or its latest revision or edition.

1.02 SECTION INCLUDES

A. Hay bales, filter fabric fence, sediment barriers and sedimentation structures

B. Temporary mulch

C. Temporary sediment basins as required by field conditions

1.03 QUALITY ASSURANCE

A. All erosion and sediment control measures will be constructed in accordance with the standards and specifications of the "Connecticut Guidelines for Soil Erosion and Sediment Control".

1.04 PROJECT CONDITIONS

A. Land disturbance will be kept to a minimum; re-stabilization will be scheduled as soon as possible. Temporary seeding or permanent hydro-seeding should take place immediately upon completion of grading. Permanent seeding will be scheduled during March 15 - June 15: August 15 - October 15.

B. Erosion and sediment control measures will be installed prior to construction whenever possible and will be maintained in effective condition throughout the construction period.

C. Hay bale filters will be installed at the base of all proposed slopes and on the downhill side of any area receiving new planting and as instructed by the Engineer.

D. Additional control measures will be installed during the construction period as required by field conditions or as requested by the Engineer.

E. Sediment removed from control structures will be disposed of on site in a manner approved by the Engineer.

F. Mulch all new slopes 3% or greater. Use straw or hay (70-90 lbs. 1,000 sq. ft.), free of weeds or coarse matter. Chemical binder such as Petroset Terratack Hydro Mulch and Aerospray will be used as recommended by manufacturer to anchor mulch. Mulch must be inspected periodically, in particular, after rainstorms to check for rill erosion. Where erosion is severe, repair the eroded area and place additional mulch as required to control the erosion. Grasses shall not be considered established until a ground cover is achieved, which is mature enough to control soil erosion and to survive severe weather conditions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Hay bales:

1. Hay bales shall be made of hay with 40 lbs. minimum weight, and 120 lbs. maximum weight. The hay bales shall be sufficiently bound with either wire or nylon twine to resist breaking apart during their use, shipment or placement.

2. Stakes shall be wood, minimum two inches (2") by two inches (2") by three feet (3') long.

B. Filter fabric:

1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene filaments and shall be certified by the manufacturer or supplier as conforming to the following requirements:

Minimum Filtering Efficiency:	75%
Minimum Tensile Strength at 20% Elongation	
for Extra Strength:	50 lbs./lin. in.
for Regular Strength:	30 lbs./lin. in.
Minimum Flow Rate:	0.3 gal./min./sq.ft.

C. Temporary mulch: clean oat straw, wheat straw, timothy hay, a mixture of clover and timothy hay or other approved native or forage grasses; well-seasoned before bailing, free from mature seed-bearing stalks or roots of prohibited or noxious weeds.

D. Crushed stone: crushed or broken stone conforming to the requirements of Section M.02.01-1 "Broken or Crushed Stone" of ConnDOT Form 816. Gradation shall conform to No. 8 (1/4" stone) per Section M.01.01.

PART 3 EXECUTION

3.01 PREPARATION

A. Conduct construction operations in compliance with all terms of regulation agency requirements, including requirements noted on the Contract Drawings.

B. Retain all sediments within the contract limits, and within designated disposal areas.

C. Install erosion control measures prior to beginning site disturbance. Maintain erosion control measures throughout construction period, install additional measures if necessary to retain all sediment on site. Install any additional erosion control measures which may be required by local regulatory officials.

3.02 SEDIMENT BARRIERS

A. Sediment barriers shall be limited to hay bales and silt fencing for sheet flow applications installed in accordance with Item 1.01.B.

B. Hay Bales:

1. Bales shall be placed in a single row, with ends of adjacent bales tightly abutting one another. Bales shall be oriented lengthwise on the contour for sheet flow applications, perpendicular to the contour for channel flow applications, and in a square or rectangular shape around depressed catch basin inlets.

2. Bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales to prevent deterioration of the bindings.

3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of the bale and the length of the proposed barrier to a minimum depth of four inches (4"). After the bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to four inches (4") against the uphill side of the barrier.

4. For channel flow applications, the barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment laden runoff will flow either through or over the barrier but not around it.

5. The areas immediately around catch basins may be excavated slightly to increase ponding of runoff water around catch basins.

6. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.

7. The gaps between bales shall be chinked with straw to prevent water from escaping between bales.

8. In sloping areas where surface flow follows the bale line, perpendicular bale checks shall be installed at appropriate intervals (100 feet maximum).

C. Filter Fabric

1. Filter fabric shall be wrapped around all existing and proposed trench drain and catch basin and inlet grates to prevent sediment from entering the storm drainage system. The fabric shall be wrapped tightly around the outside of the grate structure and the grate placed securely back inside the receiving frame.

2. Where soil stockpiles are to be placed directly over trench drains or inlets, the fabric shall be wrapped a minimum of two (2) times around the grate structure.

3.03 TEMPORARY MULCH

A. Place mulch uniformly in a continuous blanket at a rate of 2 ½ tons per acre, or two 50 pound bales per 1,000 square feet of area. A mechanical blower may be used for mulch application. Do not spread/apply mulch by mechanical means or by hand on windy or gusty days.

B. Crimp straw into soil by mechanical means.

C. On all slopes 4:1 or steeper, anchor mulch with liquid tackifier applied uniformly at a rate of 60 gallons per acre.

D. Protect buildings, paving, planting and all non-seeded areas from liquid tackifier over-spray.

3.04 INSPECTION AND MAINTENANCE

A. General

1. Inspection shall be frequent, and shall be made after each storm event. Repair or replacement shall be made promptly as needed.

B. Hay Bales

1. Cleanout of accumulated sediment behind the bales is necessary if ½ of the original height of the bales becomes filled with sediment.

2. Hay bales shall be replaced after their expected useful life of 60 days.

3. Bale barriers shall be removed when they have served their usefulness, but not before the upslope areas have been permanently stabilized and the completion of construction activities.

C. Filter Fabric Fence

1. Fabric placed around grates shall be replaced whenever the fabric becomes torn, stretched or otherwise damaged so that it can no longer perform its function.

D. Sedimentation Basins

1. Temporary sedimentation basins shall be cleaned-out once one-half of the basin volume becomes filled with sediment.

END OF SECTION 31 25 00

SECTION 32 11 23

PROCESSED AGGREGATE BASE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 DESCRIPTION OF WORK

A. Work Included: Provide and install a processed stone aggregate base in two courses on a prepared subgrade as shown on the Drawings or as ordered by the Engineer, and as specified herein.

1.03 RELATED WORK

A. Section 31 22 13 - Formation of Subgrade

B. Section 31 23 16 - Earthwork

C. Section 33 46 23.16 - Broken Stone

1.04 QUALITY ASSURANCE

A. Material Standards: As defined in Form 816 inclusive of all supplements.

B. Testing: Compaction tests may be required by the Owner and will be paid for by the Owner. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All re-testing in unsatisfactory areas shall be paid for by the Contractor.

C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests as required by the Owner and to allow adequate time for the proper execution of said tests.

1.05 SUBMITTALS

A. Submit certified test reports and materials certificates, for products specified in this Section, indicating compliance of all proposed materials with specified requirements.

1.06 PROTECTION

A. Dust Control: Use all means necessary to control dust on and near the construction areas caused by the Contractor's performance of the work in conformance with Form 816.

PART 2 PRODUCTS

2.01 PROCESSED STONE AGGREGATE

A. Conform to Article M.05.01, Form 816.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. Prior to placing the bottom course of processed stone aggregate base, the prepared subgrade shall be maintained true to line and grade, at all times for a minimum distance of 200 feet in advance of the work. No placement of the processed aggregate is to commence until acceptance by the Engineer of the subgrade on which it is to be placed.

B. The formation and protection of subgrade shall conform to the requirements of Section 02232.

3.02 MATERIAL PLACEMENT/COMPACTION

A. Install processed aggregate base material at the locations as shown on the Drawings and in accordance with Article 3.04.03 of Form 816. Dimensions specified are after compaction.

B. Compact base material with vibratory roller to minimum 95% modified AASHTO laboratory density (ASTM D-1557, Method C).

END OF SECTION 32 11 23

SECTION 32 12 00

BITUMINOUS CONCRETE PAVEMENT AND MARKINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

B. "Form 816" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes the materials, labor, installation and incidental costs for the installation of subbase material, base materials, bituminous concrete pavement and markings.

B. Coordinate the work of this Section with Section 32 13 13 - Portland Cement Concrete Pavement and Curbing.

1.03 RELATED SECTIONS

A. Section 32 13 13 - Portland Cement Concrete Pavement and Curbing

1.04 SUBMITTALS

A. Material Certificates: Provide material certificates signed by the material producer and the Contractor, certifying that materials and products comply with specified requirements.

1.05 QUALITY ASSURANCE

A. Material and Methods of Construction: Shall comply with the following standards:

1. American Society for Testing and Materials (ASTM).
2. American Association of State Highway and Transportation Officials (AASHTO).
3. Asphalt Institute (AI).
4. State of Connecticut DOT Standard Specifications, Form 816, inclusive of all supplements.

B. Testing: Compaction tests may be required by the Owner and shall be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All retesting in these areas shall be paid for by the Contractor.

C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests if required by the Owner and to allow adequate time for the proper execution of said tests.

D. Allowable Tolerances: Final surface of base materials within 3/8" from a required grade. Final pavement thicknesses shall conform to specified requirements as shown in the Drawings. Test for smoothness using a ten (10) foot long straightedge. Surface shall not vary more than 1/4" from straightedge when placed in any direction. In no case will water be allowed to stand or puddle on any finished pavement.

E. Permits/Approvals: The Contractor shall obtain approval of construction and secure all permits for all work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Transporting shipments of bituminous concrete material shall be made in tight vehicles previously cleaned of all foreign material, and delivered to the site, so that it will not become contaminated in any way.

1.07 PROJECT CONDITIONS

A. Weather Limitations

1. Base material shall not be placed on frozen or saturated subbase material.
2. Bituminous concrete paving material shall not be placed on frozen or saturated base material.
3. Cold weather: Bituminous concrete paving materials shall be mixed and placed in accordance with minimum placement temperature as specified in Article 4.06.03, Item 8 - Placing of Mixture, Form 816.
4. Precipitation or Moisture: Placement of bituminous concrete paving materials shall not be scheduled when weather conditions of fog or rain prevail nor when the pavement surface shows signs of any moisture.
5. Precipitation Probability: Placement of bituminous concrete paving materials shall not be scheduled when the Precipitation Probability, obtained by the Contractor from the U.S. Weather Bureau Within three (3) hours prior to the start of such operations, equals or exceeds fifty (50) percent. The Contractor shall notify the Engineer of the exact time at which the above information was obtained.

B. Grade Control: Establish and maintain the required lines and grades for each course during paving operations.

C. Provide temporary barricades and warning lights as required for protection of project work and pubic safety.

D. Protect adjacent work from damage, soiling and staining during paving operations.

E. Inspection Costs: All costs associated with material certifications, plant inspection and laboratory tests shall be borne by the Contractor and shall be deemed included in the price bid for asphalt pavement.

PART 2 PRODUCTS

2.01 BITUMINOUS CONCRETE PAVEMENT

A. Conform to the requirements of Article M.04.01, Form 816, Class 2.

2.02 TACK COAT

A. Conform to the requirements of Article M.04.01, Item 1(d), Sub-item (4), Form 816. Tack Coat shall be Grade CSS-1H cationic emulsified asphalt, diluted with water at a 1:1 ratio.

2.03 PROCESSED STONE AGGREGATE

A. Conform to the requirements of Article M.05.01, Form 816.

2.04 PAINT

A. Paint shall be hot-applied, fast drying type in accordance with Form 816, Section M.07.21.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that all existing utility openings, valves, and other project installations are at their proper finished grade elevations, within areas to be paved. Provide temporary closures and protection over openings until completion of rolling operations. Remove closures at completion of the work. Set covers to grade, flush with the surface of the adjoining pavement.

3.02 SUBGRADE PREPARATION

A. Prior to placing the bottom course of processed stone aggregate base, the prepared subgrade shall be maintained true to line and grade, at all times for a minimum distance of 200 feet in advance of the work. No placement of the processed aggregate is to commence until acceptance by the Engineer of the subgrade on which it is to be placed.

B. The formation and protection of subgrade shall conform to the requirements of Article 2.09.01 and 2.09.03, Form 816.

3.03 BASE COURSE MATERIAL PLACEMENT/COMPACTION

A. Install processed aggregate base material at the locations as shown on the Drawings and in accordance with Article 3.04.03, Conn DOT Form 816. Dimensions specified are after compaction.

B. Compact base material with vibratory roller to minimum 95% modified AASHTO laboratory density (ASTM D-1557, Method C).

C. Insure thorough and proper compaction around all yard drains, catch basins, structures, utility valves, and other improvements that project above base material.

3.04 BITUMINOUS CONCRETE PAVEMENT

A. General

1. Install the bituminous concrete pavement to the lines, grades, and details shown on the Drawings. Neatly and cleanly meet and match abutting pavements. Remove all soft or yielding material below grade and replace with suitable material.

2. Thicknesses after compaction shall conform to the details on the Drawings. The pavement shall consist of the number of courses and thickness as detailed. Remove and replace areas showing deficiencies in required thickness with new material as directed by the Engineer.

3. Protect existing abutting pavement during paving operations. Replace any abutting pavement damaged during paving operations. Joint between bituminous pavement and existing portland cement concrete pavement shall be tightly compacted and pavement edge shall be of equal density to other areas of pavement.

4. Provide a cross-pitch of 1/4" per foot for proper drainage. Ensure that there are no "low" spots that may trap water and create a slipping hazard.

B. Forms

1. Provide wood edge forms of an approved type and a minimum length of ten (10) feet for tangents and curves, unless otherwise shown on the plans. Wood forms shall be of a depth equal to the depth of the pavement and shall be securely staked and braced to the required line and grade. Note: Hand tamp edges and bevel if wood forms are not used.

2. Install wood forms along all edges of pavement to produce a clean vertical edge. Secure strips to allow for proper compaction of bituminous concrete. Do not remove edge screed strips until pavement is thoroughly compacted. Raveled edges will not be accepted. Wood forms are to be removed after the bituminous pavement has completely set.

3. All forms shall be straight, free from bends and warps at all times, and shall be cleaned thoroughly and oiled before pavement is placed against them, this cleaning and oiling being repeated daily as the forms are moved ahead.

4. The forms shall rest firmly upon the thoroughly compacted sub-grade throughout their entire length, shall be joined neatly and tightly and staked securely to line and grade, three (3) bracing pins or stakes, each ten (10) foot length of side form, so that they will resist the pressure of the pavement and the impact of the roller without springing.

C. Placing

1. Bituminous concrete pavement shall be constructed and compacted in conformance with Conn DOT Form 816 requirements.

2. Coat the edge of all abutting pavement with tack coat before installing bituminous concrete pavements. Insure that the abutting pavement has a sound, clean, straight edge. Feathering of edges and transitions between new and existing pavements is not acceptable. Protect surfaces of abutting pavement from tack coat overspray.

3. Each mixture shall be furnished and laid by means of a mechanical spreader of approved design to a depth which after final compaction shall be equal to the specified depth. In areas where the use of a mechanical spreader is impractical, as determined by the Engineer, other means of spreading and compacting may be permitted. The use of hand rakes will not be permitted. The Contractor shall use lutes where necessary.

4. After placing and compacting binder course, tack coat shall be applied prior to placement of the wearing (top) course.

5. Each mixture shall be laid only where the surface to be covered is free from loose or foreign material, dry, and only when weather conditions, in the opinion of the Engineer, are suitable.

6. The Contractor shall provide suitable means for keeping all small tools clean and free from bituminous accumulations.

7. Pavement may be laid by hand. Pavement shall be compacted by making multiple passes with a roller weighing not less than 2,000 pounds. After compaction, the thickness shall be that as specified on the drawings.

D. Compacting

1. Upon completion of the spreading of each mixture, the material shall be consolidated thoroughly and uniformly with self-propelled tandem rollers. The top course shall be free from roller marks.

2. Rollers used for compacting the top course shall be well balanced, self-propelled, tandem rollers, weighing between seven (7) and eight (8) tons. The roller shall have a compression under the rear wheel of between 200 and 300 pounds per linear inch of roll at a rate not exceeding 800 square yards per hour per roller. After compaction, the surface course shall have a density not less than 97% theoretical maximum density as determined by Appendix B of The Asphalt Institute Manual MS-2.

3. Locations inaccessible to the roller, the compression shall be effected with iron tampers weighing not less than twenty-five (25) pounds and having a bearing area not exceeding forty-eight (48) square inches, or other impact type equipment.

4. Perform breakdown, second and finish rolling until the bituminous concrete mixture has been compacted to the required surface density and smoothness. Continue rolling until all roller marks are eliminated. Provide a smooth compacted surface true to thickness and elevations required.

5. After final rolling, do not permit vehicular traffic on the pavement until it has cooled and hardened, and in no case sooner than 8 hours.

E. Joints for New Construction and Between Existing Pavement:

1. Carefully make joints between old and new pavements, and between successive day's work, to ensure a continuous bond between adjoining work. Construct joints to have the same texture, density, and smoothness as other sections of the asphalt concrete course.

2. Construction shall be as nearly continuous as is possible. The roller shall pass over the end of the laid mixture only when a practical necessity.

3. When the operation of laying is interrupted, the end of the laid material shall be left unrolled until such time as work is resumed, in order that there be no joints throughout the project.

4. If it is necessary to roll the end of the laid mixture during construction, thus consolidating it, the joint so made shall be cut back before recommencing the operation of laying, in order to present a fresh, clean surface for contract with the newly placed material.

5. The edges of such joints shall be painted with liquid asphalt (RC-70 or MC-70) and the use of hot smoothing irons in finishing such joints, shall not be permitted.

F. Finished Surface

1. The surface of the top course of the pavement after compression shall be smooth and true to crown and grade, free from depressions, waves, bunches, overlapping seams and unevenness in surface. All new surfaces shall meet existing surfaces smoothly and evenly.

2. After the compaction of the top course, the Contractor shall check the entire paved area for depressions, using a ten (10) foot wood or metal straightedge. Any depressions greater than three-sixteenths (3/16) of an inch shall be corrected by removing the top course of the affected areas, and replacing with new material to form a true an even surface.

G. Defects: Where defects in composition, compression or finish appear in the completed work, such finished areas shall be removed to the full depth of the course and the defective material replaced with the required thickness of pavement at the expense of the contractor.

1. Patching: Remove and replace mixtures that become mixed with foreign materials and all defective areas. Cut out such areas and fill with fresh hot asphalt concrete. Compact by rolling to the required surface density and smoothness. Remove deficient areas for the full depth of the course. Cut sides perpendicular and parallel to the directions of traffic with edges vertical. Apply a tack coat before placing asphalt concrete mixture.

3.05 PAINTED PAVEMENT MARKINGS

A. Existing painted pavement markings shall be removed by sandblasting or milling. Painting over existing markings will not be allowed.

B. Pavement areas to be painted shall be dry and sufficiently cleaned of sand, dust and road debris so as to provide an acceptable bond between the paint and the pavement.

C. Fast drying paint shall be applied at a temperature of 120 F to 150 F at the spray gun.

D. All paint shall be performed in a neat and workmanlike manner, using approved mechanical equipment. Lines shall be sharp and clear with no feathered edging or fogging and precautions shall be taken to prevent tracking by tires of the striping equipment. Paint shall be applied as shown on the plans with no unsightly deviations.

E. After application, the paint shall be protected from crossing vehicles for a time at least equivalent to the drying time of the paint.

3.06 PROTECTION/CLEAN-UP

A. Protect all work until acceptance of the project. Replace or repair pavement if damaged prior to acceptance.

B. Clean up all debris from installation procedures, including but not limited to bituminous concrete and base material overflow into/onto areas indicated to be lawn or other surfaces. Remove from site all excess materials, debris and equipment. Contractor shall dispose of debris material legally.

C. Repair damage resulting from paving operation to other areas of the work.

END OF SECTION 32 12 00

SECTION 32 12 21

BITUMINOUS CONCRETE FULL DEPTH RECLAMATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. Work under this item shall consist of the preparation of a stabilized subbase course composed of a mixture of the existing bituminous concrete pavement and the underlying granular material. The manufacture of the stabilized subbase course shall be done by in-place pulverizing and blending of the existing pavement and underlying granular materials, the introduction of the additive calcium chloride and compaction. The process which results in a stabilized subbase course shall be accomplished in accordance with these specifications and conform to the specified grades and cross-sections shown on the plans or as directed by the Engineer.

B. Where necessary, existing subgrades will be modified (raised, lowered or modified with additional aggregate) to meet required design specifications. Any modification of this nature, if required, such as but not limited to the excavation and replacement of unsuitable materials, and shaping and fine grading the subgrade, will be accomplished under separate payment items. Movement of the full depth reclamation subbase material to and from the roadway for these modifications is also to be accomplished under a separate payment item.

C. Existing asphalt pavement shall be pulverized to a depth of ten (10) inches from the top of the existing pavement surface unless otherwise specified.

D. A 500-foot test strip will be constructed at the beginning of the project at a location approved by the Engineer.

1.03 RELATED SECTIONS

A. Section 31 33 13 - Formation of Subgrade

B. Section 32 11 23 - Processed Aggregate Base

1.04 SUBMITTALS

A. Material Certificates: Provide material certificates signed by the material producer and the Contractor, certifying that materials and products comply with specified requirements.

1.05 QUALITY ASSURANCE

A. Material and Methods of Construction: Shall comply with the following standards:

1. American Society for Testing and Materials (ASTM).
2. American Association of State Highway and Transportation Officials (AASHTO).

3. Asphalt Institute (AI).
4. State of Connecticut DOT Standard Specifications, Form 816, inclusive of all supplements.

B. Testing: Compaction tests may be required by the Owner and shall be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All retesting in these areas shall be paid for by the Contractor.

C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests if required by the Owner and to allow adequate time for the proper execution of said tests.

D. Allowable Tolerances: Final surface of base materials within 3/8" from a required grade. Final thicknesses shall conform to specified requirements as shown in the Drawings. Test for smoothness using a ten (10) foot long straightedge. Surface shall not vary more than 1/4" from straightedge when placed in any direction. In no case will water be allowed to stand or puddle on any finished reclaimed surface.

E. Permits/Approvals: The Contractor shall obtain approval of construction and secure all permits for all work.

PART 2 PRODUCTS

2.01 RECLAIMED BITUMINOUS CONCRETE

A. Materials for reclaimed asphalt pavements shall consist of existing bituminous pavement and the underlying granular material. When it is necessary to alter the gradation of the full depth reclamation subbase course or raise the grade line, additional aggregate or subbase material may be added as directed by the Engineer.

B. If it is necessary to raise or lower any utilities or underdrains, the trench backfill material shall meet Section M.02.05 or have the approval of the Engineer.

C. Samples of material will be obtained by the Materials Testing Laboratory as often as deemed necessary by the Assistant Manager of Materials Testing

2.02 CALCIUM CHLORIDE SOLUTION

A. A liquid calcium chloride solution shall be added to stabilize the surface of the reclaimed asphalt pavement subbase that will carry traffic prior to placement of bituminous concrete. The calcium chloride solution shall be provided by the manufacturer as a true solution and shall not be reconstituted from flake calcium chloride.

B. The calcium chloride solution shall meet the following material specifications (ASTM D98; AASHTO-M144):

Calcium Chloride	35% +/-1%
Alkali Chloride as NaCl	2% max.
Magnesium as MgCl	0.1%

Typical composition (in lbs. per gallon)

Calcium Chloride	5.05

Sodium Chloride	0.2
Magnesium Chloride	0.004
Calcium Sulfate	0.004
Water	6.002
	11.260

2.03 ADDITIONAL AGGREAGTE

A. Additional aggregate, if required, shall meet or exceed Article M.02.06 sections (2) Plasticity, (3) Resistance to Abrasion, and (4) Soundness.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that all existing grade elevations within areas to be reclaimed. Provide temporary closures and protection until completion of reclaiming operations. Remove closures at completion of the work.

3.02 UTILITY AND STORM DRAINAGE

A. Prior to the start of the pavement pulverization, all utilities and drainage systems shall be relocated as necessary.

3.03 BITUMINOUS CONCRETE RECLAMATION

A. Methods, equipment, tools, and any machinery to be used during construction shall be approved by the Engineer prior to the start of the project. Prior to the actual pulverization of the pavement, drop inlets or catch basins that might be affected shall be sufficiently barricaded so as to prevent silt or runoff from plugging the drainage system.

B. Sufficient surface drainage must be provided for each stage of construction so that ponding does not occur on the stabilized subbase course prior to the placement of bituminous concrete.

C. Reclamation shall be accomplished by means of a self-propelled, traveling rotary reclaimer or equivalent machine capable of cutting through existing asphalt to depths of up to twelve (12) inches with one pass. Equipment such as road planers or cold milling machines designed to mill or shred the existing bituminous concrete, rather than crush or fracture it, shall NOT be allowed. Existing bituminous concrete and the underlying granular material must be pulverized and mixed so as to form a homogenous mass of full depth reclamation subbase material which will bond together when compacted.

D. Bituminous Concrete Full Depth Reclamation shall conform to the grading requirements set forth in Article M.02.06, Grading B.

E. Compaction shall be achieved by the use of a vibratory roller having the capability of producing high amplitude and low frequency vibrations. The compaction of each lift of full depth reclamation subbase shall be a minimum of 95% of the proctor wet density (AASHTO T-180D).

3.04 ADDITIONAL AGGREGATE

A. The need for additional aggregate will be determined by examining the results of a 500 foot test strip to be performed at the beginning of the project. Additional aggregate, if necessary, shall be added during the pulverization process to ensure that it is thoroughly mixed into the full depth reclamation subbase.

B. Subgrade changes may be necessary to meet proposed grade lines and cross sections. In areas where the proposed grade is below the present grade, the existing asphalt shall be reclaimed in-place and then placed in windrows or stockpiled while the additional excavation is performed. When the proposed subgrade elevation is achieved the reclaimed asphalt material will be placed back onto the work area in lifts no greater than five (5) inches in depth before being compacted.

3.05 CALCIUM CHLORIDE SOLUTION

A. Prior to the application of calcium chloride solution the surface of the full depth reclamation that will carry traffic shall be scuffed or furrowed by a grader to provide grooves approximately two inches in depth spaced approximately one foot apart, or as approved by the Engineer, to allow for sufficient penetration of the calcium chloride. The calcium chloride solution shall be uniformly distributed over the full depth reclamation subbase at an application rate of 0.4 gallons per square yard or as determined by the Engineer.

B. Calcium chloride solution will be placed over the final lift of full depth reclamation subbase after it is compacted and furrowed as described in Section 4.03.02. The treated surface will be compacted again before traffic is allowed to pass over it.

C. The distributor for the calcium chloride solution shall be capable of applying liquid calcium chloride in accurately measured quantities at any rate between 0.1 to 2.0 gallons per square yard of roadway, at any length of spray bar up to twenty feet. The distributor shall be capable of maintaining a uniform rate of distribution of solution regardless of change in grade, width or direction of the road. The distributor shall be equipped with a Digital Volumetric Accumulator capable of measuring gallons applied and distance traveled. The volume and measuring device shall be equipped with a power unit for the pump so that application is by pressure and not gravity. The spray nozzles and pressure system shall provide a sufficient and uniform fan-shaped spray of solution throughout the entire length of the spray bar at all times while operating, and shall be adjustable laterally and vertically.

D. Application of the calcium chloride solution shall be completed in continuous segments. Each segment must be reclaimed, compacted, stabilized by calcium chloride and compacted again before it is opened to traffic. The calcium chloride solution shall not be applied when it is raining or when rain is forecast within one hour of placement.

3.06 PROTECTION/CLEAN-UP

A. Clean up all debris from reclamation procedures, including but not limited to pulverized bituminous concrete and base material overflow into/onto areas indicated to be lawn or other

surfaces. Remove from site all excess materials, debris and equipment. Contractor shall dispose of debris material legally.

B. Repair damage resulting from reclamation operations to other areas of the work.

END OF SECTION 32 12 21

SECTION 32 13 13

PORTLAND CEMENT CONCRETE PAVEMENT AND CURBS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

B. "Form 816" shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes the materials, labor, installation and incidental costs for the installation of subbase material, base materials, and portland cement concrete as follows:

1. Reinforced concrete pavement
2. Concrete curb
3. Concrete sidewalk

B. Coordinate the work of this Section with Section 32 12 16 - Bituminous Concrete Pavement and Markings.

1.03 RELATED SECTIONS

A. Section 32 12 16 - Bituminous Concrete Pavement and Markings

1.04 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.05 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials. Contractor shall pay for all testing of concrete materials.

D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates
2. Steel reinforcement and reinforcement accessories
3. Admixtures

4. Curing compounds
5. Applied finish materials (i.e., traffic paint)
6. Joint fillers
7. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.06 QUALITY ASSURANCE

A. Materials and methods of construction shall comply with the following standards:
   1. American Society for Testing and Materials (ASTM)
   2. American Concrete Institute (ACI)
   3. State of Connecticut DOT Standard Specifications (Form 816)

B. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
   1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 shall be paid by the contractor to conduct the testing indicated, as documented according to ASTM E 548.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source. Do not change source of brands of cement, aggregate materials, or batching plant during course of work.

F. ACI Publications: Comply with all ACI requirements unless modified by the requirements of the Contract Documents.

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.07 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.01 FORMS

A. Forms shall conform to Article 8.11.03-3 and 9.21.03-3 of Form 816, latest revision.

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

2.02 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Reinforcement Bars: ASTM A 615, Grade 60, deformed bars.

C. Plain Steel Wire: ASTM A 82, as drawn.

D. Joint Dowel Bars: ASTM A 615, Grade 60, plain steel bars.

E. Tie Bars: ASTM A 615, Grade 60, deformed.

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

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.03 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Concrete: Conform to the requirements of Form 816, Article M.03.01, Class "C" and ASTM C-94. Batch mixing at project site not acceptable.

C. Compressive strength: 3,000 psi at 28 days.

D. Entrained air: 5 to 7%.

E. Reactive aggregates and calcium chloride are not allowed.

F. Water: Potable.

2.04 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.05 CURING MATERIALS

A. Conform to Article 4.01.03, Item F7 "Curing", Form 816.

2.06 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Premolded Joint Filler Strips: ASTM D-994, premolded, resilient non-extruding joint filler conforming to the requirements of AASHTO M213.

C. Thickness and depth of expansion- and isolation-joint filler as indicated on the drawings.

D. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.

1. Color: Blue for handicapped requirements, yellow for fire lanes, white elsewhere.

2.07 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin concrete work until such conditions have been corrected and are ready to receive concrete.

B. Remove loose material from compacted subbase surface and excavations immediately before placing concrete.

3.02 FORMS

A. Set, brace, and secure forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 72 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:

1. Top of Forms: Not more than 1/8 inch in 10 feet.

2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

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

D. Form recess to receive brick facing masonry in exposed ramp wall as detailed in the Drawings.

3.03 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.

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

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

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

3.04 JOINTS

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

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

B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, as follows:

1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.

2. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.

C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than ½ hour, unless paving terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.

2. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.

3. Provide tie bars at sides of paving strips where indicated.

4. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

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

1. Locate expansion joints at intervals of 20 feet, unless indicated otherwise.

2. Extend joint fillers full width and depth of joint, not less than ½ inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.

3. 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.

4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

E. Installation of joint fillers and sealants shall conform applicable sections of Form 814A.

F. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.

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

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

1. When concrete placing is interrupted for more than ½ hour, place a construction joint.

E. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

F. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.

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

G. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Engineer.

I. Curbs and Gutters: Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete.

J. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

K. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 CONCRETE FINISHING

A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.

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

B. Final Tooling: Radius: 3/8 inch. Tool edges of paving, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.

B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

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

D. Curing Methods: Cure concrete by curing compound, as follows:

1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.08 FIELD QUALITY CONTROL TESTING

A. Employ a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement as follows:

B. The Contractor will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

   a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

   b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.

   c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

   d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

   e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

3. When total quantity of a given class of concrete is less than 50 cu. yd., the Engineer may waive strength testing if adequate evidence of satisfactory strength is provided.

4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to the Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.

3.09 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.

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

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

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.10 PROTECTION/CLEAN-UP

A. Protect work completed until acceptance of project. Replace or repair concrete if damaged prior to acceptance.

B. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris related to this work.

END OF SECTION 321313

SECTION 32 31 13

CHAIN-LINK FENCE AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide and install PVC-coated chain link fencing including cast-in-place concrete foundations using Sona-tube forms on all posts as indicated in the Drawings.

1.02 SUBMITTALS

A. Changes in specifications may not be made after the bid date. Proposed changes must be made in writing to the Landscape Architect.

B. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.

C. Product data: Manufacturer's catalog cuts indicating material compliance and specified options.

D. Samples: Color selection for PVC finishes. Samples of all fabric materials, 18" x 18" square with knuckled edges.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Products from qualified manufacturers having a minimum of five years experience manufacturing thermally fused chain link fencing will be acceptable by the Landscape Architect as equal if they meet the following specifications for design, size gauge of metal parts and fabrication.

B. Approved Manufacturers/Suppliers:

1. Anchor Fence, Inc., Baltimore, MD
   Phone (410) 633-6500 Fax (410) 633-6506

2. Atlas Fence Company, Branford, CT
   Phone (203) 483-9013 Fax (203) 483-9985

3. Ameristar "Permacoat" Chain Link Fence
   Ameristar Corporation, P.O. Box 581000, Tulsa, OK, 74158
   Phone (800) 321-8724 Fax (918) 835-0899, www.ameristarfence.net

2.02 CHAIN LINK FENCE FABRIC

A. PVC coating thermally fused to metallic-coated steel core wire: ASTM F 668 Class 2b, 7 mil (0.18 mm) thickness thermally fused. Core wire tensile strength 75,000 psi (517 MPa). Color: black - ASTM F 934.

B. Size: Helically wound and woven to height indicated on drawings with 2" (50 mm) diamond mesh, with a core wire diameter as indicated on the Drawings and a breakload of 1290 lbs. (5740 N).

C. Selvage of fabric knuckled both top and bottom.

2.03 STEEL FENCE FRAMING

A. Steel pipe - Type I: ASTM F 1083, standard weight schedule 40; minimum yield strength of 25,000 psi; sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft^2 of coated surface area.

B. Steel pipe - Type II: Cold formed and welded steel pipe complying with ASTM F 1043, Group IC, with minimum yield strength of 50,000 psi (344 MPa), sizes as indicated. Protective coating per ASTM F 1043, external coating Type B, zinc with organic overcoat, 0.9 oz/ft^2 (275 g/m^2) minimum zinc coating with chromate conversion coating and verifiable polymer film. Internal coating Type B, minimum 0.9 oz/ft^2 (275 g/m^2) zinc or Type D, zinc pigmented, 81% nominal coating, minimum 3 mils (0.08 mm) thick.

C. Formed steel ("C") sections: Roll formed steel shapes complying with ASTM F 1043, Group II, produced from 45,000 psi (310 MPa) yield strength steel; sizes as indicated. External coating per ASTM F 1043, Type A, minimum average 2.0 oz/ft^2 (610 g/m^2) of zinc per ASTM A 123, or 4.0 oz/ft^2 (1220 g/m^2) per ASTM A 525. C section post may have ASTM F 1043, Type C external and internal coating consisting of 0.9 oz/ft^2 (275 g/m^2) zinc 5% aluminum-mischmetal alloy, per ASTM A 875.

D. Steel square sections: [ASTM A 500, Grade B] Steel having minimum yield strength of 40,000 psi (275 MPa); sizes as indicated. Hot-dipped galvanized with minimum 1.8 oz/ft^2 (550 g/m^2) of coated surface area.

E. PVC-Coated finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils (0.254 - 0.38 mm) of thermally fused PVC <u>in black color to match fabric.</u>

F. Terminal and Corner Posts: as indicated on the Drawing

Line (intermediate) Posts: as indicated on the Drawings

Rails and Braces: as indicated on the Drawings

2.04 ACCESSORIES

A. Chain link fence accessories: Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. Conform to ASTM F 626.

B. Post caps: Formed steel, cast malleable iron, or aluminum alloy weathertight closure cap for tubular posts. Provide one cap for each post. Where top rail is used, provide tops for line posts to permit passage of top rail.

C. Top rail and brace rail ends: Formed steel, malleable or cast iron, for connection of rail and brace to terminal posts.

D. Top rail sleeves: 6" (152 mm) sleeve allowing for expansion and contraction of top rail.

E. Wire ties: 9 gauge [0.148" (3.76 mm)] galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge [0.092" (2.324 mm)] for rails and braces. Hog ring ties of 12-1/2 gauge [0.0985" (2.502 mm)] for attachment of fabric to tension wire.

F. Brace and tension (stretcher bar) bands: Pressed steel.

G. Tension (stretcher) bars: One piece lengths equal to 2 inches (50 mm) less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (4.76 mm x 19 mm). Provide tension (stretcher) bars where chain link fabric meets terminal posts.

H. Truss rods: Steel rods with minimum diameter of 5/16" (7.9 mm).

I. Nuts and bolts are galvanized but not vinyl coated. Cans of PVC touch up paint are available to color coat nuts and bolts if desired.

2.05 SETTING MATERIALS

A. Delete this Article if concrete is specified in Division 3. If retaining, revise to suit Project. Gate frames: Fabricate chain link cantilever slide gate in accordance with ASTM F 1184, Type II, Class 2, using 2 inch aluminum members, ASTM B 221, alloy and temper 6063-T6, weighing 0.94 lb/ft. Weld members together forming rigid one-piece frame integral with top track. Frame members to be square, straight and true to within 1mm over a 40' span in an un-stressed state. Provide 2 trunk assemblies for each gate leaf, except as indicated for gates larger than 30'. Frame size over 27' in length shall be shipped in 2 parts and field spliced with special attachments provided by the manufacturer. Polymer coated frame and top rack thermally fused with minimum 10 mils per ASTM 1043 (after fabrication).

B. Cantilever support (overhang): With Gate Leaf size of 23ft to 30 ft use 12' Cantilever support.

C. Gate frame and chain Link filler finish: Polymer coated, thermally fused with minimum 10 mils per ASTM 1043 including track.

D. Bracing: Provide diagonal adjustable length truss rods of 3/8" galvanized steel, in each panel of gate frames.

E. Top track/rail: Enclosed combination one-piece track and rail, aluminum extrusion with weight of 3.72 lb/ft. Track to withstand reaction load of 2,000#.

F. Truck assembly: Swivel type, zinc die cast, with 4 sealed lubricant ball bearings rollers, 2 inches in diameter by 9/16" in width, and 2 side rolling wheels to ensure truck alignment in track. Mount trucks on post brackets using 7/8"diameter ball bolts with ½" shank. Truck assembly to withstand same reaction load as track, 2,000#.

G. Gate hangers, latches brackets guide assemblies, and stops: Malleable iron or steel, galvanized after fabrication. Provide positive latch with provisions for padlocking.

H. Bottom guide wheel assemblies: Each assembly shall consist of two, 3" diameter rubber wheels, straddling bottom horizontal gate rail, allowing adjustment to maintain gate frame plumb and in proper alignment. Attach one assembly to each guide post.

I. Gate posts: galvanized steel 4" OD schedule 40 pipe, ASTM F 1083, weighing 9.1 lb/ft. Provide 1 latch post and 2 support posts. Finish to match fence.

2.06 SETTING MATERIALS

A. Concrete: Minimum 28-day compressive strength of 3,000 psi (20 MPa).

2.07 FOUNDATION FORMS

A. All concrete fence post foundations shall be formed by Sona-tube forms or equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.02 CHAIN LINK FENCE FRAMING INSTALLATION

A. Install chain link fence in accordance with ASTM F 567 and manufacturer's instructions and as indicated in the Drawings.

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

C. Space line posts uniformly at 10'-0" on center.

D. Concrete set all posts: Drill holes in firm, undisturbed or compacted soil. Use Sona-tube forms for each post. Inside diameter of Sona-tube form shall have diameter 4 times greater than outside dimension of post. Holes shall be approximately 6" deeper than post bottom as indicated in the Drawings. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

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

F. Bracing: Install horizontal pipe brace at mid-height for fence locations indicated in the Drawings, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

G. Top rail: Install lengths of top rail, 21' long. Connect joints with sleeves for rigid connections for expansion/contraction.

H. Center Rails: Install mid rails between posts with fittings and accessories as indicated in the Drawings.

I. Bottom Rails: Install bottom rails between posts with fittings and accessories.

3.03 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric as indicated on the Drawings and attach so that fabric remains in tension after pulling force is released. Refer to Drawings for dimension between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15" on center and to rails and braces at 24" on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15" on center.

3.04 ACCESSORIES

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.05 CLEAN-UP

A. Clean up debris and unused material, and remove from the site.

END OF SECTION 32 31 13

SECTION 32 31 29

TIMBER GUIDERAIL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions, and Division One General Requirements apply to the work specified in this section.

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 or its latest edition and any supplemental specifications.

1.2 DESCRIPTION OF WORK

A. Provide and install weathering metal post and timber guide rail as indicated on the Drawings.

1.3 RELATED WORK

A. Section 312316 Earthwork

1.4 SUBMITTALS

A. Wood Treatment Data: Submit materials certificate by treating plant indicating chemicals and process used and compliance with specified requirements and all governing ordinances.

B. Submit materials certificates and data sheets for all weathered metal posts.

1.5 REFERENCES

A. FS TT-W-550 Wood Preservative – Chromated Copper Arsenate.

B. FS TT-W-571 Wood Preservative – Treating Practices.

C. Form 816, 2004, State of Connecticut Standard Specifications for Roads, Bridges, and Incidental Construction.

1.6 QUALITY ASSURANCE

A. Wood Treatment: Comply with American Wood Preservers Association (AWPA) standards for wood preservative treatment schedule.

B. Provide each piece of lumber factory grade-marked in conformance with AWPA quality mark.

D. Allowable Tolerances: Guide rail shall not deviate more than ½" in line to grade in section.

E. Obtain all wood rails and metal posts each from a single source.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Keep materials dry during delivery and site storage. Stack materials above ground to ensure proper drainage and ventilation. Protect from weather damage and deterioration.

PART 2 PRODUCTS

2.1 TIMBERS – GUIDE RAIL

A. Rough sawn, No. 2 or better Southern Yellow Pine Timbers.

B. AWPA grade stamped LP-22 with .40 lbs., p.c.f. retention of waterborne CCA preservative.

C. Kiln dried or air dried before and after treatment or 25% maximum moisture content.

2.2 WEATHERING STEEL – POSTS

A. Weathering Steel Posts

1. Size: W6x15 – 5.99" x 5.99" x 6' length.

2. Weathering steel post shall be galvanized in accordance with ASTM 123 4' from bottom of post to allow for 1" maximum of exposed galvanized coating above ground.

3. All steel posts shall conform to ASTM A36.

2.3 BOLTS/WASHERS/NUTS

A. Conform to Article M.10.02-6 of Form 816, 2004. Galvanized. Provide with double washers.

PART 3 EXECUTION

3.1 PREPARATION

A. Obtain measurements and verify dimensions and details before proceeding with work.

3.2 CONSTRUCTION – GUIDE RAIL

A. Install timber guide rails where and as shown on the Drawings.

1. Examine materials upon delivery to project site. Damaged or defective timber shall be returned immediately to the manufacturer\supplier.

2. Posts shall be set at a constant vertical alignment above finished grade for each segment of guide rail.

3. Posts shall be aligned in a straight line and held at a consistent distance from the edge of roadway as indicated on the Drawings. Posts shall be firmly installed below grade to the dimensions indicated.

B. Install rails as detailed. Counter bore rails to receive bolts and double washers. Predrill rail holes.

C. Finish grade around posts to prepare for site finishing and lawn seeding. Provide topsoil for all proposed lawn areas. Do not allow water to stand adjacent to post bases.

3.3 FINISHING

A. Exposed edges of all timbers rails (all open ends of constructed guiderail) shall be chamfered or routed 1" and lightly sanded to produce eased edges.

3.4 CLEANING

A. Clean up debris and cuttings on a regular periodic basis.

B. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, tools, equipment. Repair damage resulting from rough carpentry work.

C. Dispose of all treated waste lumber in a satisfactory legal manner.

END OF SECTION 32 31 29

SECTION 32 91 13

TOPSOIL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including the General Conditions, Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 SECTION INCLUDES

A. Testing, screening, amending, placing and finish grading all stockpiled and borrow topsoil as shown on the Drawings and specified herein.

1. Provide all borrow topsoil and compost necessary to properly complete all lawn and planting operations.
2. Provide 6" depth of topsoil in all lawn seeding areas.

1.03 QUALITY ASSURANCE

A. Topsoil

1. Testing: Representative samples of borrow topsoil and stockpiled topsoil shall be completely analyzed/ tested to determine:

a. Nutrient analysis using the Modified Morgan extractant for soil available P, K, Ca, and Mg.

b. Soil pH.

c. Organic content- determined by loss of weight on ignition.

d. Particle size analysis - sand, silt, and clay - analysis shall be determined using the hydrometer or pipette methods of particle size analysis with size fractions based upon size limits established by USDA.

2. Before delivery of any borrow topsoil, furnish the Architect with a 5 gallon sample of material.
3. Topsoil testing costs shall be borne by the Contractor.
4. Testing laboratory shall be:

Soils Testing Laboratory
Horticulture Storage Building
University of Connecticut
2019 Hillside Road
Storrs, CT 06269

Substitute laboratory may be used only if approved by the Owner and Architect.

1.04 SUBMITTALS

A. Submit topsoil test results for approval.

B. Submit materials certificates and product data for the following items, clearly marked, to indicate proposed materials. Printed data shall state application rates and amount of product to be added, if applicable.

1. Soil amendments and conditioners
2. Compost

C. Submit batch delivery tickets for the following items, indicating the trade name, the supplier/distributor's name and the amount of product delivered to the contracting firm/project site.

1. Soil amendments and conditioners
2. Compost
3. Processed sand

D. Submit materials certificate and certified test report for processed sand and gravel.

1.05 PRODUCT HANDLING: Coordinate delivery of borrow topsoil such that it is placed as delivered and no stockpiling is required.

1.06 PROJECT CONDITIONS:

A. Verify that subsurface drains are complete and fully functional prior to beginning work of this Section. Protect subsurface drains from failure.

B. Coordinate topsoil placement with irrigation equipment installation (if applicable).

PART 2 PRODUCTS

2.01 BORROW TOPSOIL

A. Shall be clean, fertile, friable, and well draining; not to contain materials harmful to plant life. All topsoil to be free of any subsoil earth clods, sods, stones over 3/4 inch in any dimension, sticks, roots, weeds, litter and other deleterious material. Topsoil shall be uniform in quality and texture and contain specified organic matter and mineral elements necessary for sustaining healthy plant growth.

B. Topsoil shall have a pH of 6.0 to 8.0.

C. Organic Matter Content: 3 - 6%

D. Nutrient levels shall be achieved by the Contractor's addition of amendments to the topsoil to meet the optimum nutrient levels specified in the testing laboratory report.

E. Single source of all borrow topsoil is required.

F. Topsoil shall meet the USDA Soils Textural Classification percentage of sand, silt and clay for "sandy loam or ""fine sandy loam' classifications.

G. Free of any toxic chemical, waste or any material or condition that would prevent the establishment of a suitable lawn.

2.03 AMENDMENTS/CONDITIONERS: As recommended by the Topsoil Test Report.

2.04 COMPOST

A. Compost shall be either Pioneer Valley Compost or Agresoil Premium Organic Compost as distributed by: Agresource, phone 800-313-3320 or approved equal.

B. Compost shall be derived from organic wastes such as food and agricultural residules, animal manures, mixed solid waster and biosolids (treated sewage sludge) that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

C. Compost shall have the following properties:

Parameters	Range
pH	5.5 - 8.0
Moisture Content	35% - 55%
Soluble Salts	4.0 mnhos (dS)
C:N ratio	15 - 30:1
Particle Size	<1"
Organic Matter Content	>50%
Bulk Density	<1000 lbs./cubic yard
Foreign Matter	<1% (dry weight)

D. Compost generator shall also provide minimum available nitrogen and other macro and micro-nutrients to determine fertilizer requirements.

2.05 SAND: Processed to meet the following particle size criteria:

Description	Sieve Mesh	Diameter of sieve (mm)	Allowable range % retained
Gravel	10	2.00	0- 5%
Very coarse sand	18	1.00	0-20% combined with Gravel
Coarse	35	0.50	at least 60% in this range
Medium	60	0.25	at least 60% in this range
Fine	100	0.15	10% maximum
Very Fine	270	0.05	3% maximum
Silt		0.002	5% maximum
Clay		<0.002	3% maximum

In addition, there shall be 100% passing the No. 5 screen (4mm), and no more than 10% combined very fine sand, silt, and clay.

PART 3 EXECUTION

3.01 TOPSOIL PREPARATION

A. Provide properly amended topsoil to complete the work of this Section.

3.02 SHAPING AND GRADING OF SUBSOIL AT LAWN AREAS

A. At completion of rough grading, shape and grade subgrade areas to lines and levels as noted on the drawings.

B. Shape subgrade areas to allow placement of uniform depth of topsoil. Adjustments may be necessary due to field conditions. Provide all shaping adjustments at no additional cost to the owner.

C. Harrow or otherwise loosen the subgrade soil to a depth of 4 inches.

D. Remove all sticks, stones, or foreign material two (2) inches or greater in dimension from surface. Remove debris and stone off-site.

3.03 SPREADING TOPSOIL AND TOPSOIL/COMPOST MIXES

A. Do not apply topsoil materials to the scarified subgrade or gravel layer without approval by the Engineer. No vehicular traffic or rubber tired equipment shall be allowed on finished subgrade. Topsoil materials shall not be spread until topsoil has been amended as required. Topsoil materials shall not be worked in a frozen or muddy condition.

B. Uniformly distribute and spread topsoil materials over all graded lawn areas to conform smoothly to the lines, grades, and elevations shown or otherwise required. Maintain consistent depths of material throughout the project area. Install topsoil materials in athletic fields from the sidelines/ edges towards the center of each field.

C. Manually supply topsoil around all trees to remain. Avoid damage to root systems. Depth of topsoil around existing trees to be determined by Engineer.

D. Spread topsoil mixtures in two (2) equal lifts in all locations scheduled to receive 8" or more total topsoil thickness. Bottom lift shall be incorporated into the loosened subgrade or gravel layer as applicable, by disking, harrowing, or other approved means.

E. Place topsoil in layers that will provide the scheduled thickness after natural settlement and light rolling.

F. Spread topsoil from edges inward toward the middle of areas receiving topsoil. Do not allow equipment directly on the loosened subgrade.

G. Do not over compact the topsoil. Do not allow rubber-tired equipment on topsoil areas. Use the lightest weight equipment practicable. Sequence operations to minimize the number of equipment passes required.

H. Track topsoil slopes -parallel to the fall line.

I. Place topsoil materials only when it can be immediately followed by seeding operations.

J. Resupply and place topsoil to eroded, settled or damaged areas until all lawn areas are stabilized. Care shall be taken not to damage grass or pavement areas in the replacement to topsoil.

K. Compact subgrade soils where fill is required to 80-85% maximum dry density.

3.04 PROTECTION

A. Remove weeds prior to lawn development operations. No weeds shall be allowed to go to seed.

B. Keep heavy equipment, trucks, etc. off topsoil areas at all times.

C. If over compaction to topsoil occurs, scarify to the full depth of the topsoil and regrade topsoil.

3.05 EXCESS MATERIALS

A. Excess material, including tailings from screening operations shall be legally disposed of offsite.

3.06 FIELD QUALITY CONTROL

A. Following spreading of topsoil, and prior to the start of seeding operations, set grades as shown on the plans.

END OF SECTION 32 91 13

SECTION 32 92 00

SEEDED LAWN

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements apply to the work specified in this Section.

1.02 SECTION INCLUDES

A. Contractor to provide and install all topsoil and fine grading for seeded lawns as shown on the Drawings and as specified herein, including:

1. Fine grading for seed bed.
2. Repair of seeded lawn areas damaged by the work of other sections of this Contract.
3. Providing and incorporating amendments as indicated for good seeded lawn growth.
4. Seed all areas identified on the Drawings as lawn.
5. Providing and installing erosion control systems as necessary.
6. Mowing, watering, and maintaining the seeded lawn until established and accepted by the Owner.
7. Treating all lawn areas with crabgrass and broadleaf weed controls as needed to insure that lawn is free of weeds and crabgrass.
8. Protection, security and repair of damage to all seeded lawn areas.

1.03 RELATED SECTIONS

A. Section 32 91 13 - Topsoil

B. Section 32 92 00.1 - Steep Slope Seed Mix

C. Section 32 93 00 - Landscape Planting

1.04 QUALITY ASSURANCE

A. Qualifications of Installers: Provide at least one person who shall be present at all times during execution of this portion of the Work, who shall be thoroughly familiar with the type of materials being installed and who shall direct all work performed under this Section.

B. Preventatives and Controls: Prior to the application of the preventatives and controls specified, confirm that each of the materials is permitted in the State of Connecticut.

1.05 PRODUCT HANDLING

A. Delivery and Storage:

1. Seed, fertilizer, lime, and chemical preventatives and controls shall be delivered in standard size unopened containers, showing weight, analysis, and name of manufacturer.
2. Protect materials from deterioration during delivery and while stored at the site.

1.06 GUARANTEE

A. Duration of guarantee shall be until the completion of the specified maintenance period and until Owner's final acceptance of lawn areas.

1.07 SCHEDULE

A. Construct seeded lawns between April 1 and June 1 and between August 15 and October 1 unless otherwise permitted by the Owner's Representative.

1.08 EXISTING WORK

A. Verify that topsoil surface. is true to grade, smooth, free of irregularities, properly installed to the scheduled thickness and in good condition to receive the work of this Section.

1.09 SUBMITTALS:

A. Provide copies of a material certificate signed by the seed vendor and the Contractor, (stating botanical and common names, percentages by weight, and percentages of purity, germination and weed seed for each 'grass' seed species) certifying that the seed mixture complies with the specified requirements.

B. Submit materials certificates and product data for the following items, clearly marked, to indicate proposed materials. Printed data shall state application rates and amounts of product to be added, if applicable.

1. Fertilizers
2. Lime
3. Chemical preventatives and controls

C. Submit batch delivery tickets for the following items, indicating the trade name, the supplier/distributor's name and the amount of product delivered to the contracting firm/project site.

1. Fertilizers
2. Seed mixes

1.10 TOPSOIL TESTING

A. Insure that topsoil has been tested in accordance with Section 32 91 13.

1.11 INSPECTION AND ACCEPTANCE OF LAWN AREAS

A. Submit written notice requesting inspection at least 10 days prior to the anticipated date.

B. Maintenance responsibilities end with final acceptance which shall be a minimum 60 consecutive calendar days from the date of seeding. Seeded areas will not be accepted in 'pieces' unless specifically agreed to by the Owner. No seeded areas will be accepted prior to the substantial completion of this Contract and prior to the completion of a minimum of 5 mowings.

C. A satisfactory stand of acceptable grass is defined as:

1. Consisting of a uniform dense stand of established permanent grass species. Engineer will be the judge. Any part of the seed lawn that does not show a uniform dense lawn grass shall be repaired. Lawns must be free of weeds, crabgrass, and other undesirable plants, and with no diseases present.

D. Final acceptance will not be made until all damaged areas, including areas outside the property limits, have been restored to their original conditions by topsoiling, seeding, and other necessary operations.

E. Upon stabilization of seeded lawn areas, erosion control devices and protection fencing shall be removed and disposed of off-site.

1.12 PROTECTION AND SECURITY

A. Provide protection and security as necessary to prevent damage to lawn areas by any cause, including malicious vandalism and unauthorized usage, prior to acceptance of lawn by Owner.

PART 2 PRODUCTS

2.01 LIME:

A. Ground limestone, 95% passing through a 100 mesh screen.

B. Calcium carbonate shall have an equivalency of 90% or higher.

2.02 FERTILIZER:

A. Topsoil Fertilizer: complete at the ratios recommended in the topsoil test reports.

B. Starter Fertilizer: guaranteed analysis of 10.20.10.

C. Secondary Fertilizer: guaranteed analysis of 15.15.15.

2.03 LAWN SEED

A. Provide fresh, clean, new-crop seed; blue tag certified complying with the tolerance for purity and germination established by the Office of Seed Analysis of North America. Provide seed of the grass species, proportions and maximum percentages of weed seed. Provide seed in cleaned, sealed, properly labeled containers. Seed that is wet, moldy, or otherwise damaged will not be accepted. Handle seed in accordance with the manufacturer's recommendations for exposure to extremes of heat, cold, or moisture.

B. LAWN SEED QUALITY:

1. Weed Seed: maximum of 0.50%, no noxious weed seed.

2. Purity: minimum 97% pure.

3. Crop: maximum 0.50%

4. Germination Rate: minimum 80%

C. SEED MIXTURE (percent by weight):

35% Masterpiece Tall Type Fescue
20% Adventure II Tall Fescue
20% Kittyhawk SST Tall Fescue/ Aztec Tall Fescue
15% Secretariet Perennial Ryegrass
5% Famous Kentucky Bluegrass
5% Baron Kentucky Bluegrass

2.04 HYDROMULCH: Soil Guard Bonded Fiber Matrix as manufactured by Weyerhaueser or approved equal.

2.05 CHEMICAL PREVENTATIVES AND CONTROLS: Commercial materials labeled for turf maintenance.

2.06 WATER: Potable.

PART 3 EXECUTION

3.01 SEEDED LAWN: RATES OF APPLICATION

Material	Application Rate
Topsoil Fertilizer, Lime and Topsoil Conditioners	As recommended by the topsoil test report.
Grass Seed	5 lbs./1,000 S.F.

Material	Application Rate
Hydromulch	As recommended by manufacturer.
Starter Fertilizer	10 lbs./1,000 S.F.
Crabgrass Preventative	As recommended by the manufacturer.
Lawn Pest/Disease Control	As recommended by the manufacturer.
Soil Insect Control	As recommended by the manufacturer.
Broad Leaf Weed Control	As recommended by the manufacturer.
Secondary Fertilizer	6.5 lbs./1,000 S.F.

3.02 SEEDED LAWN: BED PREPARATION

A. Apply lime, topsoil fertilizer, and other recommended conditioners at the rates recommended by the topsoil tests in all areas where topsoil and topsoil/compost mix have been installed. Cultivate topsoil to a 4" depth by spring-toothed harrow or other approved methods to thoroughly incorporate amendments into the topsoil. Maintain a loose friable seed bed. At no time will rubber tired loaders or graders having greater compaction than a small farm tractor be allowed on topsoil. Keep all heavy equipment and trucks off prepared topsoil. Do not prepare while ground is wet or frozen.

B. Provide additional topsoil where and as required to properly meet all proposed finish grades.

C Remove any weeds, debris, foreign matter and stones having any dimension greater than 3/4". Remove from property.

D. Fine grade to a smooth uniform surface. The entire area shall present an even grade with no depressions where water will stand. Grades shall be within 1/2" of designated elevation. Any protective fencing around existing trees shall be removed and disposed of by the Contractor at this time. Topsoil shall be smoothly blended to existing finish grades around trees, erosion control devices and adjacent existing conditions, maintain existing surface drainage patterns. Smoothly round-off all top and toe of slopes. Reinstall erosion control devices and protective fencing as required.

E. Approval of surface by Engineer shall be obtained before seeding operations begin.

F. All areas to receive seed shall be compacted evenly and uniformly using a two-hundred pound (200 lb.) roller.

G. Perform bulk density and compaction tests to monitor degree of soil compaction/seed bed friability where directed. Where required, loosen the seed bed to obtain no greater than 70% of the ASTM D-1557 modified optimum density.

3.03 SEEDED LAWN: DEVELOPMENT

A. All disturbed areas not developed otherwise shall be developed as lawn with six (6) inches of topsoil as indicated on the drawings and as specified.

3.04 SEEDED LAWN: SEEDING PROCEDURE

A. Seeding shall be done when wind does not interfere with uniform distribution of hydroseeding mixture.

B. Apply starter fertilizer, seed and maximum 10% of mulch in one operation by the use of an approved spraying machine. Avoid spraying mix on adjacent surfaces, walks, building walls, and curbs.

C. Apply remaining 90-100% of the mulch in a second separate application.

D. Mix materials with water. Keep in an agitated state so that the materials are uniformly suspended in the water. Apply all materials at the specified rates.

E. Do not overseed with unapproved quick-germinating species.

3.05 SEEDED LAWN: ESTABLISHMENT

A. Maintain a moist seed bed at all times. Water seed bed so that the topsoil is wet to a depth of 2". Apply complete coverage to the seeded area as necessary to insure proper germination conditions.

B. Protect all lawn areas with barricades, if necessary, to keep all traffic off the area. Repair all damage to lawn areas including topsoil replacement, at no additional cost to owner.

C. Re-seed all areas which have failed to show a uniform stand of grass after the initial plants have appeared. All areas disturbed/prepared for reseeding in spring or summer shall receive crabgrass preventative.

3.06 SEEDED LAWN: MAINTENANCE

A. Maintenance Period Required: Contractor shall maintain lawn from immediately after seeding and shall continue maintenance until final acceptance.

B. Provide all reseeding, watering, mowing, weeding, insect or disease control, re-fertilizing, repair of washouts and other maintenance procedures which are necessary to produce a uniform stand of grass.

C. Grass must be maintained at a height of 1 1/2 - 3". Mowing frequency shall be weekly minimum and must be adequate to insure that no more than 1/3 of the grass blade height is removed at any one time. Remove heavy clippings. The Contractor shall provide a minimum of five (5) mowings. Initial mowing shall occur when grass reaches 2 1/2" height.

D. Secondary Fertilization: Apply secondary fertilizer 14 days after seeding. Apply per manufacturer recommendations.

3.07 EROSION PREVENTATIVES: Install erosion control system in any seeded areas which receive concentrated run-off water and areas as required by the Owner or Owner's Representative. Erosion control materials shall be secured as recommended by the manufacturer or as indicated on the Drawings.

3.08 CRABGRASS AND BROADLEAF WEED CONTROL

A. Treat any lawn areas infested with crabgrass or broadleaf weeds with weed control products in conformance with manufacturer's recommendations, as required after identification of weed/crabgrass presence.

B. Time: Conform to the manufacturer's recommendations.

C. Rate: Conform to the manufacturer's recommendations.

3.09 DISEASE CONTROL

A. Treat any diseased lawn areas with proper disease control product in conformance with the manufacturer's recommendations, as required after diagnosis of disease organisms.

B. Time: Conform to the manufacturer's recommendations.

C. Rate: Conform to the manufacturer's recommendations.

3.10 PROJECT CLEAN-UP

A. Upon completion of all lawn areas, remove all excess soil, debris, and other materials resulting from work operations of this Section. Restore all improvements to original condition. Broom clean all walks and pavements. All clean-up shall be completed at the end of each working day.

B. Upon stabilization of lawn areas, remove all erosion control systems. Re-seed as required.

END OF SECTION 32 92 00

SECTION 32 93 00

LANDSCAPE PLANTING

PART 1 GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions, and Division 1 – General Requirements apply.

1.02 SECTION INCLUDES

A. Provide all labor, materials, equipment, services etc. necessary and incidental for the completion of all landscape work as shown on the drawings and specified herein.

B. The Contractor shall be liable for any damage to property caused by landscaping operations and all areas and construction disturbed shall be restored to their original condition to the satisfaction of the Engineer.

C. The Contractor shall carefully correlate his work with that of other Contractors.

D. The Contractor is required to install and maintain his finished work at his expense as specified.

1.03 RELATED SECTIONS

A. Section 32 91 13 - Topsoil

B. Section 32 92 00 - Seeded Lawn

1.04 SUBMITTALS

A. Manufacturer's Data: Submit copies of the manufacturer's and/or source data for all materials specified, including soils.

B. Samples: Submit samples of all topsoil, soil mixes, mulches, and organic materials. Samples shall weigh 1 kg (2 lb) and be packaged in plastic bags. Samples shall be typical of the lot of material to be delivered to the site and provide an accurate indication of color, texture, and organic makeup of the material.

C. Plant Photographs: Submit color photographs of representative specimens of each type of tree and shrub on the plant list. Photos shall be 75 x 125 mm (3 x 5 in.) taken from angle that depicts the size and condition of the typical plant to be furnished. A scale rod or other measuring device shall be included in the photograph. For species where more than 20 plants are required, include a minimum of three photos that show the average plant, the best quality plant, and the worst quality plant to be provided. Label each photograph with the plant name, plant size, and name of the growing nursery.

D. Nursery Sources: Submit a list of all nurseries that will supply plants, along with a list of the plants they will provide and the location of the nursery.

E. Soil Test: Submit soil test analysis report for each sample of topsoil and planting mix per submittal requirements Section 32 91 13 - Topsoil.

1.05 MATERIALS STORAGE AND CLEAN-UP

A. The Contractor shall keep the premises free from rubbish and all debris at all times and shall arrange his material storage so as not to interfere with the operation of the project. All unused materials, rubbish and debris shall be removed from the site.

1.06 COMPLETION AND ACCEPTANCE

A. The Contractor shall notify the Engineer when the work of this section is substantially complete. The Engineer shall then review the work and prepare the "punch list" of items remaining or work that is unacceptable. At this time the Engineer may issue the "Notification of Substantial Completion" if the majority of the work is complete to the satisfaction of said Engineer.

B. The completion of the contract will be accepted and Notice of Completion recorded only when the entire contract is completed to the satisfaction of the Engineer.

C. Work under this Section will be accepted by the Owner's Construction Representative upon satisfactory completion of all work including "punch list" items.

1.07 WARRANTY

A. All plant material (tree, shrubs, etc.) and planting supplies (edging, bark mulch, etc.) shall be guaranteed for a period of one (1) year from the date of "Notification of Substantial Completion" of the landscaping installation.

1.08 LANDSCAPE MAINTENANCE

A. The Landscape Contractor shall maintain his finished work for a period of not less than one (1) year commencing from the time the installation is complete to the satisfaction of the Engineer.

B. IMPORTANT: It is the Contractor's responsibility to determine water application rates. Water if rainfall does not exceed 3/4" in any 8 day period.

C. The Landscape Contractor shall maintain the landscaping until final acceptance.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Refer to Section 32 91 13 - Topsoil

2.02 PLANTING SOIL MIXTURE

A. Topsoil for backfilling plant pits and shrub bed areas shall be mixed with well rotted manure in the following proportions:

Seven (7) cubic yards of topsoil to two (2) cubic yards of manure. They shall be thoroughly mixed by placing the manure evenly over the topsoil piles and turning the piles at least three (3) times or until thoroughly mixed to the satisfaction of the Engineer.

2.03 PLANT STOCK

A. Plant material shall be first quality stock and shall conform to the code of standards set forth in the current edition of the American Standards for Nursery Stock sponsored by the American Association of Nurserymen, Inc.

B. Species and variety as specified on the drawings and delivered to the site shall be certified true to their genus, species and variety and as defined within the current edition of International Code of Nomenclature for Cultivated Plants, issued by the International Union of Biological Sciences. Substitutions are not permitted without Engineer's written approval.

1. For plant size and types see Drawings for plant list.

C. Plants shall be nursery grown and shall be of varieties specified in the plant list bearing botanical names.

D. Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, free from disease, sun-scale, windburn, abrasion, and harmful insects or insect eggs; and shall have healthy, normal unbroken root systems. deciduous trees and shrubs shall be symmetrically developed, of uniform habit of growth, with straight trunks or stems, and free from objectionable disfigurements. Evergreen trees and shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety. Plants shall have been grown under climatic conditions similar to those in the locality of the project. Plants budding into leaf or having soft growth shall be sprayed with an anti-desiccant at the nursery before digging.

E. Stock Sizes: All stock measurements - caliper, height branching level, number of canes, ball sizes shall be in strict accordance with the latest edition of the American Standard for Nursery Stock. Minimum acceptable sizes as specified on the Drawings.

F. All stock shall be balled and burlapped or container grown stock. Bareroot stock of any kind is unacceptable unless otherwise indicated on the Drawings.

2.04 MULCH FOR PLANTING PITS/BEDS (SHREDDED CEDAR BARK)

A. Shredded cedar bark mulch shall be a natural forest product composed of shredded bark or wood not exceeding three inches (3") in length and on inch (1") in width. Mulch shall be derived from tree material, not from wood waste or by-products like sawdust, shredded palettes, or other debris. It shall be of a uniform grade and dark brown color with no additives or any other treatment. Mulch with leaves, twigs, and/or debris shall not be acceptable. The pH factor should range from 5.8 to 6.2.

2.05 WATER

A. Water shall not contain elements toxic to plant life.

2.06 ANTI-DESICCANT

A. Anti-desiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and not damage the plant.

2.07 TREE WOUND DRESSING

A. Tree wound dressing shall be a black asphalt-base antiseptic paint.

PART 3 EXECUTION

3.01 GENERAL PREPARATION

A. Prior to beginning the work of this section, verify that site grading and preparation have been properly completed.

B. Clearing shall consist of the satisfactory removal and disposal of brush and rubbish occurring within all lawn and planting areas.

3.02 UNDERGROUND OBSTRUCTIONS TO PLANTING

A. If underground utilities, are encountered, other locations for planting may be selected by the Engineer. Damage to utility lines shall be repaired at the Contractor's expense at no additional cost to the Owner.

B. Remove all miscellaneous debris below the ground surface and dispose of according to the specifications.

3.03 PREPARATION OF PLANTING MIXTURE

A. Before mixing, clean topsoil of roots, plants, sod, stones, clay lumps and other extraneous materials harmful or toxic to plant growth, by screening.

B. To prepare planting mixture mix recommended soil amendments and fertilizers with topsoil at rates specified. Delay addition of fertilizer if planting mixture will not be used within two (2) days.

3.04 TREE, AND SHRUB PLANTING

A. All planting shall be performed by personnel familiar with the accepted procedure of planting and under the constant supervision of a qualified planting foreman.

B. All planting is to be done as shown on drawings and as specified herein and in strict accordance with standard horticultural practices.

C. PLANTING SEASONS AND CONDITIONS

1. Planting shall be done only when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting.

2. Unless otherwise directed by the Engineer, deciduous material shall be planted from March 1st to May 1st and from October 15th to December 15; evergreen material shall be planted from April 1st to May 15th and from September 1st to October 15th, or a approved by the Engineer.

D. LAYOUT: Plant material locations and bed outlines shall be staked on the project site by the Contractor and approved by the Engineer before any plant pits or beds are excavated. Plant material locations may be adjusted by the Engineer to meet field conditions.

E. INSTALLATION OF TREES AND SHRUBS

1. <u>Setting Plants</u>:

a. Balled and burlapped and container-grown plants shall be handled and moved only by the ball or container. Plants shall be set plumb and held in position until sufficient soil

has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are even with the depth at which they are grown int he nursery, collecting field, or container. Fertilizer in tablet form shall be placed prior to backfilling and in accordance with the manufacturer's specifications.

b. Balled and burlapped stock shall be backfilled with planting soil mixture to approximately half the depth of the ball and then tamped and watered. Burlap and tying materials shall be carefully removed or opened and folded back from top 1/3 of root ball. the remainder of backfill of planting soil mixture shall be tamped and watered. Earth saucers or water basins shall then be formed around the base of each plant.

c. Container-grown stock shall be removed from containers without damaging plant or root system. Planting shall be completed as specified for balled or burlapped plants.

2. Mulching:

a. Bark mulch for planting beds shall be installed to a minimum depth of three inches (3") in all areas specified on the landscaping plans.

b. Prior to the installation of bark mulch all areas to be covered shall be weed free and shall be treated with pre-emergent herbicide.

c. Mulching shall take place within 48 hours after planting.

d. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.

e. The top of all areas of bark cover shall be 1" below the top of adjacent curb, walk or edge of pavement.

3. Pruning: New plant material shall be pruned in the following manner: Dead and broken branches shall be removed. Pruning of deciduous trees and shrubs shall be minimal. Evergreen plants shall not be pruned except to remove dead or broken branches. Typical growth habit of individual plants shall be retained with as much height and spread as is practicable. Cuts shall be made with sharp instruments, and shall be flush with trunk or adjacent branch to insure elimination of stubs. "Headback" cuts at right angles to line of growth shall not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off". Trimmings shall be removed from the site.

4. Plant Sizes: For plant size and types see Drawings for plant list.

END OF SECTION 32 93 00

SECTION 33 40 00

STORM DRAINAGE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Form 816 shall mean the State of Connecticut, Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications.

1.02 SUMMARY

A. This Section includes the installation of storm drainage outside the building and the abandonment and removal of existing storm drainage as indicated on the Drawings.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete

B. Section 31 22 13 - Formation of Subgrade

C. Section 31 23 16 - Earthwork

D. Section 32 11 23 - Processed Aggregate Base

1.04 SUBMITTALS

A. Shop Drawings: Include plans, elevations, details, and attachments for the following:

1. Precast concrete manholes and other structures, including frames, covers, and grates.

2. Cast-in-place concrete manholes and other structures, including frames, covers, and grates.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.06 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 PRODUCTS

2.01 PIPING

A. Polyethylene Pipe: Corrugated smooth-lined high density polyethylene pipe, type N-12 as manufactured by Advanced Drainage Systems, Inc (ADS). Pipe coupler connections shall be watertight type "Pro-Link WT" by ADS.

B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, for gasketed joints.

1. Gaskets: ASTM C 443, rubber.

C. Roof Drainage Pipe: PVC Drainage Pipe and Fittings conforming to the following:

1. PVC Drainage Pipe and Fittings, NPS 15 (DN375) and Smaller: ASTM D 3034, SDR 40, for solvent-cemented or gasketed joints.

2. Gaskets: ASTM F 477, elastomeric seals.

2.02 MANHOLES

A. Precast Concrete Manholes:

1. Precast Units shall conform to Form 816A, Article M.08.02, 4- Precast Units for Drainage Structures and ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
2. Diameter: 48 inches minimum, unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
7. Gaskets: ASTM C 443, rubber.
8. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.

B. Manhole Frames and Covers:

1. Frames and Grates shall conform to 816, Article M.08.02, 5- Metal for Drainage Structures.
2. ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7 to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

C. Manhole Steps:

1. Steps shall be fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

2.03 CATCH BASINS

A. Precast Concrete Catch Basins:

1. Precast Units shall conform to Form 816, Article M.08.02, 4- Precast Units for Drainage Structures and ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.

2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

B. Masonry Catch Basins:

1. Masonry Units shall conform to Form 816, Article M.08.02, 1- Brick <u>or</u> 2- Concrete Building Brick <u>or</u> 3- Masonry Concrete Units for Catch Basins, Manholes or Drop Inlets.

2. Mortar shall conform to Form 816, Article M.11.04.

C. Catch Basin Frames and Grates:

1. Frames and Grates shall conform to Form 816, Article M.08.02, 5- Metal for Drainage Structures.

2.04 CONCRETE FOR CAST-IN-PLACE STRUCTURES

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.

2. Fine Aggregate: ASTM C 33, sand.

3. Coarse Aggregate: ASTM C 33, crushed gravel.

4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.

2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed steel.

PART 3 EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312316 - Earthwork.

3.2 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of storm drainage and sanitary sewer piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Install gravity-flow piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

1. Install piping to grade and elevations as shown on plans.

2. Install piping with minimum cover as recommended by the manufacturer.

D. Join and install PVC pipe in accordance with ASTM D 3212.

3.3 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

C. Construct cast-in-place manholes as indicated.

3.4 CATCH-BASIN/YARD DRAIN INSTALLATION

A. Construct catch basins / yard drains to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.5 INSTALLATION OF IDENTIFICATION

A. Install continuous plastic underground warning tape during backfilling of trench for underground water service piping. Locate 6 to 8 inches directly over piping.

3.6 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads or with at least 8-inch thick, cast-in-place concrete plug.

2. Close open ends of piping with threaded metal caps, plastic plugs, cast-in-place concrete plugs or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Structures: Excavate around structure as required and use one procedure below:

1. Remove structure and close open ends of remaining piping.

2. Remove top of structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

3. Backfill to grade according to Division 2 Section "Earthwork."

3.7 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.

2. Place plug in end of incomplete piping at end of day and when work stops.

3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project. If inspection indicates poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects and re-inspect.

C. Testing: Pressure test all manholes and force main in accordance with the Town of Newtown Water Pollution Control Authority.

END OF SECTION 33 40 00

SECTION 33 46 23.16

BROKEN STONE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 General Requirements and Specific Requirements, apply to this Section.

B. State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816-2004 or its latest edition and any supplemental specifications (referenced herein as "Form 816").

1.02 SUMMARY

A. This Section includes the following:

1. Furnish and place broken stone in the locations where shown on the plans or as directed by the Engineer. This stone will be used for drainage applications and other miscellaneous work, as shown on the plans and as directed by the Engineer.

1.03 QUALITY ASSURANCE

A. Material Standards: As defined in the State of Connecticut Department of Transportation Standard Specifications for Roads, Bridges and Incidental Construction, Form 816 inclusive of all supplements.

B. Testing: Compaction tests may be required by the Owner and will be paid for by the Contractor. No specific testing schedule has been established at this time. If tests indicate that density requirements have not been achieved, the Contractor shall continue compacting. All retesting in these areas shall be paid for by the Contractor.

C. Density and Compaction Testing: The Contractor is responsible to schedule compaction tests as required by the Owner and to allow adequate time for the proper execution of said tests.

1.04 SUBMITTALS

A. Submit certified test reports and materials certificates, for products specified in this Section, indicating compliance of all proposed materials with specified requirements.

1.05 PROTECTIONS

A. Dust Control: Use all means necessary to control dust on and near the construction areas caused by the Contractor's performance of the work in conformance with Form 816.

PART 2 PRODUCTS

2.01 BROKEN STONE

A. Broken Stone shall conform to Article M.05.01, Form 816.

B. IMPORTANT: Material substitutions will not be approved under any circumstances. All recycled materials will be rejected.

PART 3 EXECUTION

3.1 MATERIAL PLACEMENT/COMPACTION

A. Install broken stone base material at the locations as shown on the Drawings and in accordance with Article 3.04.03 of Form 816. Dimensions specified are after compaction.

B. Compact base material with vibratory roller to minimum 95% modified AASHTO laboratory density (ASTM D-1557, Method C).

END OF SECTION 33 46 23.16

TOWN OF NEWTOWN

SEALED BID REQUEST

BID OPENING DATE: Monday, October 17, 2016 **TIME:** 11:00 am

LOCATION: Finance Dept., Newtown Municipal Center, **3 Primrose Street**, Newtown, CT 06470

BID TITLE: PARKING LOT ENHANCEMENTS – DICKINSON PARK

SECURITY REQUIRED: Five Percent (5%) Bid Security. One Hundred percent (100%) Performance & Employees and Materialmen Security

DATED IN NEWTOWN: September 13, 2015

BID SECURITY $ _____

(CERTIFIED CHECK, LETTER OF CREDIT OR BID BOND)

PLEASE NOTE: ONE (1) ORIGINAL AND ONE (1) COPY OF SEALED BID MUST BE SUBMITTED.

Is your company a MBE/WBE business: _____ _____
(YES) (NO)

Proposed Working Duration: _____/Days

TOTAL BID: $_____/Lump Sum

Deduct Alternate No. 1 (Sec. 012300, 3.1.A): $_____/Lump Sum

Deduct Alternate No. 2 (Sec. 012300, 3.1.B): $_____/Lump Sum

Deduct Alternate No. 3 (Sec. 012300, 3.1.C): $_____/Lump Sum

COMPANY	**SIGNATURE**
ADDRESS	**SIGNED BY (Print or Type)**
ADDRESS 2	**TITLE**
ADDRESS 3	**FAX NO.**
TELEPHONE NO.	**DATE**
TAX ID NUMBER	**E-MAIL (Please include for our records)**