Bid Document Specification and Drawing List
Hains Park
Old Lyme, CT

Specifications

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015713	Temporary Erosion and Sedimentation Controls
015714	Temporary Dust Control
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Drawings

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SECTION 01 3543
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. General environmental protection.

2. Prevention of environmental pollution and damage resulting from construction operations.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 ENVIRONMENTAL PROTECTION REQUIREMENTS

A. Contractor shall comply with all applicable Federal, State, and local regulations, laws, and guidelines regarding environmental protection during the duration of the construction contract, whether or not the regulation, law or guideline is provided herein. Contractor shall provide environmental protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during construction.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

1.3 PERMIT CONDITIONS

A. Contractor and Subcontractors are bound to comply with any project-related permits obtained by Owner or Engineer for the work of the project. Such permits will affect performance of the work, and Contractor and Subcontractors are bound to comply with requirements of such permit and representations contained in permit application as though Contractor and Subcontrator were the Permittee/permit-holder. Requirements and conditions set forth in Owner or Engineer-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

1.4 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. United States Code of Federal Regulations (CFR)

1. 40 CFR, Protection of Environment.

C. Regulations of Connecticut State Agencies (RCSA)

1. RCSA Section 22a-30-1 through 22a-30-17, Tidal Wetlands

2. RCSA Section 22a-39-1 through 22a-39-15, Inland Wetlands and Watercourses
3. RCSA Section 22a-69-1 to 22a-69-7.4, Noise Control
4. RCSA Section 22a-65-1, Discarding of Pesticides
5. RCSA Section 22a-49-1, Use of Pesticides (Use of Forms)
6. RCSA Section 22a-50-1 through 9, Pesticide Registration and Classification
7. RCSA Section 22a-66a-1 through 2, Posting and Notification of Outdoor Pesticide Application
8. RCSA Section 22a-66-1 through 7, Use of Pesticides
9. RCSA Section 22a-133k-1 through 3, Remediation Standard
10. RCSA Section 22a-174-1 through 43, Abatement of Air Pollution
11. RCSA Section 22a-174-100, Indirect Sources of Air Pollution
12. RCSA Section 22a-209-1 through 16, Solid Waste
13. 22a-315-10 through 19, Soil and Water Conservation
14. RCSA Section 22a-354i-1 through 10, Aquifer Protection Area Land Use Regulations
15. RCSA Section 22a-372-1, 22a-377(b)-1, 22a-377(c)-1, 22a-377(c)-2, Water Diversion
16. RCSA Section 22a-430-3 through 4, General Conditions Applicable to Water Discharge Permits and Procedures and Criteria for Issuing Water Discharge Permits
17. RCSA Section 22a-430-8, Underground Injection Control
18. RCSA Section 22a-449(c)-100 through 119, Hazardous Waste

1.5 DEFINITIONS

A. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural or historic perspective. Environmental protection is the prevention/ control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive materials; and other pollutants.

B. Contaminated Material: A material or waste, including liquids, solids, debris, equipment, machinery, miscellaneous waste, or combination thereof affected by the presence of any organic or inorganic chemical substance which, because of its quantity, concentration, or physical, chemical or infectious characteristics may cause, or significantly contribute to an increase in serious irreversible, or incapacitating reversible illness or pose a substantial present or potential hazard to human health, safety, or welfare or to the environment when improperly handled, treated, stored, transported, used or disposed of, or otherwise managed, or by regulation is controlled in its handled, treatment, storage, transportation, use, or disposal.

Contaminated Materials shall be synonymous with Hazardous Material, and may also include those materials defined as Contaminated Soils, Polluted Soils, Regulated Waste, Special Waste, or Hazardous Waste.

C. Hazardous Waste: Any waste material which may pose a present or potential hazard to human health or the environment when improperly disposed of, treated, stored, transported, or otherwise managed, including (A) hazardous waste identified in accordance with 40 CFR 261.3 (B) hazardous waste identified by regulation by the Department of Environmental Protection, and (C) polychlorinated biphenyls in concentrations greater than fifty parts per million, but does not mean by-product material, source material or special nuclear material, as defined in section 22a-151, or scrap tires.

D. Discharge or Contaminated Material Discharge: The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying or dumping of Contaminated Material into or on any land, surface water, ground water, or into the atmosphere.

1.6 INSPECTIONS

A. Engineer may routinely inspect the Project Site and will notify the Contractor in writing of any observed noncompliance with contract requirements.

B. Contractor shall notify the Engineer immediately upon request from regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to environmental protection work. Contractor shall notify the Engineer immediately of any violations or non-compliance issues identified by regulatory agencies.

C. Contractor shall, after notification of violations or non-compliance from either the Engineer or regulatory agencies, inform the Engineer of proposed corrective action and take such action to correct the noncompliance. If Contractor fails to act promptly, Engineer may order stoppage of all or part of the work until satisfactory corrective action has been taken.

1. No claim for an extension of time or for excess costs or damage incurred by Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that Contractor was in compliance.

1.7 ENVIRONMENTAL PROTECTION REQUIREMENTS

A. Contractor shall comply with all applicable Federal, State, and local regulations, laws, and guidelines regarding environmental protection during the duration of the construction contract, whether or not the regulation, law or guideline is provided herein. Contractor shall provide environmental protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during construction.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

1.8 PROTECTION OF FEATURES

A. Contractor shall conduct operations in such a manner as to protect those environmental features including but not limited to wetlands, watercourses, trees, other vegetation, habitats or sensitive environmental receptors requiring protection, whether such features are specifically identified on the drawings or not. Contractor shall protect those environmental features,

indicated specifically on the drawings as requiring protection, in spite of interference, which their preservation may cause to Contractor's work.

B. Contractor shall confine construction activities to those work areas defined by the Drawings. All land resources within the project boundaries and outside the limits or permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that, which existed prior to work under this contract.

1.9 STORAGE AREAS

A. The location of Contractor's storage areas for equipment and/or materials shall be clear of existing vegetation or shall be on areas that are to be cleared of vegetation as part of this project. Contractor's storage and staging area locations shall require written approval of Engineer or Owner prior to use. Plans showing storage facilities for equipment and materials shall be submitted for approval.

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of fifty (50) feet of any wetland resource area or any drainage facility. Adequate measures for erosion and sediment control such as the placement of hay bales and silt fence around the perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

C. Provisions must be made in and around storage areas to contain any spills or rupture of storage supplies. Engineer or Owner may designate a particular area or areas where Contractor may store materials used in his operations.

D. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

A. The Contract Documents have been prepared to comply with the special conditions, approvals, permits and mitigation measures of an environmental nature which were established during the planning and development of this project. Contractor is advised that deviations from the scope of work could result in the requirement for Engineer to re-analyze the work from an environmental standpoint. Deviations from restrictions, limitations, or defined construction methods and procedures indicated by the Contract Documents which may have an environmental impact will require review, processing, and approval by Engineer or regulatory agencies. Engineer reserves the right to disapprove alternate methods, even if they are more cost effective, if in the Engineer's opinion the proposed alternate method will have an adverse environmental impact or require regulatory interactions which will cause a delay in the progress of the Work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

A. Comply with applicable regulations and these specifications. Preserve the natural resources within the project boundaries and outside the limits of permanent work performed in their

existing condition or restore to an equivalent or improved condition as approved by engineer or Owner.

B. Confine work activities to work area limits indicated on the Drawings or to work area limits established in the field. Remove debris, rubbish, and other waste materials resulting from construction operations from the Project Site. Transport materials with appropriate vehicles and dispose of them off-site to areas that are approved for disposal by governing authorities having jurisdiction. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways.

3.2 PROTECTION OF LANDSCAPE

A. Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from Engineer or Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees that are not to be removed, particularly overhanging branches and limbs. Contractor shall, in any event, be responsible for any damage resulting from such use.

B. Branches, limbs, and roots shall not be cut except by permission of Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Where, in the opinion of Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by Contractor's equipment or by his blasting or other operations, the Engineer may direct Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of Contractor. Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of.

D. Cultivated hedges, shrubs, and other plants that could be injured by Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.3 PROTECTION OF WATER RESOURCES

A. Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface water, wetlands and ground water. All earthwork, grading, moving of equipment, water control in foundation areas, and other operations likely to create silting, shall be planned and conducted so as to avoid and/or minimize pollution in adjacent waterways. Water that has been used for any purpose that has been contaminated with oil, bitumen, salt or other pollutants, shall be treated prior to discharge in accordance with applicable regulations so as to avoid affecting nearby waterways. Under no circumstance shall pollutants or polluted water be discharged into the environment. At all times comply

with the requirements of the Connecticut Department of Energy and Environmental Protection (DEEP), and all local, State and Federal regulations of authorities having jurisdiction.

B. Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Store and service construction equipment at areas designated for collection of oil wastes. Prevent ponding of stagnant water conducive to mosquito breeding habitat. Prevent run-off from site during demolition and construction operations.

C. Equipment will not be permitted to ford live streams or creeks. Utilize temporary bridges for such purpose. Remove temporary bridges upon completion of work and repair the area to its original condition, unless otherwise indicated.

D. Comply with the following as applicable to the Project:

1. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, (DEP-PED-GP-015) modified April 8, 2004 or the latest revision thereof. Conditions of such permit, other conditions of approval or authorizations, and any Stormwater Pollution Prevention Plans shall become part of the Contract Documents.

2. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer (DEP-PERD-GP-007) issued August 13, 1996 or the latest revision thereof. The conditions of such permit, other conditions of approval or authorizations, and any supplemental plans shall become part of the Contract Documents.

3. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (DEP-PED-GP-020) issued February 9, 2005 or the latest revision thereof. The conditions of such permit, other conditions of approval or authorizations, and any supplemental plans shall become part of the Contract Documents.

3.4 CONSTRUCTION IN WETLAND RESOURCE AREAS

A. Disturbance to wetland resource areas is not allowed, unless otherwise called-for on the Drawings or in the Specifications. If work within a wetland resource area has been authorized, comply with the regulations, permits, and conditions of approval of all authorities having jurisdiction, whether local, State and Federal while carrying out the work.

B. Contractor shall comply with the following:

1. Comply with applicable provisions of local, State or Federal approvals, conditions of approval, authorizations, or permits.

2. Contractor shall make every effort to minimize disturbance to the resource area(s).

3. Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction, including ground elevations. If such disturbance does occur, Contractor shall take all measures necessary to return these areas to the condition (including elevation) that existed prior to construction.

4. For work in wetland resources areas, Contractor shall carefully remove and stockpile the topsoil. This wetland resource topsoil material shall be reused in the same location from

which it came upon completion of the work if restoration activities are conducted. If restoration activities are called-for, the elevation of the work area shall be restored to the pre-construction elevation wherever disturbed by Contractor's operation.

5. Excavated materials shall not be permanently placed or temporarily stored in wetland resource areas. Temporary storage areas for excavated material shall be as approved by Engineer.

6. The use of a temporary gravel roadway in wetland areas is not acceptable. Contractor will be required to utilize timber or rubber matting to support equipment in these areas. The timber or rubber matting shall be constructed of materials and placed in such a way that when removed the material below the matting will not be unduly disturbed, mixed or compacted so as to adversely affect recovery of the existing plant life.

7. Measures shall be taken to dam pipe trenches that are located within wetland resource areas to prevent drainage of the wetlands via the pipe trench.

3.5 FUELS, LUBRICANTS AND OTHER FLUIDS

A. Fuels, lubricants or other petroleum or chemical based fluids shall be stored in the appropriate containers at the Project Site in accordance with all applicable Federal, State, and local laws and regulations. Fuels, lubricants or other petroleum or chemical based fluids shall be stores at designated locations only. Coordinate with the engineer and Owner.

B. Fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spills and evaporation.

C. Lubricants, waste oil, or other equipment fluids to be discarded shall be stored in marked corrosion-resistant containers in a designated area and recycled or disposed in accordance with Federal, State, and local laws and regulations.

3.6 DISPOSAL OF SOLID WASTE

A. Solid Wastes is rubbish, debris, waste materials, garbage, and other discarded solid materials (excluding clearing debris and Contaminated Materials or Hazardous Waste as defined in these Specifications). Solid waste shall be placed in appropriate containers and disposed on a regular schedule. All handling and disposal shall be conducted in such a way as to prevent spillage and contamination. Contractor shall transport all solid waste off of the Project Site and dispose in compliance with Federal, State, and local requirements.

B. The burning of trees, brush and other combustible materials will not be permitted. Provide satisfactory methods of disposal without additional compensation.

C. Handling and Disposal of Contractor Generated Contaminated Materials, Regulated Waste, or Hazardous Waste.

1. Contaminated Materials, Regulated Waste, or Hazardous Waste shall be as defined by the Contract Documents and applicable State and local regulations. Contractor shall segregate these wastes from other materials and wastes, and shall protect such waste from the weather by placing it in a safe covered location; precautionary measures against accidental spillage such as berming, secondary containment, or other appropriate measures shall be taken in accordance with applicable regulations and best management practices. These waste generated by construction activities shall be removed from the

work area and be disposed in compliance with Federal, State, and local requirements. At no time shall these wastes be dumped onto or into the ground, into storm sewers or open water courses, into the sanitary sewer system, or released into the air.

3.7 HANDLING OF CONTAMINATED MATERIALS

A. All Contaminated Materials encountered during the course of the work of this project will require management procedures beyond those required for normal construction operations in accordance with the requirements set forth in these Specifications. Contractor is required to implement Special Handling in accordance with the Specifications, and all applicable permits, approvals, authorizations, laws, and regulations when managing such materials.

B. Activities involving Contaminated Materials performed by Contractor or Subcontractors at the project shall be performed in a manner which considers the health and safety of site personnel and the surrounding environment. Activities involving Contaminated Materials shall be conducted in conformance with the applicable Specification Sections and all applicable permits, approvals, authorizations, laws, and regulations.

3.8 PROTECTION OF AIR RESOURCES

A. Special management techniques as set out below shall be implemented to control air pollution by Contractor's activities. These techniques supplement the requirements of Federal, State, and local laws and regulations; and the safety requirements under this Contract. If any of the following subarticles conflict with the requirements of Federal, State, or local laws or regulations, or safety requirements under this contract, then those requirements shall govern.

B. Contractor is responsible for all dust suppression measures and monitoring of airborne particulate matter throughout execution of the work. Airborne particulates, including dust particles, from general site activities, demolition, excavation and handling of soils, Contaminated Materials, and processing or preparation of demolition materials shall be controlled at all times during the work, as well as hours when work is not in progress, including weekends and holidays. Contractor shall maintain all work areas, including but not necessarily limited to demolition areas, processing areas, staging areas, excavations, stockpiles, and permanent or temporary access roads, free from airborne dust which would cause a hazard or nuisance. Refer to Section 01 5714 - Temporary Dust Control.

C. Burning is prohibited unless specifically-approved in writing by Owner.

3.9 NOISE CONTROL

A. Contractor shall endeavor at all times to maintain as low a level of construction noise as practicable in order not to create a disturbance in the neighborhood or Owner's premises.

B. If noise becomes problematic, as determined by neighborhood complaints and exceedance of the local noise , the Contractor, at his own expense, shall prepare a noise monitoring plan.

1. The plan shall consist of locations where noise monitoring will be performed, type of measurement device, data reporting methods, response and resolution procedures, and method for periodic inspections of equipment mufflers.

2. Contractor shall submit noise measurement reports weekly during construction. Weekly reports shall include noise level measurements taken during the previous week including construction, complaint response, and equipment certification measurements.

3. Any complaints duly registered by Owner of unacceptable noise levels shall be cause for the use of special precautions and methods of operation by Contractor to reduce noise to acceptable levels, at no additional cost to Owner.

4. Owner shall be the sole judge of the tolerability of noise levels as defined herein. Measurement of noise levels will be at the centerline of the roadway surrounding the Site.

5. Any high noise level operations intended to occur during early morning and evening hours or weekends shall be subject to review and approval by the Owner prior to proceeding.

C. In additional to any local requirements, Contractor shall be responsible for ensuring that the following criteria are complied with:

1. Truck and equipment mufflers shall be periodically inspected for proper operation.

2. Low-pitch backup alarms shall be used.

3. Sound barriers shall be erected if noise limits exceeding those allowed are anticipated.

4. Daytime, evening and night time construction noise levels at noise-sensitive locations shall not exceed 85dBa.

5. The operation of equipment at full-load capacity shall not exceed the maximum noise limits specified.

6. The use of equipment with potentially higher noise levels shall be prohibited within 200 feet of a noise-sensitive location during night-time hours.

7. To the extent practical, staging of compressors, pumps and similar pieces of equipment that remain stationary throughout the construction period shall be located away from sensitive receptors whenever possible.

3.10 MAINTENANCE OF POLLUTION CONTROL FACILITIES

A. Contractor shall maintain all constructed pollution control facilities and portable pollution control devices for the duration of the Contract or for the length of time construction activities create the particular pollutant.

END OF SECTION

SECTION 01 5626

TEMPORARY CHAIN LINK FENCE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Furnishing and installing woven wire fencing systems of the type and height specified and supported by metal posts erected where indicated on the Drawings and as specified herein, including fence and gates.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. American Society for Testing and Materials (ASTM).

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM A90- Standard Test Method for Weight (Mass) of Coating on Iron or Steel Articles with Zinc or Zinc Alloy.

3. ASTM A123- Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

4. ASTM A153- Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

5. ASTM A392- Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

6. ASTM A428- Standard Test Method for Weight (Mass) of Coating on Aluminum-Coated Iron or Steel Articles.

7. ASTM A491- Standard Specification for Aluminum Coated Steel Chain Link Fence Fabric.

8. ASTM A780 – Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

9. ASTM A817- Standard Specification for Metallic-Coated Steel Wire for Chain Link Fence Fabric and Marcelled Tension Wire.

10. ASTM A824 - Standard Specification Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence.

11. ASTM B211- Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire.

12. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

13. ASTM F552 - Standard Terminology Relating to Chain Link Fencing.

14. ASTM F567- Standard Practice for Installation of Chain Link Fence.

15. ASTM F626 - Standard Specification for Fence Fittings.

16. ASTM F668 - Specification for Polymer Coated Chain Link Fence Fabric.

17. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.

18. ASTM F934 - Specification for Standard Colors for Polymer-Coated Chain Link.

19. ASTM F1043 - Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.

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

21. ASTM F1183 - Standard Specification for Aluminum Alloy Chain Link Fence Fabric.

D. Chain Link Fence Manufacturer's Institute

1. Chain Link Fence Manufacturer's Institute Product Manual, latest revision.

1.3 SYSTEM DESCRIPTION

A. Temporary Construction Fence shall meet the following basic parameters:

1. Fence Height: 8 feet.

2. Mesh Size: 2 inches.

3. Mesh Gage: 12

4. Gates: Height of gates shall match that of fence. Width of gates shall be as shown on the Drawings.

5. Anchored post or driven posts where indicated. No top or bottom rails required.

6. Panelized/modular units where indicated. Two stabilizers per panel.

1.4 SUBMITTALS

A. Shop drawings showing the plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates and a schedule of components.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence and gate posts, rails, and fittings.

2. Chain-link fabric, reinforcements, and attachments.

3. Gates, locking mechanisms and hardware.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.

D. Samples for Initial Selection: For components with factory-applied color finishes.

1.5 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 of this Section.

B. Supply material in accordance with Chain Link Fence Manufacturer's Institute Product Manual and this Specification.

C. Perform installation in accordance with ASTM F567.

D. Maintain all facilities installed under this Section in proper and safe condition throughout the progress of the work.

E. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

B. Packages shall be labeled with the manufacturer's name.

C. Store fence fabric and accessories in a secure and dry place.

PART 2 PRODUCTS

2.1 GENERAL

A. Material furnished shall be in good condition and shall not have been painted.

B. All posts and rails shall be straight, true to section and of sufficient length for proper installation.

C. Unless otherwise specified, hardware and accessories shall conform to the requirements of ASTM F626 and ASTM A123 or ASTM A153 as applicable for zinc-coating.

2.2 POSTS

A. Type I: 1.25-inch nominal (1.625 O.D.) steel pipe.

2.3 BRACE ASSEMBLY

A. Rails

1. Type I: 1.25-inch nominal (1.660 O.D.) steel pipe.

2.4 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: As indicated on Drawings.

2. Steel Wire Fabric: Wire with a diameter of 9 gauge galvanized core fused. Measured prior to application of coating.

a. Mesh Size: 2 inches. Measured prior to application of coating.

3. Selvage: Knuckled at top.

2.5 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

1. Fence Height: 8’.

2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.

3. Horizontal Framework Members: Intermediate top rails complying with ASTM F 1043.

a. Top Rail for all fencing systems and all heights: 1 3/8" OD Pipe (Sch 40). 10’ Maximum spacing between center rails.

2.6 STRETCHER BARS

A. Bars shall be one piece lengths of zinc-coated steel, not less than 2-inches shorter than the full height of the fencing fabric with a minimum cross section of 3/16-inch by 3/4-inch, ASTM F626.

B. Polymer coating over metallic coating.

C. Color: Black, ASTM F 934.

2.7 TENSION WIRE

A. Polymer-Coated Steel Wire: Marcelled (spiraled or crimped) No. 7 gage, (0.177-inches) diameter, ASTM A824, ASTM F 1664, Class 2b over-coated steel wire.

B. Polymer coating over metallic coating.

C. Color: Black, ASTM F 934.

2.8 HARDWARE AND TIES

A. Miscellaneous hardware, including but not limited to nuts, bolts, washers, clips, bands, rail ends, brackets, and straps shall be provided as required, hot-dip galvanized steel or aluminum alloy, ASTM F626.

B. Tension bands shall be formed from flat or beveled steel and shall have a minimum thickness after galvanizing of 0.078-inches and a minimum width of 3/4-inch.

C. Brace bands shall be formed from flat or beveled steel and shall have a minimum thickness after galvanizing of 0.108-inches and a minimum width of 3/4-inch.

D. Wire ties shall be minimum 16-gage galvanized steel wire or minimum 9-gage aluminum alloy wire.

E. All fasteners shall be hot-dip galvanized, ASTM F2329.

F. Bolts: Steel, ASTM A307.

G. Washers: Steel, round, ASTM F844.

H. Bolts: Steel, ASTM A563 Grade A, hex head.

2.9 FITTINGS

A. General: Comply with ASTM F 626.

2.10 GATES

A. Gate Construction: All components of temporary construction gate to match temporary chain link fence.

B. Hardware:

1. Hinges: 360-degree inward and outward swing.

2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

3. All gates shall be equipped with hinges and latch with provisions for padlocking.

4. Double gates and single gates with leaf width 4 feet and greater shall be equipped with a minimum ½'' drop bar and gate hold backs.

5. Hinges shall be cast steel hinges capable of 360 degree opening. Set screw shall be installed drilled into the steel post to lock each hinge to the gate post and prevent rotation. No-lift-off type. Box type hinges are not acceptable.

6. Gate Leaves: Configured with intermediate members and diagonal truss rods or tubular members as necessary to provide rigid construction, free from sag or twist.

7. Latches, hinges, stops, keepers and other hardware items shall be furnished as required for proper operation.

PART 3 EXECUTION

3.1 GENERAL

A. Install fence with properly trained crew as shown on the drawings in accordance with ASTM F567.

B. Install all nuts for tension bands and hardware bolts on the side of the fence opposite the fabric.

C. The temporary chain link fence shall be removed at the conclusion of the work.

3.2 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

B. Post Setting: Set posts at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

2. Gate post/footings shall be installed a minimum of 24-inches below grade.

C. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

D. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches on-center.

E. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches on-center and to braces at 24 inches on-center.

F. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

G. Fabric:

1. Provide fabric of the height specified. Install fabric on the public side of the fence, with bottom no greater than 2-inches above the ground surface. Fabric shall be pulled taut to prevent sagging and provide a uniform smooth appearance. Fasten fabric to line posts at intervals not exceeding 15-inches with ties as specified.

2. Install tension wire in one continuous length between pull posts, weaved through fence fabric at top. Tension wire shall be applied to provide a wire without visible sag between posts. Fasten fabric to tension wire at intervals not exceeding 24-inches with ties or hog rings as specified.

3. Where it is not practicable to conform the fence to general contour of the ground, as at ditches, channels, etc., the opening beneath the fence shall be enclosed with chain link fabric and sufficiently braced to preclude access, but not to restrict the flow of water.

END OF SECTION

SECTION 01 5713

TEMPORARY EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of temporary erosion and sedimentation control measures
2. Maintenance of temporary erosion and sedimentation control measures.
3. Monitoring of site condition and installation of supplemental temporary erosion and sedimentation control measures.
4. Sediment removal and disposal
5. Temporary seeding or other surface stabilization measures.
6. Removal of temporary erosion and sedimentation control measures.
7. Monitoring, documentation, and recordkeeping.
8. Installation of permanent erosion control materials.
9. Final cleanup.

B. Erosion and sediment control techniques include, but are in no way limited to, silt fence, hay bales, drainage structure inserts/filters, mulching with hay/straw, netting/matting, grassing, and appurtenances which will ensure that erosion and sediment pollution will be either eliminated or maintained within acceptable limits.

C. The measures specified herein are the minimum requirements which Contractor shall comply to control erosion and siltation throughout execution of the work. Contractor shall provide additional work if necessary to control erosion and siltation throughout the duration of the construction as conditions dictate, or as directed by Engineer.

1.2 SUBMITTALS

A. Submit material specifications and shop drawings for all materials furnished under this Section.

B. Prior to the start of the construction, submit schedule for the construction of required stormwater detention basins, temporary and permanent erosion and sedimentation control measures, clearing and grubbing, grading, structures at watercourses, construction, and paving.

C. During construction, submit to Engineer schedule changes that affect timing of construction.

D. Submit copies of all inspection and maintenance report forms.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. 22a-315-10 through 19, Soil and Water Conservation

C. Connecticut Department of Energy and Environmental Protection (DEEP)

1. Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

D. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.

1.4 PERMIT CONDITIONS

A. Contractor and Subcontractors are bound to comply with any project-related permits obtained by Owner or Engineer for the work of the project. Such permits will affect performance of the work, and Contractor and Subcontractors are bound to comply with requirements of such permit and representations contained in permit application as though Contractor and Subcontrator were the Permittee/permit-holder. Requirements and conditions set forth in Owner or Engineer-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

1.5 QUALITY CONTROL

A. Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the erosion of soil or movement of sediment from construction activities to off-site areas via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of Contractor.

B. Where additional erosion and sedimentation control measures are required beyond what is indicated on the Drawings or herein, comply with applicable sections of the Connecticut Guidelines for Soil Erosion and Sediment Control, DEEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

C. If applicable, comply with applicable provisions of the Connecticut Department of Energy and Environmental Protection (DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, (DEEP-WPED-GP-015), latest revision thereof. Conditions of such General Permit, other conditions of approval or authorizations, and associated Stormwater Pollution Control Plan (SWPCP) shall become part of the Contract Documents.

D. Engineer has the authority to order immediate, additional, temporary control measures to prevent contamination of adjacent streams or other watercourses, or other areas of water impoundment and damage by erosion.

E. If Engineer observes construction procedures and operations that jeopardize erosion control provisions, Engineer will notify Contractor. If such construction procedures and operations are not corrected promptly, Engineer may suspend the performance of any or all construction until corrections have been made, and such suspension shall not be the basis of any claim by Contractor for additional compensation, nor for an extension of time to complete the Work.

F. Should construction materials be washed away or otherwise rendered ineffective in the opinion of Engineer during the progression of the Work, Contractor shall replace the installations at no additional cost to the Owner.

1.6 COORDINATION WITH PERMANENT EROSION CONTROL PROVISIONS

A. Coordinate temporary erosion and sedimentation control measures with permanent erosion control features to the extent practical to ensure economical, effective and continuous erosion control throughout construction and post-construction periods.

PART 2 PRODUCTS

2.1 HAY BALES

A. Hay bales shall be made of cut hay with forty (40) pounds minimum weight and 120 pounds maximum weight. Bales shall be free of rotten or degraded hay, significant splits or voids. Hay bales shall be held together with a minimum of two bands made of either wire or heavy twine.

B. Stakes to anchor the bales shall be a minimum of 36 inches long and made of hardwood with a minimum dimension of 1½-inch by 1½-inch normal size. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, “U”, “T”, “L”, or “C” shaped with a minimum weight of 0.5 pounds per foot.

C. Replace individual hay bales upon loss of 30% of original mass or volume, whichever is less.

2.2 SILT FENCE

A. Woven Polypropylene geotextile having a minimum weight of 3.1 ounces per square yard conforming to the following:

1. Mechanical and Physical Properties of Silt Fence Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Weight	ASTM D 3776	oz/yd^2	5.6
Grab Tensile Strength	ASTM D 4632	Pounds	60
Grab Elongation (Max percent)	ASTM D 4632	Percent (%)	15-30
Trapezoidal Tear	ASTM D 4533	Pounds	30
Puncture	ASTM D 4833	Pounds	30
Mullen Burst	ASTM D 3786	psi	150-200
Permittivity	ASTM D 4491	Sec^{-1}	0.15
Flow Rate	ASTM D 4491	gal/min/ft2	15-20
Apparent Opening Size	ASTM D 4751	(U.S. Sieve)	30-35
UV Resistance (at 500	ASTM D 4355	% strength	70

hours)		retained	

B. Silt fence shall be constructed of a minimum thirty-six (36) inch wide continuous woven geotextile. The material shall have a high sediment filtration capacity, high slurry flow and minimum clogging characteristics. Edges of the fabric shall be finished to prevent the outer fibers from pulling away from the geotextile. Geotextile shall be free of defects or flaws that significantly affect its physical and/or filtering properties.

C. Fabric shall be securely fastened to stakes a minimum of 42 inches long and made of hardwood with a minimum dimension of 1½ inch by 1½ inch normal size such that a 6 to 8 inch length of fabric is unattached at the bottom for anchorage in soil. Metal stakes may be used instead of wooden stakes. Metal stakes shall be round, “U”, “T”, “L”, or “C” shaped with a minimum weight of 0.5 pounds per foot. Stakes shall be spaced not greater than ten feet apart. When required, wire or another type of support shall be constructed between the geotextile fabric and the posts to improve the load carrying capacity of the silt fence.

2.3 STRAW MULCH

A. Straw mulch shall be comprised of threshold straw of oats, wheat, barely, or rye that is free from noxious weeds, mold or other objectionable material. Straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment. Straw mulch shall be utilized on all newly graded areas with slopes exceeding 5% to protect areas against washouts and erosion unless other erosion control measures are provided.

2.4 EROSION CONTROL MATTING

A. Temporary Erosion Control Blanket shall be 1) Curlex® Excelsior Blanket, as manufactured by American Excelsior Company, 2) ERO-MAT® V75S(FD), as manufactured by Verdyol Plant Research, Ltd., or 3) Landlok® S2 RD, as manufactured by SI® Geosolutions, or 4) approved equal.

B. Degradable Erosion Control Fabric Netting shall be Landlok® 407 GR, as manufactured by 1) SI® Geosolutions, or 2) GeoJute® as manufactured by Belton Industries, Inc., or 3) BioNet® S150BN™ Double Net Straw Blanket, as manufactured by North American Green, or 4) approved equal.

C. Long-Term and Non-degradable Turf Reinforcement Mats shall be 1) Pyramat®, as manufactured by SI® Geosolutions, or 2) Recyclex® Turf Reinforcement Matting, as manufactured by American Excelsior Company, or 3) Vmax3 C350™, as manufactured by North American Green, or 4) approved equal.

D. Erosion control matting shall be secured with staples or an alternative attachment device such as geotextile pins or plastic pegs as recommended by the manufacturer. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval prior to installation.

PART 3 EXECUTION

3.1 GENERAL

A. Install erosion and sedimentation control measures as shown on the Drawings prior to any site disturbance.

B. No work shall be started until erosion control schedules and installation have been accepted by Engineer.

C. Engineer has the authority to control the surface area of each material exposed by construction operations and to direct Contractor to immediately provide permanent or temporary pollution control measures to prevent contamination of adjacent watercourses or other areas of water impoundment. Every effort shall be made by Contractor to prevent erosion on the site and abutting properties or areas.

D. Contractor shall construct all permanent erosion and sediment control features at the earliest practical time as outlined in the accepted schedule. Temporary erosion and sediment control measures shall be used to correct conditions that develop during construction, which were unforeseen, but are needed prior to installation of permanent control features, or that are needed temporarily to control erosion or sedimentation which develops during construction operations.

E. Contractor shall limit as necessary the surface area of the earth material exposed to sufficiently maintain and protect the slopes to prevent pollution. Where erosion is likely to be a problem, clearing and grubbing operations shall be scheduled and performed so that grading operations and permanent erosion and sediment control features can follow immediately thereafter, if conditions permit; otherwise, temporary control measures will be required between successive construction stages.

F. Erosion control measures shall be maintained by Contractor, and he shall remove such installations only upon completion of the work and the site is stabilized or when authorized to do so by Engineer.

G. Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. Contractor shall cease any of his operations, which will increase pollution during rainstorms.

H. Failure by Contractor to control erosion, pollution, and siltation shall be cause for the Engineer to employ outside assistance to provide the necessary corrective measures. The cost of such assistance, including engineering costs, will be charged to Contractor and appropriate deductions made to Contractor's payment.

3.2 HAY BALES

A. Hay bales shall be positioned as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities, or as direct by the Engineer.

B. Hay bales shall be utilized on all catch basins and drainage facilities on the Project Site to prevent the entry of sediments or other debris. Maintain such protection throughout execution of the work until such drainage facilities have been abandoned/removed.

C. Bales shall be placed lengthwise with ends of adjacent bales tightly abutting one another to form a continuous barrier. Bales shall be entrenched to a depth of 4 inches and backfilled, with the backfill placed toward the potential source of runoff and sediment. All bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms. Each bale shall be anchored with a minimum of two stakes, driving the first stake in each bale towards the previously laid bale to drive the bales together. Stakes must be driven a minimum

of 18 inches into the ground. Loose hay shall be inserted between bales as required to prevent water from escaping between the bales.

3.3 GEOTEXTILE SILT FENCE

A. Install a filter fabric silt fence prior to construction and remove after full surface restoration has been achieved. Install silt fence as indicated on the Drawings and/or as necessary to prevent off site movement of sediment produced by, or as a result of, construction activities.

B. Install as follows:

1. Hand shovel excavate a small trench a minimum of six inches wide by six inches deep on the upslope side of the desired fence line location.

2. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post at least 12 inches into the original ground.

3. Fabric rolls shall be spliced at posts. The fabric shall be overlapped six inches, folded over and securely fastened to posts.

4. Lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off.

5. Backfill the trench and compact. Compaction is necessary to prevent the run-off from eroding the backfill.

6. For slope and swale installations, extend the ends of the trench sufficiently up slope such that the bottom end of the fence will be higher than the top of the lowest portion of the fence.

3.4 TEMPORARY MULCHING

A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 30 calendar days of the completion of rough grading or where final grading has been completed but seeding is not anticipated for 20 days.

1. Straw/Hay Mulch

   Exposure Period: 6 months

   Application Method: By hand or machine

   Application Rate: 110 lbs/1,000 square feet.

2. Bark Chips/Shredded Bark

   Exposure Period: Less than one year

   Application Method: By hand or machine

   Application Rate: 6 cubic yards /1,000 square feet.

3.5 INSPECTIONS AND MAINTENANCE

A. Contractor is responsible to maintain the sediment and erosion control features at all times throughout the project duration and until the completion certification and approval has been issued.

B. Regular erosion and sediment control system inspections shall be conducted by Contractor throughout the project duration. At a minimum, Contractor shall conduct daily inspections and maintain erosion control systems in good operating condition. Report the results of the inspection and the recommended maintenance and/or repair requirements to Engineer.

C. Additional inspections may be required and/or directed prior to, or immediately following, a storm event generating a discharge. Repairs shall be made as necessary.

D. In the event that the sedimentation and erosion control measures employed by Contractor prove to be inadequate as determined by the Engineer, Contractor shall adjust operations to the extent necessary to prevent erosion and sediment transport.

E. Surface water shall be pumped to maintain excavations free of water. Comply with applicable requirements of the Connecticut Department of Environmental Protection, specifically those requirements related to the management of stormwater and dewatering wastewaters associated with construction activities.

F. Hay bales and/or silt fences.

1. Remove accumulated sediment once it builds up to one-half of the height of the bale or fabric.

2. Replace damaged or degraded bales as necessary or when directed by the Engineer.

3. Replace damaged fabric, or patch with a 2-ft minimum overlap. Overlaps may only be made at fence posts.

4. Make other repairs as necessary to ensure that the bales/fence is filtering all runoff.

G. Erosion Control Mats shall be inspected at least once a week. Areas where the mat has become dislodged from the soil surface or become torn shall be re-graded and re-seeded as necessary and the mat re-installed. When repetitive failures occur at the same location review conditions and modify erosion control measures to reduce failure rate. Temporary erosion control blanket damaged during the progress of work or resulting from the Contractor's vehicles, equipment, or operations shall be repaired or replaced at the expense of the Contractor.

END OF SECTION

SECTION 01 5714
TEMPORARY DUST CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and spreading water, calcium chloride, and/or mulch on the subgrade, or in other areas of a Project Site or associated off-site areas, for the purpose of controlling dust emissions.

B. The requirements set forth in this section of the specifications apply to all phases and areas of construction.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Regulations of Connecticut State Agencies (RCSA)

1. RCSA Section 22a-174-1 through 43, Abatement of Air Pollution.

C. American Society for Testing and Materials (ASTM)

1. ASTM D98, Standard Specification for Calcium Chloride.

PART 2 PRODUCTS

2.1 MATERIALS

A. Only water, calcium chloride, and mulch are approved for dust control. No asphalt or petroleum-based products may be utilized for dust control.

B. Water used shall be clean, non-polluted water obtained from sources approved by Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Dust control shall be the responsibility of Contractor and dust control operations shall meet the requirements of the State of Connecticut Department of Environmental Protection.

B. Construction sequencing shall be organized and conducted in a manner to leave existing pavement or ground coverings in place until just prior to earth excavation for the purpose of minimizing the migration of dust beyond the Project Limits into the surrounding area.

C. Engineer reserves the right to conduct active dust monitoring using visual methods and may utilize particulate measurement equipment during the course of the work. If the amount of fugitive dust and/or particulate generated during the work is deemed unacceptable in the Engineer’s judgment or exceeds baseline Project Site conditions at Engineer’s monitoring

locations, Engineer may require Contractor to stop work and implement corrective measures. No claim for delay will be considered for work stoppage based upon the results of Engineer's active dust monitoring results.

D. Stockpiled materials from which particle have the potential of becoming airborne shall be securely covered with a temporary waterproof covering made of polyethylene, polypropylene, hypalon, or approved equal. The covers must be in place at all times when work with the stockpiles is not occurring.

E. Subcontractor shall sweep all adjacent roads and neighboring parking lots and driveways that are impacted by the work. Whenever dirt is tracked from the site it shall be cleaned as necessary to prevent it from becoming a nuisance or hazard. At a minimum, adjacent streets shall be swept once per week.

3.2 WATER

A. The application of water shall be under the control of Engineer at all times. It shall be applied only at the locations, and at such times, and in the amount as may be directed by Engineer. Quantities of water wasted or applied without authorization will not be paid for.

B. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding or pollution.

C. Contractor shall have available and maintain in an operable condition at all times, sufficient equipment for the purpose of applying water for dust control.

D. Watering equipment shall consist of pipelines, tanks, tank trucks, distributors, pumps, meters, hose or other devices, approved by Engineer, which are capable of applying a uniform spread of water over the surface. A suitable device for a positive shut-off and for regulating the flow of water shall be located so as to permit positive operator control.

E. Applications of water for dust suppression include, but are not necessarily limited to, the following:

1. Demolition activities, material handling, material processing, and loading.

2. Earthwork.

3. Open excavation faces and dust-prone areas of the work.

4. Temporary access roads and roadway surfaces within and around the Project Site.

END OF SECTION

SECTION 02 3219

EXPLORATORY EXCAVATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation of test pits where it may be necessary to locate or examine soils, groundwater, drains, pipes, rock, utilities, subsurface structures, or any other obstacles or subsurface conditions.

2. Stockpiling, management, and disposal of surplus or unsuitable material.

3. Backfilling and compacting of test pits with suitable material.

B. Exploratory excavations shall be conducted where shown on the Drawings, where directed or approved by Engineer, and as Contractor may deem necessary to locate or examine subsurface conditions as part of his work.

C. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

D. Contractor is responsible for all health and safety.

1.2 PAYMENT

A. Exploratory excavation work conducted by Contractor for his use or as specifically called-for on the Drawings or in the Specifications shall be considered incidental work and shall be included in Contractor's base price for the project. Contractor shall be responsible for any required backfilling with suitable materials, disposal of unsuitable excavated materials, and restoration of the excavation area.

1.3 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. United States Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

1.4 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint

as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.5 SUBMITTALS

A. Submit record data of observations noted in test pits, including photographs, diagrams, and descriptive notes.

1.6 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination

1. Inform all utility owners of the necessity of test pit work. Prove reasonable advance notice to allow for coordination.

2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.

3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

D. Utility Protection

1. Safeguard and protect from damage any utility to remain in service. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.

2. Where utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

3. When uncharted or incorrectly charted piping or utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

E. Retaining Structures

1. Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utilities, paving, light standards, piping or conduit. Assume responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

1.7 SEQUENCING

A. Contractor shall provide Engineer a minimum two (2) day notice prior to test pit excavation. Notify Engineer prior to backfill.

B. If test pits are required during the work to evaluate unforeseen conditions, notify Engineer as soon as the need for such work is known.

C. Notify Engineer and/or utility companies of any conflicts or other conditions observed which may require design revisions, relocations, and/or adjustment. No work shall be started within areas where conflicts or other conditions are observed which require design revisions, relocations, and/or adjustment until authorized by Engineer.

PART 2 PRODUCTS - NOT USED

2.1 SOILS

A. Refer to Section 31 2310 – Earthwork.

PART 3 EXECUTION

3.1 EXCAVATION

A. Test pit excavation and backfill shall comply with applicable provisions of earthwork and excavation as indicated in other applicable Specification Sections.

B. Excavation of test pits shall be accomplished by such means as are required to ensure that underground utilities or structures which may be encountered are not damaged.

C. Contractor shall measure and record the size, configuration, exact horizontal and vertical location of all utilities, pipes or other conditions/obstacles encountered.

D. Contractor shall be solely responsible for any damages incurred during excavation operations. Any such damages shall be repaired or replaced by Contractor to the satisfaction of the facility

owner/operator, responsible/administering agency, and/or Engineer. Whether repair and/or replacement is Conducted by Contractor or must be conducted by owner/operator or responsible/administering agency, any and all costs thereof, including those costs associated with planning, coordination and owner/operator or responsible/administering agency personnel, shall be borne by Contractor.

E. Where an existing pavement has been removed for test pit excavation, the surface shall be restored in accordance with the Drawings and Specifications. In all other areas, the surface of test pit areas shall be backfilled and the surface restored to a condition equal to original, unless otherwise indicated by Engineer.

END OF SECTION

SECTION 02 4123

SITE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. General Site Demolition.

2. Demolition of structures, signage, foundations and appurtenances, pavement, curbing, and similar site improvements.

3. Filling of voids and excavations resulting from demolition.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut.

1. State of Connecticut Solid Waste Management Regulations, Sections 22a-209 including any amendments thereto.

1.3 DEFINITIONS

A. Demolition: Any operation including the dismantling or wrecking of a structure, assembly, appurtenance, or any portion thereof, including major and minor components, parts, and systems. Demolition shall be inclusive of the removal, handing, processing, segregation, loading, and proper off-site disposition of materials. Demolition shall be interpreted as complete and total removal unless otherwise indicated. The term Remove shall be synonymous with Demolition.

B. Bulky Waste: Land clearing debris and non-contaminated or hazardous waste material resulting directly from demolition activities other than Clean Fill, including such materials as tree stumps, tree tops, concrete, wood, brick, plaster, roofing materials, wallboard, metals, carpeting, insulation, furniture, and furnishings. Bulky Waste shall include Construction and Demolition Debris and Construction and Demolition Waste.

1.4 SAFETY

A. Conduct the work of this Section in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Utility Coordination

1. Inform all utility owners of the necessity of test pit work. Prove reasonable advance notice to allow for coordination.

2. Coordinate the excavation of all test pits with the respective utility owners having facilities in the vicinity of the test pit location.

3. If so desired by the respective utility owners, all or part of the work under this Section may be accomplished by their crews and/or supervised by them.

1.6 REGULATORY REQUIREMENTS

A. Comply with all applicable federal, state, and local safety and health requirements regarding all aspects of the work. Do not proceed until all permits or other approvals are secured.

B. Contractor is bound to comply with any project-related permits or approval obtained by Owner, including all requirements of such permit and representations contained in permit application as though Contractor were the permittee. Requirements and conditions set forth in Owner-obtained project-related permits and permit applications shall be binding on Contractor just as any Specification would be.

C. Do not close or obstruct roadways, sidewalks, hydrants, or other infrastructure without permits or authorization from local municipal authorities or other authorities having jurisdiction.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 IDENTIFICATION OF EXISTING FEATURES

A. Prior to commencing construction activities, Contractor shall identify and delineate those areas or specific improvements that are not to be disturbed. Areas or specific improvements within the Limits of Work/Contract Limits and general work areas which are not to be disturbed shall be clearly marked or fenced. Monuments and markers shall be protected before construction operations commence. Contractor’s personnel shall be knowledgeable of the purpose for marking and/or protecting designated areas, specific improvements, monuments, and markers at the Project Site.

3.2 PROTECTION OF EXISTING FEATURES

A. General

1. All areas or specific improvements, including but not limited to vegetation, utilities, poles, wires, fences, curbings, property-line markers, and other structures, which must be preserved in place without being temporarily or permanently relocated shall be carefully supported and otherwise protected from damage by Contractor.

2. As excavation/demolition work approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

B. Pavements

1. On paved surfaces to remain, Contractor shall not use or operate tractors, bulldozers, or other power operated equipment, or store tools, equipment or materials which may cut or otherwise damage such surfaces.

2. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of construction operations. Such restoration shall meet the approval of Engineer.

C. Utilities

1. Locate and identify existing utilities that are to remain and protect them from damage. Provide protection as required such as bracing, stabilizing, supporting, and retaining.

2. Before excavating near any utility, notify the utility owner, coordinate protective work, and comply with the utility owners' requirements.

3. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.

4. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

5. When uncharted or incorrectly charted utilities are encountered, stop work and notify Engineer. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

D. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Contractor assumes responsibility for the strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto.

3.3 SITE DEMOLITION

A. Conduct site demolition as shown on the Drawings.

B. Conduct site demolition operations in a manner that will prevent damage to adjacent structures, utilities, pavements and other facilities to remain.

C. Remove from the site and properly dispose all materials resulting from site demolition.

3.4 DUST CONTROL

A. Implement fugitive dust suppression to prevent unacceptable levels of dust resulting from site demolition operations or other activities required by the Contract Documents. It shall be the Contractor’s responsibility to supervise fugitive dust control measures and to monitor airborne particulate matter. Comply with Section 01 5714 – Temporary Dust Control.

3.5 REPLACEMENT

A. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

B. Contractor shall patch, repair and/or replace all adjacent materials and surfaces damaged through the prosecution of work at no expense to Owner. All repair and replacement work shall match the existing in-kind. Final acceptance of said work shall be at the sole judgment of Owner.

END OF SECTION

SECTION 03 3200

SITE CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Site cast-in-place concrete, including but not necessarily limited to, sidewalks, pads and bases.

2. All facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the Work shown on the Drawings and as specified herein.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

2. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

3. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

4. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

5. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

6. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

7. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars or Concrete Reinforcement.

8. ASTM C29 - Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

9. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

10. ASTM C33 - Standard Specification for Concrete Aggregates.

11. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

12. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

13. ASTM C70 - Standard Test Method for Surface Moisture in Fine Aggregate.

14. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

15. ASTM C117 - Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.

16. ASTM C127 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.

17. ASTM C128 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.

18. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

19. ASTM C138 - Standard Test Method for Density ("Unit Weight"), Yield, and Air Content (Gravimetric) of Concrete.

20. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.

21. ASTM C150 - Standard Specification for Portland Cement.

22. ASTM C156 - Standard Test Method for Water Retention by Concrete Curing Materials.

23. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

24. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.

25. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

26. ASTM C192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

27. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

28. ASTM C233 - Standard Test Method for Air-Entraining Admixtures for Concrete.

29. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

30. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

31. ASTM C311 - Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.

32. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.

33. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

34. ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

35. ASTM C566 - Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.

36. ASTM C595 - Standard Specification for Blended Hydraulic Cements.

37. ASTM A 615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

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

39. ASTM C685 - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.

40. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

41. ASTM C803 - Standard Test Method for Penetration Resistance of Hardened Concrete.

42. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

43. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

44. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.

45. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.

46. ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars.

47. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

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

49. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

50. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

51. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

52. ASTM D5249 - Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

53. ASTM D5893 - Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

54. ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

D. Concrete Reinforcing Steel Institute (CRSI).

1. CRSI Manual of Standard Practice.

E. State of Connecticut

1. State Building Code, including all Amendments, Supplements, and Errata.

F. American Concrete Institute (ACI)

1. ACI 224R - Control of Cracking on Concrete Structures.

2. ACI 224.3R - Joints in Concrete Construction.

3. ACI 301 - Specifications for Structural Concrete.

4. ACI 302.1R - Guide for Concrete Floor or Slab Construction.

5. ACI 304R-00 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

6. ACI 305R-10 - Guide to Hot Weather Concreting.

7. ACI 306R-10 - Guide to Cold Weather Concreting.

G. American Welding Society (AWS).

1. AWS A5.1/A5.1M (2004; Errata 2004) Carbon Steel Electrodes for Shielded Metal Arc Welding.

2. AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding Code - Reinforcing Steel.

1.3 SUBMITTALS

A. Sampling and Testing Laboratory - Submit name and qualifications of commercial sampling and testing laboratory for Engineer's approval.

B. Testing Agency - Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer's approval.

C. For each type of specially furnished concrete provide a description of methods and the sequence of placement.

D. Manufacturer's catalog data for the following items shall include printed instructions for admixtures, bonding agents, epoxy-resin adhesive binders, waterstops, and liquid chemical hardeners:

1. Concrete Aggregates.
2. Portland Cement.
3. Ready-Mix Concrete.
4. Form Facing Materials.
5. Reinforcement Materials.
6. Joint Materials.
7. Water-Vapor Barrier Subgrade Cover.
8. Bonding Materials.
9. Finish Materials.
10. Concrete Curing Materials.
11. Form release agent.
12. Concrete coloring additive.
13. Elastomeric joint sealant.
14. Preformed joint filler

E. Submit samples of the following:

1. Preformed joint filler.
2. Manufacturer’s color charts showing full range of colors available.
3. Cured samples of elastomeric join sealants in the color(s) selected.

F. Design Data

1. Mix Design data for each class of Ready-Mix Concrete shall be submitted at least 15 calendar days prior to start of specified work.
2. Mix Design data for each type of integrally-colored concrete mix called-for shall be submitted at least 15 calendar days prior to start of specified work.

G. Certificates

1. Submit certificates for the following:
   a. Concrete Design Mixes.
   b. Concrete Aggregates.

c. Welding Procedures. Welding Procedures shall be in accordance with AWS D1.4/D1.4M. Certificates for Welder Qualifications shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

d. Mill certificates for Steel Bar.

2. Certificates for concrete shall contain project name, title/number, date, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer, brand name of manufactured materials, material name, values as specified for each material, and test results.

H. Manufacturer's Instructions

1. Installation instructions shall indicate the manufacturer's recommended method and sequence of installation for the following items:

a. Admixtures

b. Bonding Materials

c. Waterstops

d. Liquid Chemical Hardener

1.4 QUALITY ASSURANCE

A. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated on the Drawings are approximate. Manufacturer’s approved shop drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size and details.

B. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

C. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

D. Welder qualifications: Welder qualifications shall be verified in accordance with AWS D1.4/D1.4M or under an equivalent qualification test approved in advance. Welders shall be permitted to do only the type of welding for which each is specifically qualified.

E. Concrete testing: Concrete testing shall be performed by an approved Testing Agency/Testing Laboratory experienced in sampling and testing of concrete. Testing Agency/Testing Laboratory shall meet the requirements of ASTM E329.

1.5 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturers’ written recommendations.

B. Packaged materials shall be delivered to the project site in their original, unopened package or container bearing label clearly identifying manufacturer's name, brand name, material, weight

or volume, and other pertinent information. Packaged materials shall be stored in their original, unbroken package or container in a weather-tight and dry place until ready for use in the work.

C. Unpackaged aggregates shall be stored to avoid excessive segregation, contamination with other materials or other size aggregates, or freezing.

D. Reinforcement and other metal items shall be protected from corrosion and shall be kept free from ice, grease, and other coatings that would destroy or reduce bond.

1.6 PROJECT CONDITIONS

A. Environmental Requirements

1. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours.

2. Protect fresh concrete from rain, moisture, and freezing.

3. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

A. Cement: ASTM C 150. One brand and type of cement shall be used for formed concrete having exposed-to-view finished surfaces.

B. Unless otherwise specified, cement shall be Type IA.

2.2 READY-MIX CONCRETE

A. Ready Mix Concrete: Portland Cement Concrete, air-entrained, ASTM C94.

1. Compressive Strength:

a. Unless otherwise indicated, minimum compressive strength at 28 days shall be 4,000 psi minimum.

b. Sidewalks, stairs and landings, pedestrian and vehicle ramps, and curbing: Minimum compressive strength at 28 days shall be 4,500 psi minimum.

2. Water/cement ratio: Maximum 0.45.

3. Air content by volume: 6 percent ± 1 percent, ASTM C231 (primary method) or ASTM C173 (secondary method).

4. Slump: no less than 2 inches, not greater than 4 inches, ASTM C143.

5. Standard Color: Natural grey.

B. Aggregate

1. Coarse aggregate: ASTM C33. Broken stone or gravel consisting of clean durable fragments of uniform quality throughout. It shall be free from soft, disintegrated pieces, mud, dirt, organic or other injurious material. Coarse aggregate of a size retained on a 1-

inch square opening sieve shall not contain more than 8% of flat or elongated pieces, whose longest dimension exceeds five times their maximum thickness.

2. Fine aggregate: ASTM C33. Sand consisting of clean, hard, durable, uncoated particles of quartz or other rock, free from lumps of clay, soft or flaky material, loam, organic or other injurious material. Fine aggregate shall contain not more than 3% of material finer than a #200 sieve, ASTM C117.

C. Water: Potable quality.

D. Admixtures

1. Concrete shall contain a water reducing agent, ASTM C494, to minimize cement and water content of the concrete mix at the specified slump.

2. Air-Entraining Admixtures: ASTM C260.

3. Pozzolan: Fly ash or other pozzolans used as admixtures shall conform to ASTM C618, Class C or Class F with 4 percent maximum loss on ignition. Pozzolan may be used to replace a maximum of 15 percent (15 %) of cement by weight.

4. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of Engineer in each case.

2.3 FORMS

A. Forms shall be substantially built and adequately braced so as to withstand the liquid weight of concrete without deforming. All linings, studding, walling and bracing shall be such as to prevent bulging, spreading, or loss of true alignment while pouring and displacement of concrete while setting.

B. All edge forms for sidewalk pavements, curbs and gutters shall be of sufficient rigidity and adequately braced to accurately maintain line and grade. Form work shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

C. Forms for curved sections shall be so constructed and placed that the finish surface of walls and edge of sidewalks, curbs and gutters will not deviated appreciably from the arc of the curve.

D. Exposed vertical and horizontal edges of the concrete in structures shall be chamfered as indicated on the Drawings by the placing of moldings in the forms.

E. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a smooth, continuous, straight, and level surface.

1. Plywood shall be APA A-A, A-B or A-C, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8" thick.

F. Forms for Non-Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Form work materials shall produce a generally smooth, continuous, straight, and level surface. Grain patterns or similar imperfections are acceptable. Lumber shall be dressed on at least two edges and one side.

1. Plywood shall be at least B-B, Class 1, Exterior Grade. Thickness shall be as required to prevent movement or deformation but shall not be less than 5/8" thick.

G. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms or ABS or PVC plastic reusable forms.

H. Form Ties: Provide prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, corner locks and other accessories as necessary.

I. Form Release Agent: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.

2.4 REINFORCEMENT MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60 unless otherwise indicated.

B. Galvanized Reinforcing Bars: ASTM A 767, Class II with galvanizing before fabrication.

C. Weldable Reinforcing Bars: ASTM A 706, Grade 60 unless otherwise indicated. Maximum carbon content shall be 0.55 percent.

D. Epoxy-Coated Reinforcing Bars: ASTM A 775, Grade 60 unless otherwise indicated.

E. Steel Wire: ASTM A 82, 16 gauge or heavier black annealed wire.

1. Ties for epoxy-coated bars shall be vinyl-coated or epoxy-coated.

2. Ties for zinc-coated bars shall be zinc-coated.

F. Welded Wire Reinforcement (WWR)

1. Sidewalks: Plain wire, ASTM A497, 6 x 6 -W3 x W3 unless otherwise indicated on the Drawings.

2. Concrete Pavement: Plain wire, ASTM A497, 6 x 6 -W3 x W3 unless otherwise indicated on the Drawings.

G. Supports for Reinforcement

1. Supports shall include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and wire fabric in place. Supports shall be wire bar type conforming to ACI/MCP 405, ASTM E 648, ACI/MCP 305ACI 318/318R and CRSI MSP-2.

2. Supports shall be corrosion-resistant, hot-dip galvanized, plastic-coated, plastic, or stainless-steel.

H. Bar/Dowel Adhesive: Two component (1:1 ratio), 100% solids, high modulus, moisture-insensitive structural epoxy gel designed specifically for bonding bars, dowels, and bolts in concrete.

2.5 JOINT MATERIALS

A. Preformed Joint Filler Strips

1. Where no joint sealant is called-for: Nonextruding and resilient bituminous type conforming to ASTM D 1751, 1/2 inch thick, one piece for the full depth and width of the joint.

2. Where joint sealant is called-for: Nonextruding and resilient nonbituminous type conforming to ASTM D 1752, Type I (sponge rubber) or Type II (cork), 1/2 inch thick, allowance for sealant at top and extending for the full depth and width of the joint.

B. Joint Sealant Compound, ASTM C920

1. Self-Leveling (Type SL; Grade "P")

a. Cold-applied and self-leveling, Type S or Type M elastomeric polymer sealant.

2. Gun-Grade (Non-Sage; Grade "NS")

a. One-component (Type S) high-performance moisture-curing polyurethane sealant specifically formulated for bonding to masonry and concrete.

C. Traffic Bound areas: T sealant.

D. Non-Traffic Bound areas: NT sealant.

E. Color: As approved by Engineer.

F. Backer material: ASTM D5249, closed cell.

2.6 CONCRETE BONDING MATERIALS

A. Aqueous-phase, film-forming, nonoxidizing, freeze and thaw-resistant compound suitable for brush or spray application conforming to ASTM C 932.

B. Epoxy-Resin Adhesive Binder: Two-component, penetrating high solids, epoxy-based primer/bond coat, 100% solids, moisture-tolerant, ASTM C-881, Types I, II, and V, Grade-2, Class C and AASHTO M-235.

2.7 CONCRETE CURING MATERIALS

A. Curing shall be by moist curing (preferred) or by use of curing compound. Sodium Silicate curing compounds shall be used where required by the weather, approved construction schedules and construction that is not adaptable to damp curing.

B. Curing compound shall be a resin-base, white pigmented compound, ASTM C309, Type 2.

C. Curing compounds shall contain a fugitive dye or when hot weather conditions dictate, a fugitive heat reflecting pigment.

D. Moisture-Retaining Cover:

1. Waterproof paper, ASTM C 171, regular or white.

2. Polyethylene sheeting, ASTM C 171.

3. Polyethylene-coated burlap consisting of a laminate of burlap and a white opaque polyethylene film permanently bonded to the burlap. Burlap: ASTM C 171, Class 3. Polyethylene film: ASTM C 171.

4. When tested for water retention in accordance with ASTM C 156, weight of water lost 72 hours after application of moisture retaining covering material shall not exceed 0.039 gram per square centimeter of the mortar specimen surface.

E. Water: Potable Quality.

F. Membrane-Forming Curing Compound

1. Liquid type, ASTM C 309, Type 1, clear, Type 2, white, pigmented.

2.8 BOND BREAKER

A. Asphalt felt conforming to ASTM D2626, Type I or 6-mil polyethylene sheeting, ASTM D4397.

2.9 SEALER

A. Consolideck® Saltguard® silane/siloxane water repellent and chloride screen as manufactured by Prosoco, Inc., 3741 Greenway Circle, Lawrence, KS 66046, or approved equal.

PART 3 EXECUTION

3.1 GENERAL

A. Verify site conditions before proceeding with the work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.

B. Provide construction techniques in accordance with applicable provisions of ACI 224R-01, ACI 224.3R-95, and ACI 302.1R-04.

C. Engineer shall be notified of concrete placement sufficiently in advance of start of operation to allow their representative to complete preliminary inspection of the Work, including subgrade, forms, and reinforcing steel, if used.

D. Adjacent work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original conditions at the contractor's expense. No concrete walks shall be poured after 12 noon unless a guard is visibly stationed nearby to prevent graffiti. Contractor shall be responsible for replacing any graffiti if he fails to provide adequate protection.

E. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect exposed surfaces.

F. Retempering of concrete is not permitted.

G. Contractor is responsible for the protection and resetting of all existing utility covers/castings to finish grade; as well as, setting all new utility covers/castings to finish grade prior to placement of concrete. The repair of any settlement, or protrusion above finish grade, shall be the responsibility of Contractor at no additional cost to Owner.

3.2 PREPARATION OF SUBGRADE

A. Compact and bring area to required subgrade elevation in accordance with Section 31 2310 – Earthwork. Provide for final fine grading, and compaction of areas as required to form a firm, uniform, accurate and unyielding subgrade at required elevations and to required lines.

B. Existing subgrade material, which will not readily compact as required, shall be removed and replaced with satisfactory materials in accordance with Section 31 2310 – Earthwork.

C. Subgrade of areas to receive concrete shall be recompacted as required to bring the top 8 inches of material, immediately below the base course, to a compaction at optimum moisture content of at least 95 percent (95%) of maximum density, as determined by ASTM D1557. Subgrade compaction shall extend for a distance of at least 1 foot beyond pavement edge.

D. Materials shall not be stored or stockpiled on subgrade.

E. Disposal of debris and other material excavated under this section, and material unsuitable for, or in excess of requirements for, completing work of this section shall be disposed of off-site.

F. Prepared subgrade shall be inspected and approved by Engineer Representative before installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the Specification.

3.3 AGGREGATE BASE COURSE

A. Prepare aggregate base course for concrete in accordance with Section 31 2310 - Earthwork.

B. Width of base course shall be greater than or equal to the width of concrete surface, if continuous lateral support is provided during rolling. The width of base course shall extend at least 2 x base thickness beyond the edge of the course above, if it is not so supported.

C. Aggregate shall be applied in lifts less than or equal to 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.

2. The base shall be wetted and rolled or tamped after the spreading of each lift.

3. Rolling shall begin at the sides and progress to the center of crowned areas, and shall begin on the low side and progress toward the high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.

4. Surface irregularities, which exceed 1/2-inch, as measured by means of a 10-foot long straightedge, shall be replaced and properly re-compacted.

D. Density: Base course shall be compacted at optimum moisture content to not less than 95 percent of maximum density as determined by ASTM D1557.

E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and the area repaired.

F. Portions of subgrade, or of construction above, which become contaminated, softened, or dislodged by the passing of traffic, or otherwise injured, shall be cleaned, replaced, or otherwise repaired to conform to the requirements of this specification before proceeding with the next operation.

3.4 FORMS

A. Forms shall be securely staked, braced and held firmly to the required line and grade and shall be sufficiently tight to prevent leakage of mortar. All forms shall be cleaned and oiled or wetted before concrete is placed against them.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Complete and approve formwork. Remove debris and foreign material from interior of forms before start of concrete placing.

D. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

E. The maximum cross slope for sidewalks shall be 2.0 percent, sloped towards the gutter. Verify formwork prior to concrete placement. Make corrections as required and bring discrepancies to attention of Engineer.

3.5 JOINTS

A. Locate joints as located on the Drawings, as shown on Engineer-approved joint plan. Conform with applicable sections of ACI 224.3R-95.

B. Construction Joints: Effected at the end of a pour, lift, or at the end of a day's concrete placement. This type of joint is a plane surface between two distinct sections of concrete.

1. Construction Joints shall be ½ inch wide.

2. Joint filler: Unless otherwise specified, Construction Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

4. Where called-for on the Drawings, install pins at Construction Joints.

C. Isolation Joints: Installed at intersections of structures on any type including but not limited to buildings, walks with steps, pre-cast concrete curb, light foundations, walls, pads, slabs at footings, or other structures. Isolation Joints shall not be required where concrete flatwork abuts granite curbing.

1. Isolation Joints shall be ½ inch wide.

2. Joint Filler: All Isolation Joints shall be constructed with joint filler. Joint filler shall extend the full depth of the slab and shall extend the full length of the joint. Use of multiple pieces of joint material of lesser dimensions to make up required depth and width of joint will not be permitted.

3. Where joints are to receive filler, recess joint filler 1/4-inch below finish surface or as otherwise indicated on the Drawings.

D. Control/Contraction Joints: Installed to form a weakened plane in a concrete member to provide a reduction in member thickness for the purpose of controlling shrinkage stresses to that specific area. Control/Contraction Joints shall be synonymous with "Dummy Joints".

1. Control/Contraction Joints shall be tooled or saw-cut.

a. Tooled joints: Tool-form joint into the concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/4-inch. Each side of tooled joint shall be dressed to match final overall slab finish. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before the slab has achieved its final set.

1) Where tooled joints are to receive joint sealant, provide 1/2-inch wide tooled joint and install backer rod material to create 1/4-inch recess below finished surface.

b. Saw-cut joints: Saw-cut joint into concrete 1 inch in depth, but in no case less than 25 percent of slab depth. Joint width shall be 1/8-inch. Cut joint using rotary saw within 4 to 12 hours after the concrete has been finished.

3.6 STEEL REINFORCEMENT

A. Install steel reinforcement as shown on the Drawings.

1. Welded wire reinforcement: Where WWR is called-for, install material in the upper 30 to 40 percent (30%-40%) of the overall slab thickness, or at the nearest depth below top of slab as required to achieve a minimum of 2-inches of cover.

B. Before being placed in position, reinforcing for reinforced concrete shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material, which may reduce the bond between the concrete and reinforcing. Where there is a delay in placing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when necessary.

C. Any bar showing cracks after bending shall be discarded.

D. Minimum Cover: 2 inches, except where concrete is cast against and permanently exposed to earth minimum cover shall be 3 inches.

E. For slab-type construction, welded wire reinforcement and reinforcing bars shall be elevated off the base material by use of supports as specified herein. Adjacent sheets of welded wire reinforcing shall lap 6 inches.

F. Joints

1. Construction Joints: Reinforcement shall not continue through construction joints. Allow for 2-inches of cover at end of slab. Where called-for on the Drawings, install pins at Construction Joints.

2. Isolation Joints/Expansion Joints: Allow for 2-inches of cover at end of slab.

3. Control/Contraction Joints: Cut at least one-half of reinforcement at joints.

G. Reinforcing shall be securely wired in the position called for, and shall be maintained in that position until concrete is placed and compacted.

3.7 PLACEMENT

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.

B. Existing concrete, earth, forms, and other water-permeable material against which new concrete is to be placed and shall be thoroughly damp when concrete is placed. There shall be no free water on the surface.

C. Concrete shall arrive at the job site in a timely manner so that no additional water will be required to produce the desired slump. When conditions develop that require the addition of water to produce the desired slump, permission of the Engineer must be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material.

D. Concrete, which has set, or partially set, before placement shall not be employed.

E. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.

F. Concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

G. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 inch thick shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete flatwork surfaces shall be screened off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.

1. Finished concrete surface for concrete subbase shall be woodfloated to a slightly rough surface. Surface shall not deviate more than 1/4- inch in 10 feet.

2. Finished concrete surface for concrete pavement, walks, and pads shall be wood-floated and steel troweled to a smooth surface. Surface shall not deviate more than 1/8-inch in 10 feet.

B. Unless otherwise indicated, horizontal surfaces of concrete surfaces, which will be exposed, shall be given a light broomed finish, with direction of grooves in concrete surface perpendicular to length of concrete band, slab or pad. After concrete has set sufficiently to prevent coarse aggregate from being torn from the surface, but before it has completely set, brooms shall be drawn across it to produce a pattern of small parallel grooves. Broomed surface shall be uniform, with no smooth, unduly rough or porous spots, or other irregularities. Coarse aggregate shall not be dislodged by the brooming operation.

C. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a ¼ inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall be same time be finished to a ¼ inch radius.

D. Where finishing is performed before the end of the curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until the end of the specified curing period.

B. Water shall not be applied to curing concrete within 24 hours after initial placement. Any water shall be applied only to maintain damp conditions. Do not add water during floating and troweling operations.

C. Between finishing operations, the surface shall be protected from rapid drying by covering with a material specified herein. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of fine- spray of water, applied as often as necessary to prevent drying after the initial 24-hour cure period.

D. Concrete surfaces shall be cured by completely covering them with curing paper or an application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.

2. If concrete is cured with a curing compound, the compound shall be applied at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Curing period shall be seven days minimum. Full-strength shall be considered after 28 days.

E. Only if additional protection is required, the surface should remain uncovered for at least 4 days, after which time new and unwrinkled non-staining reinforced waterproof Kraft curing paper may be used.

3.10 COLD WEATHER CONCRETING

A. Comply with ACI 306R-10 Guide to Cold Weather Concreting.

B. Materials for concrete shall be heated for concrete, which is mixed, placed or cured when the mean daily temperature is below 40□F or is expected to fall below 40□F within 72 hours. The concrete, after placement, shall be protected by covering, heat, or both.

C. Details of handling and protecting concrete during freezing weather shall be subject to the approval of Engineer.

3.11 HOT WEATHER CONCRETING

A. Comply with ACI 305R-10: Guide to Hot Weather Concreting.

B. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placement shall be sprinkled with cold water. Every effort shall be made to minimize delays that will result in excessive mixing of the concrete after arrival on the job.

C. During periods of excessively hot weather (95 degrees F, or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305R. Any concrete with a temperature below 95 degrees F, when ready for placement, will not be acceptable, and will be rejected.

D. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. Records shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the Work so that conditions surrounding the construction of any part of the structure can be ascertained.

3.12 PROTECTION

A. Concrete surface shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, ½ inch thick plywood sheets shall be used to protect the exposed surface.

3.13 CLEAN UP

A. Remove all debris, residuals, and materials at the conclusion of the work. Dispose of all materials in accordance with applicable waste management regulations.

END OF SECTION

SECTION 11 6833

ATHLETIC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes equipment for:

1. Basketball Courts.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. American Society for Testing and Materials (ASTM).

1. ASTM A123- Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

2. ASTM C94- Standard Specification for Ready-Mixed Concrete.

1.3 SUBMITTALS

A. Shop drawings for all equipment furnished under this Section. Shop drawings shall indicate the configuration, dimensions, layout, and spacing of major and minor equipment components such as posts, supports, rails, brackets, fasteners, foundations, anchorage, and a schedule of such equipment components. Show in large-scale details any unique fabrication, assembly, and/or installation requirements.

B. Material certificates or other data indicating compliance with these Specifications for finish type, color, size, style, posts, fittings, hardware, and accessories.

C. Copies of manufacturer-provided installation instructions, operation instructions, and maintenance material for all equipment furnished under this Section.

D. Manufacturer’s warranties and associated warranty registration data in Owner’s name. Submit two (2) copies of each warranty to Engineer in the manufacture’s/supplier's standard form or if there is no standard form available, in a form specified by Engineer.

1.4 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 of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in packed cartons or other protective packaging.

B. Deliver, move, store, or otherwise handle equipment to avoid damage.

C. Damaged equipment shall not be installed. Contractor shall bear responsibility for damage to equipment until final acceptance by Owner. Any installed equipment exhibiting damage shall be replaced or repaired to the satisfaction of Engineer, and Contractor shall assume all costs related thereto.

1.6 WARRANTY

A. Provide manufacturer’s standard warranty, as applicable, for all products furnished under this Section. Warranty shall be registered in Owner’s name.

B. Bind warranties in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

C. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.

D. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of Contractor.

E. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 PRODUCTS

2.1 BASKETBALL COURT

A. Shall be a fixed system with a 4 inch square direct buried, powder coated steel upright and extension arm as supplied by Jaypro Sports LLC, 976 Hartford Turnpike, Waterford, CT, Ph. 860-447-3001 or approved equal.

B. Backboard: 36-inch by 48-inch, official size acrylic board.

C. Goal: 18 inches in diameter, minimum diameter of 5/8-inch, solid steel support braces at least 1/2-inch diameter. Net hooks shall be welded.

D. Finish: Black, powder-coated.

E. Padding: Pole and backboard edge padding shall be included. Color: black.

PART 3 EXECUTION

3.1 GENERAL

A. Install all equipment at the location indicated on the Drawings in accordance with manufacturer's instructions and approved shop drawings. Verify proper installation and operation of all equipment.

END OF SECTION

SECTION 31 2310

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Preparation and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.

2. Excavating and backfilling for structures.

3. Excavation and backfilling for underground utilities and associated appurtenances.

4. Excavation, backfill and compaction for the demolition/removal of subsurface utilities and improvements.

5. Earth retention systems.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 GENERAL

A. Contractor is advised that lines and grades, as shown on the Drawings, are subject to change. Although it is intended to adhere to what is shown on Drawings, Engineer reserves the right to make changes in lines and grades of utilities r other subsurface construction when such changes may be necessary or advantageous.

B. In open trenching on public roadways, Contractor shall be governed by the conditions, restrictions and regulations made by the local or state authority as applicable. All such regulations shall be in addition to those set down in the Specifications.

1.3 EXCAVATION CLASSIFICATIONS

A. Excavation - Excavation shall be unclassified and no consideration will be given to the nature of the materials. Excavation shall comprise and include the satisfactory removal and disposal of all materials encountered regardless of the nature of the materials and shall be understood to include but not limited to earth, fill, boulders, foundations, pavements, curbs, piping, cobbles, stones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.

B. Common Excavation - Excavation of all materials that can be excavated, moved, loaded, transported, and unloaded using heavy equipment or that can be excavated and dumped into place or loaded onto hauling equipment by excavation equipment (shovel, bucket, backhoe, dragline, or clam shell) or moved with dozer-type equipment, appropriate to the material type, character, and nature of the materials. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material. All Common Excavation shall be included in the Base Bid.

C. Rock Excavation - Rock Excavation as defined herein. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of Common Excavation shall be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

1.4 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.

C. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction

D. American Concrete Institute (ACI)

1. ACI 229R-99 - Controlled Low-Strength Materials (CLSM).

E. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO Method T 90 - Determining the Plastic Limit and Plasticity Index of Soils.

2. AASHTO T104 - Standard Method of Test for Soundess of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

3. AASHTO Method T146 - Standard Method of Test for Wet Preparation of Disturbed Soil Samples for Test.

F. American Society for Testing and Materials (ASTM)

1. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.

2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3)).

4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.5 DEFINITIONS

A. Backfill: Soil material or flowable concrete used to fill an excavation.

B. Bedding Course: Layer placed over the excavated sub-grade in a trench before laying pipe.

C. Benching: A method of limiting cave-in potential by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

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

E. Clearing: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.

F. Drainage Course: Layer supporting basement grade used to minimize capillary flow of pore water.

G. Earth Retention Systems: Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.

H. Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

1. Additional Excavation: Excavation beyond required dimensions or below subgrade elevations that is requested and/or directed by Engineer. Additional Excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.

3. Unauthorized Excavation: Excavation below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work without the request and/or direction of the Engineer. Unauthorized excavation, as well as any remedial work directed by Engineer, or if applicable Geotechnical Engineer, shall be without additional compensation.

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

J. Finished Grade: The proposed final elevations shown on the Drawings or called for in the Specifications.

K. Geotechnical Engineer: A qualified and licensed entity designated for the project as the authority on the assessment, design, and oversight of soil and/or rock conditions and construction affected by such conditions.

L. Geotechnical Testing Agency: An independent testing agency employed by Owner, or by Contractor is called-for, and qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

M. Grubbing: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter and debris, and stumps having a diameter of three inches or larger, to a depth of at least 18 inches below the surface and or subgrade; whichever is lower, and the disposal thereof.

N. Protective System: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

O. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.

P. Rock: Solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling or hoe ramming. All boulders containing a volume of more than one (1) cubic yard shall be considered rock.

Q. Rock Excavation: Removal and satisfactory disposal of Rock, which, in the opinion of Engineer, cannot be excavated except by drilling, wedging, jack hammering or hoe ramming or the excavation of boulders or rock fragments containing a volume of more than one (1) cubic yard. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

R. Licensed Professional Engineer: A person who is licensed as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

S. Satisfactory Materials: Earth material that meets the classification, use, and/or gradation requirements herein that does not contain limestone, shale, clay, ash, slag, friable material, organic or vegetative materials, topsoil, wood, trash, broken concrete, masonry rubble, trash, refuse, or frozen materials.

T. Shield System: A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

U. Sloping: A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

V. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

W. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below drainage fill.

X. Surplus Material: Excavated acceptable material that cannot be utilized elsewhere on the site as backfill or embankment fill, or as otherwise directed by the Engineer.

Y. Temporary Dewatering System: A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.

Z. Testing Laboratory: A qualified entity engaged to perform specific laboratory tests.

AA. Testing Agency: A qualified entity engaged to collect samples, perform specific in-field tests, and/or inspections. The Testing Laboratory may provide the services of the Testing Agency.

BB. Trench: A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.

CC. Unacceptable Material: Soil material that contains organic silt, peat, vegetation, wood or roots, stones or rock fragments over six (6) inches in diameter or exceeding 40 percent by weight of the backfill material, porous biodegradable matter, loose or soft fill, construction debris, or refuse, or material which cannot be compacted to the specified or indicated density.

1.6 SUBMITTALS

A. Testing Laboratory - Submit name and qualifications of commercial testing laboratory for Engineer’s approval. Submit applicable documentation of credentials, licenses, etc.

B. Testing Agency - Submit name and qualifications of third-party in-field quality control Testing Agency for Engineer’s approval. Submit applicable documentation of credentials, licenses, etc.

C. Site Characterization of Off-Site Borrow Sources: The following information shall be submitted to Engineer for review at least two weeks prior to use of an off-site borrow source:

1. Location and name of the borrow source site.

2. Owner and contact information for the borrow source site.

3. Present and past usage of the source site and materials.

4. Any previously existing report(s) associated with an assessment of the source site as relates to the presence of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

5. Location within the site from which the material will be obtained.

6. Chemical Testing Data:

a. Analytical test results from a certified laboratory keyed to each type/classification of earth material proposed, along with written certification that proposed material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

b. For each type/classification and source of earth material proposed, submit a letter signed by an authorized representative of Contractor stating that such proposed earth material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

D. Material Testing Data

1. Gradation analysis all proposed bedding, fill, aggregates, and backfill.

2. Soil classification and Moisture-Dry Density Curve for all proposed bedding, fill, and backfill.

E. Field Testing Results

1. Compaction test results keyed to date and specific location of testing.

F. Product Data

1. Plastic warning tape.

2. Separation fabric, filter fabric, geogrids, or similar geotextiles.

1.7 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to construct permanent or temporary excavation support systems, including, but not necessarily limited to, sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping, and benching.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate for the condition.

1.8 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Utility Mark-out

1. Prior to commencing work, comply with utility mark-out requirements of the Call-Before-You-Dig System (1-800-922-4455).

2. Verify the location of all subsurface utilities marked through the Call-Before-You-Dig System.

3. Not all subsurface facilities or structures will be identified through the Call-Before-You-Dig System. Confirm the location of other subsurface utilities and other subsurface facilities or structures prior to commencing work. Field-mark utilities as required.

C. Codes and Standards: Perform the work of this Section in accordance with all applicable codes, standards, and the requirements of authorities having jurisdiction.

D. Engineer reserves the right to perform all in-field testing specified in this Section and reserves the right to determine the suitability of all materials to be used for fills and reject any fill not meeting the specifications.

E. Field Density testing and subgrade observation shall be performed by the designated entity

F. Weather Limitations:

1. Material excavated when frozen or when air temperature is less than 32 degrees Fahrenheit (32 F) shall not be used as fill or backfill until material completely thaws.

2. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.9 TESTING

A. Quality control testing during construction shall be the responsibility of Contractor via Testing Agency and Testing Laboratory as applicable. Contractor shall retain and pay for the services of such Testing Agency/Testing Laboratory to perform all testing in accordance with applicable standards.

B. Borrow and Fill: Contractor shall provide testing as defined below.

1. Gradation analysis for each type of borrow and on-site fill materials by ASTM D422.

2. Soil classification (ASTM D2487) and Moisture-Dry Density Curve (Proctor Test-Modified) by ASTM D1557 for all proposed fill and backfill materials at the frequency specified below:

a. For suitable soil materials removed during Trench Excavation, perform one test for every 1,000 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.

b. For borrow materials, perform tests from each proposed source, at a rate of one test for every 1,000 cubic yards of soil type. Similarity of soil types will be as determined by the Engineer.

C. Compaction Testing: Contractor shall conduct compaction testing (i.e. ASTM D2922 and ASTM D3017 or ASTM D1556) at a frequency of one test for every 100 cubic yards of material backfilled. Engineer will determine the locations and lifts to be tested.

1. Additional compaction testing may be required when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.

2. If all compaction test results within the initial 25% of the total anticipated number of tests indicate compacted field densities equal to or greater than 95% of maximum dry density at optimum moisture content, Engineer may reduce frequency of compaction testing. In no case will the frequency be reduced to less than one test for every 500 cubic yards of material backfilled.

3. Contractor is cautioned that compaction testing by nuclear methods may not be effective where trenches are so narrow that trench walls impact the attenuation of the gamma radiation or where oversize particles (i.e. large cobbles or coarse gravels) are present. In these cases, other field density testing methods may be required.

4. If testing indicates that compacted subgrade, backfill, or fill are below specified density, additional compaction and/or replacement of material shall be provided at no expense to Owner.

D. Chemical Testing: Prior to delivery of any earth material to the Project Site, Contractor shall conduct chemical testing to demonstrate that such material is free of oils, hazardous materials, or other organic and non-organic constituents which may be considered contaminants.

1.10 EXCAVATED MATERIAL

A. Placement

1. Excavated material shall be so placed as not to interfere with travel or movement on existing streets, driveways, sidewalks or other areas designated to remain undisturbed. Excavated material shall not be deposited on private property without the written consent of the property owner(s) and approval of Engineer.

2. No excavated material shall be stored on top of installed pipe or other construction. Contractor shall consider surcharge loads when stockpiling excavated material adjacent to trenches, and take any measure required to prevent cave-in, including but not limited to, trench support systems and/or stockpiling excavated material remote from trench.

B. Suitable excavated material may be used for Common Fill or Backfill on other parts of the Work, if specifically approved by Engineer.

C. Material excavated from private property shall belong to the property Owner, or his representative, and shall be disposed of by the Contractor, as required by said Owner or his representative. If the Contractor fails to promptly remove such surplus material, Engineer may have the same done and charge the cost thereof as money paid to the Contractor.

D. Contractor shall be responsible for the proper disposal of all unsuitable excavated materials. Engineer shall determine what is suitable or unsuitable material where questions arise. Generally, unsuitable material shall include, but not be limited to, pavement (bituminous and concrete), large boulders, pipe, conduit and metal.

E. Contractor shall submit to Engineer, for approval, the location(s) to be utilized during the Contract period for waste material disposal. This approval must occur before any export of waste material from the project site. Any change in the disposal site during construction shall be submitted for approval.

1.11 SHEETING, SHORING AND BRACING

A. Provide earth retention systems as required by federal, state and local regulations. Shoring and bracing of trenches and other excavations shall be in accordance with the latest OSHA Standards and Interpretations, and to all other applicable codes, rules and regulations of federal, state and local authorities.

1.12 DRAINAGE

A. At all times during construction, Contractor shall temporarily provide, place and maintain ample means and devices with which to remove promptly, and dispose of properly, all water entering trenches and other excavations, or water that may flow along or across the site of the Work, and keep said excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be damaged. At the conclusion of the work, Contractor shall remove such temporary means and devices.

B. All groundwater which may be found in the trenches and foundation excavations, and any water which may get into them from any cause whatsoever, shall be pumped or bailed out, so that the trench shall be dry during pipe laying and backfilling and during the placement of concrete.

C. All water pumped or drained from the Work shall be managed in accordance with applicable discharge permits, without undue interference with other work or damage to pavements, other surfaces, or property.

1.13 COORDINATION

A. Prior to commencing earthwork operations, meet with representatives of governing authorities, Engineer, testing entity, and other pertinent entities.

1. Review earthwork procedures and responsibilities including Contractor's schedule of operations, scheduling observation and testing procedures and requirements.

2. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish copies to each participant.

3. Contractor shall at all times so conduct his work as to insure the least possible inconvenience to the general public and the residents in the vicinity of the work. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by Contractor to ensure the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed except as approved by Engineer.

B. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, replace at no cost to Owner.

C. Provide five (5) days advance notice to Engineer and testing entity for any proposed earthwork operation requiring observation and/or testing.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. All materials used in the work of this Section shall be Satisfactory Material, and any material that does not meet this classification shall be considered an Unsatisfactory Material and shall not be used.

B. Unsatisfactory Soils: Soil materials not meeting the requirements for Satisfactory Soils.

1. Unsatisfactory soils also include satisfactory soils not maintained within two (2) percent of optimum moisture content at time of compaction.

2.2 COMMON FILL/ORDINARY BORROW

A. Earth materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GP-GC, SW, SP, and SM that are free of clay.

B. Common Fill material is subject to the approval of Engineer and may be either material removed from excavations or borrow from off site. It shall have physical properties such that it can be readily spread and after it has been placed and properly compacted, it will form a dense, stable fill.

C. Common Fill shall be graded as follows:

Gradation of Common Fill

Sieve	Percent Passing by Weight
6”	100
3.5 ”	50-100
3/4”	50-90
No. 4	25-55
No. 200	0-20

1. Less than twenty (20) percent of material by weight passing the No. 4 sieve shall pass the No. 200 sieve.

2. Common Fill shall not be used at locations where use of select fill is indicated.

2.3 COMMON FILL/ORDINARY BORROW

A. Satisfactory Material that is well-graded meeting ASTM D 2487 classification group GW, GP, GM, SW, SP, and SM. No particle shall exceed 6-inches in size and no greater than 10% by weight of the material shall pass the No. 100 sieve and no greater than 5% by weight of the material shall pass the No. 200 sieve.

B. Common Fill is subject to the approval of Engineer and may be either material removed from on-site excavations or borrow pits or imported from off-site, approved sources. It shall have physical properties such that it can be readily spread and after it has been placed and properly compacted, it will form a dense, stable fill.

2.4 GRANULAR FILL

A. Broken or crushed stone, gravel, or a mixture thereof.

B. Broken or crushed stone

1. The product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

C. Bank or crushed gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. Crushed gravel shall be the manufactured product resulting from the deliberate mechanical crushing of gravel with at least 50% of the gravel retained on the No. 4 sieve having at least one fractured face.

D. Granular Fill shall be graded as follows:

Gradation of Granular Fill (ConnDOT Grading "A")

Sieve	Percent Passing by Weight
3 ½"	100
1 ½"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.5 SCREENED GRAVEL AND CRUSHED STONE

A. Screened gravel, well graded in size from 3/8 inch to 3/4 inch. The gravel shall consist of clean, hard, and durable particles or fragments. Crushed rock of suitable size and grading may be used instead of screened gravel.

B. Screened Gravel shall be graded as follows:

Gradation of Screened Gravel (ConnDOT Gradation No. 6)

Sieve	Percent Passing by Weight
1"	100
3/4"	90-100
1/2"	20-55
3/8"	0-15
No. 4	0-5

2.6 BEDDING

A. Slabs on grade

1. Granular Fill unless otherwise indicated.

B. Utilities- Refer to applicable utility Specifications.

2.7 SAND

A. Sand shall consist of clean, hard, durable, uncoated particles of quartz or other rock. It shall not contain more than 3% of material finer than a #200 sieve.

B. Organic Impurities: Fine aggregate subjected to the colorimetric test shall not produce a color darker than Gardner Color Standard No. 11, using AASHTO T 21. If the fine aggregate fails to meet this requirement, the provisions of AASHTO M 6, Section 5.2, will govern.

C. Sand shall be uniformly graded as follows:

Gradation of Sand

Sieve	Percent Passing by Weight
3/8”	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

D. The above gradation represents the extreme limits which shall determine suitability for use from all sources of supply. The gradation from any one source shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. For the purpose of determining the degree of uniformity, a fineness modulus determination will be made upon representative samples from any source. Fine aggregate from any one source having a variation in fineness modulus greater than 0.20 either way from the fineness modulus of the representative sample will be rejected.

2.8 DETECTABLE WARNING TAPE

A. Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils 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 deep; colored as follows:

1. Red: Electric power lines, electric power conduits and other electric power facilities.

2. Blue: Water.

3. Orange: Communication lines or cables, including but not limited to telephone, fire signals, cable television, and electronic controls.

4. Green: Storm drainage and sanitary sewer systems, including force mains and other non-hazardous materials.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify "Call-Before-You-Dig" to request a utility mark-out for the Project Site prior to any earth disturbance. Provide written confirmation to Engineer that such mark-out has been completed.

B. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any discrepancies or hazardous conditions.

C. Take precautions for preventing injuries to persons or damage to property in or about the work. Protect structures, utilities, sidewalks, pavements and other improvements from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

D. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

E. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

F. When excavations are to be made in paved surfaces, the pavement shall be removed so as to provide a clean uniform edge with a minimum disturbance of remaining pavement. Saw cutting the pavement to provide a clean, uniform edge shall unless otherwise indicated.

G. If pavement is removed in large pieces, it shall not be mixed with other excavated material, but shall be disposed of away from the site of the Work before the remainder of the excavation is made.

3.2 DEWATERING

A. Comply with all applicable permit requirements.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade and from flooding Project site and surrounding area.

C. Protect sub-grades 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 de-watering system to keep subgrades dry and convey ground water away from excavations.

3.3 EXCAVATION

A. Dust Control: During the progress of the Work, Contractor shall conduct his operations and maintain the area of his activities in order to minimize the creation and dispersion of dust. Refer to Section 01 5714- Temporary Dust Control.

B. Excavate to the exact elevations shown on the plans, or as directed by Engineer. Where no dimensions are indicated, make excavations in such manner, and to such depths, elevations, and dimensions, that will give suitable room for construction of the work indicated on the Drawings. As applicable for utility installations, comply with trench limits shown on the Drawings.

C. Furnish and place all sheeting, bracing, and supports, and render the bottom of the excavation firm and dry, and in all respects, acceptable for construction of the work.

D. If Contractor excavates below the elevations specified on the plans, beyond the limits indicated on the plans, or where no dimensions are indicated, beyond depths, elevations, and dimensions reasonably necessary for construction of the work, Contractor shall bring the excavation back to the proper elevation and/or dimension by backfilling with Suitable Material that is approved by Engineer in accordance with the backfilling provisions specified herein. Engineer, or if applicable Geotechnical Engineer, shall have sole authority in determining the specific composition of such Suitable Material.

1. Any increase in cost resulting from Unauthorized Excavation, including but not necessarily limited to backfilling, haul-off, increasing the size of footings or foundations, testing, schedule impact, or administrative impact shall be at Contractor's sole expense.

E. If utilities are to be laid in new embankments, or other new fill areas which are more than 12 inches deep below the invert of the pipe, the fill material shall be placed and properly compacted to final grade or to a height of at least 3 feet above the top elevation of the pipe, whichever is the lesser, before laying pipe. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

3.4 TRENCH EXCAVATION

A. In general, trenches shall be excavated to such depth as will provide a cover depth as indicated on the Drawings from finished grade to the top of the pipe barrel. Deeper trenches shall be provided where necessary on account of the conformation of the ground and to permit the alignment of the pipe without undue deflection of joints.

B. Trenches shall be excavated by hand or machinery to the width and depth indicated on the Drawings and specified herein. Depth shall account for thickness of the pipe and thickness of bedding. All loose materials shall be removed from the bottom of the trench so that the bottom of the trench will be in an undisturbed condition.

C. If in the opinion of Engineer, the material at or below the depth to which excavation for structures and pipes would normally be carried is unsuitable for foundation, it shall be removed to such widths and depths as directed and replaced with suitable material.

D. Trench widths shall be 3 feet greater than the nominal inside diameter of pipe for such diameters of 36 inches or less. For diameters greater than 36 inches, the width shall be 4 feet greater than nominal inside diameter. Trench excavation for manholes, catch basins, drop inlets, etc. shall be two (2) feet outside the neat lines of the foundations. These limits may be adjusted for field conditions at the direction of Engineer.

E. Bedding for pipe and utility structures will be as detailed on the Drawings.

3.5 APPROVAL OF SUBGRADE

A. Notify Engineer, and Geotechnical Engineer if applicable, when excavations have reached required subgrade elevation.

B. If Engineer and, if applicable, Geotechnical Engineer determines that Unacceptable Material is present, continue excavation of such Unacceptable Material and replace with approved Satisfactory Materials as directed. The replacement of Unacceptable Material with Satisfactory Materials will be paid for as a change in the work according to applicable provisions of the contract.

C. Protect subgrade from disturbance at all times. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water or construction activities, as directed by Engineer. Excavation and replacement with structural fill of any disturbed or softened materials resulting from inadequate preparation, inadequate dewatering, or inadequate protection, shall be at Contractor's sole expense.

3.6 PROTECTION OF EXISTING FEATURES

A. General

1. Protect all existing improvements from damage unless those improvements are specifically designated for permeant removal, relocation, or temporary removal and replacement.

2. As excavation approaches underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools.

B. Pavements: On paved surfaces to remain, do not use or operate tractors, bulldozers, or other power-operated equipment, the treads or wheels of which are so shaped as to cut or otherwise damage such surfaces. All surfaces, which have been damaged by Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration.

C. Utilities

1. Existing utilities remaining in service, including those remaining in service until after relocation, and relocated utilities shall be protected from damage. Before excavating near any existing utilities, notify the utility owner, coordinate protective work and comply with the utility owners' requirements.

2. Safeguard and protect from damage or movement any existing services, utilities and utility structures uncovered or encountered which are to remain in service.

3. All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.

4. Where known utilities are encountered, notify Engineer and document location and type of utility before proceeding with work in such area.

5. When uncharted or incorrectly charted piping or utilities are encountered during excavation, stop work and notify Engineer immediately. Cooperate with the utility owners in maintaining their utilities in operation prior to resuming work.

D. Retaining Structures: Provide bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures necessary to guard against any movement or settlement of existing or new construction, utility systems, paving, or other improvements. Assume responsibility for the

strength and adequacy of retaining structures, and for the safety and support of construction, utilities or paving, and for any movement, settlement or damage thereto. Retain the services of a licensed engineer as required to design bracing, shoring, sheeting, sheet piling, underpinning or other retaining structures.

E. Replacement and Relocation

1. In case of damage, Contractor shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs themselves, all damage shall be repaired by Contractor, or, if not promptly done by him, Engineer may have the repairs made at the expense of Contractor.

2. If certain existing structures are encountered that in the opinion of Engineer require temporary or permanent relocation or removal, Engineer may order in writing that Contractor undertake all or part of such work or to assist the Owner in performing such work. For such occurrences, Contractor shall be compensated as applicable, as extra work.

   a. In removing existing structures, Contractor shall use care to avoid damage to the material, and Engineer shall include for payment only those new materials, which, in his judgment, are necessary to replace those unavoidably damaged.

3. The structures to which the provisions of the preceding two paragraphs shall apply include structures which (1) are not indicated on the Drawings or otherwise provided for, (2) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (3) in the opinion of Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced. (See Item 3.19, "Sub-Surface Obstructions" also).

3.7 FILL AND BACKFILL

A. Fill: Contractor shall remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas upon which embankments will be built or material will be placed for final grading. The subgrade shall be shaped as indicated on the Drawings and shall be so prepared by forking, furrowing, or plowing such that the first layer of the new material placed thereon, will be well bonded to it.

B. Backfill: Common Fill material may be used as backfill when indicated on the Drawings or when authorized by Engineer (or as applicable Geotechnical Engineer) if Contractor can achieve required minimum dry density after compaction. Backfilling shall be done as promptly as is consistent with non-injury to the pipe or structures, but no backfilling shall be done before Engineer (or as applicable Geotechnical Engineer) gives permission. Where the trench is in a paved area, or an area to be paved, backfill shall be bank-run gravel as shown on the Drawings.

C. Frozen material shall not be placed in fill, nor shall fill be placed upon frozen material. Previously frozen material shall be removed, or shall be otherwise treated as required, before new fill is placed.

D. After the subgrade has been prepared, fill material shall be placed thereon and built up in successive layers not exceeding twelve (12) inches until it has reached the required elevation.

1. When gravel fill or other material is used for foundation of structures, it shall be spread in layers of uniform thickness not exceeding six (6) inches before compaction. Each spread

layer shall be thoroughly compacted by means of suitable power-driven tampers or other power-driven equipment.

E. Each layer of material shall be compacted by the use of approved rollers, or other approved means, so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, or where such equipment is not permitted, the materials shall be thoroughly compacted by the use of suitable power- driven tampers.

F. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or application of water, to compact it properly. At such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.

G. Compaction Density: Compaction density shall be expressed as a percentage of maximum dry density at optimum moisture content according to ASTM D 1557 Method C. Density indicated is minimum required.

1. Under structures, building slabs, and steps: 95 %

2. Utilities, below pipe centerline: 95%

3. Utilities below unpaved surface, above pipe centerline: 92%

4. Utilities below paved surface, above pipe centerline: 95%

5. Landscaped areas: 90 %.

H. Upon completion of filling and backfilling, the streets or property shall be cleaned, surplus material removed and the surfaces restored to the condition in which it was before ground was broken. All materials left over in public roadways shall become the property of the Contractor. If the Contractor fails to promptly remove such surplus material, Engineer may have the same done, and charge the cost thereof as money paid to the Contractor.

3.8 BACKFILLING UTILITIES AROUND STRUCTURES

A. No backfill shall be deposited against concrete until the concrete has obtained sufficient strength to withstand the earth pressure placed upon it and in no case less than seven days, nor before carrying out and satisfactorily completing the tests for watertight structures specified elsewhere. Compaction of backfill against concrete structures shall not be carried out by motorized equipment closer to the structure than the depth of the structure below grade.

3.9 BACKFILLING UTILITIES

A. As soon as practical after utility has been placed into bedding and joints properly made, backfilling shall begin, and shall continue without delay.

B. Placement of bedding over pipe prior to placement of backfill shall be as indicated on the Drawings. Hand-place bedding at the sides of the pipe and to the limits indicated on the Drawings over the pipe. Bedding placed over pipe shall be in 6-inch layers, leveled along the length and width of the trench and thoroughly compacted with approved tampers.

C. Install warning tape twelve (12) inches to twenty-four (24) inches above the utility unless otherwise specified by the utility owner/operator.

3.10 BACKFILL AT BUILDINGS

A. Prior to placing compacted granular fill, subgrade shall be compacted with at least four passes of a minimum 10-ton dynamic force vibratory roller. Soft or loose material evident during compaction shall be removed and replaced with granular fill.

B. Backfill as soon as permanent work has been completed and footings, piers, foundation walls, etc., have attained sufficient set and strength.

1. Remove shoring and bracing prior to backfilling.

2. Place backfill in maximum uniform layers of 9"; in confined areas use 6" lifts. Do not allow levels of fill against concrete walls to differ by more than two feet on either side of walls unless walls are adequately braced or all floor framing is in place, up to and including grade level slabs.

C. Bring backfill to sub-grade elevations. Slope backfill at exterior of building to drain water away from building.

3.11 SUBSURFACE OBSTRUCTIONS

A. As a general rule, sub-surface obstructions encountered along the route of the pipeline shall be considered as follows:

1. Crossing Obstruction: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 20 degrees or greater to the centerline of the pipe being installed shall be considered as crossing obstructions and shall be protected, or repaired or replaced if damaged, or relocated, all at no additional cost to the Owner.

2. Interfering Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of less than 20 degrees, but more than 5 degrees to the centerline of the pipe being installed, shall be considered as interfering obstructions. Costs for supporting such obstructions in place during installation of the new pipe shall be paid for by the Owner. Costs for supporting interfering obstructions shall not be construed to include any costs for excavation. Repairing or replacing damaged interfering obstructions, or relocation shall be accomplished at no additional cost to the Owner.

3. Parallel Obstructions: All pipes, conduits, wires, etc. of whatever nature whose centerline lies at an angle of 5 degrees or less, or is truly parallel and less than 0.5 feet offset from outside the normal trench limits, as specified in Subarticle 3.5 B. of this Section, of the pipe being installed, shall be considered parallel obstructions. Costs for supporting such obstructions in place during installation of the new pipe, including excavation, may be paid for by the Owner, or Owner may elect to pay for the cost of replacing such obstructions. Should Owner first elect to pay the cost of supporting the obstruction and then elect to pay the cost of replacing the obstruction, approved costs for supporting the obstruction, including excavation, incurred prior to electing replacement costs shall also be paid. After Owner elects to pay replacement costs, only replacement costs will be paid for all additional work in the vicinity of the parallel obstruction.

4. Angle measurement between centerline of obstructing pipe, conduit, wire, etc. and centerline of the pipe being installed shall be taken from between the horizontal projection of the centerlines at ground surface. Parallel offset distance between centerline of obstructing pipe, conduit, wire, etc. and the outside of normal trench limits of the pipe being installed shall be taken from between the horizontal projection of the centerlines and outside trench limit at ground surface.

END OF SECTION

SECTION 31 2319

DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of surface water and ground water as necessary to perform the construction required by the contract.

2. Constructing, installing, building, and maintaining all necessary temporary water extraction and management facilities.

3. Furnishing, installing, and operating all necessary pumps, piping, and other equipment.

4. Complying with all applicable approvals, authorizations or permits associated with the management of dewatering wastewaters.

5. Removing all such temporary works and equipment after their intended function is no longer required.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. Connecticut Department of Energy and Environmental Protection (DEEP)

1. Connecticut Guidelines for Soil Erosion and Sediment Control, DEP Bulletin 34, State of Connecticut Council on Soil and Water Conservation, 2002.

2. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, (DEP-PED-GP-015), latest issue.

3. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer (DEP-PERD-GP-007), latest issue.

4. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (DEP-PED-GP-020), latest issue.

D. Regulations of Connecticut State Agencies (RCSA)

1. RCSA Section 22a-372-1, 22a-377(b)-1, 22a-377(c)-1, 22a-377(c)-2, Water Diversion.

2. RCSA Section 22a-430-3 through 4, General Conditions Applicable to Water Discharge Permits and Procedures and Criteria for Issuing Water Discharge Permits.

3. RCSA Section 22a-430-8, Underground Injection Control.

1.3 DESCRIPTION OF THE WORK

A. Prevent surface water and subsurface or groundwater from flowing into excavations or earthwork areas which would cause flooding of the Project Site and surrounding area, or softening or loosening of the soil at excavation or earthwork subgrade.

B. Provide adequate and satisfactory dewatering and drainage of excavations and furnish all materials and equipment and do all incidental work required in conjunction with the furnishing, installing, and maintaining of same to permit proper and timely completion of all work required.

C. Contractor may choose any satisfactory dewatering method he wishes subject to the approval of Engineer, provided such method performs the dewatering required and complies with applicable approvals, authorizations and permits.

D. Contractor shall assume all responsibility for the adequacy of the methods, materials, and equipment employed. Contractor shall take all precautions necessary to prevent loosening or softening of the subgrade. In this regard, Contractor shall at all times be prepared to alter his construction method or sequence.

E. The work shall be maintained dry until the structures (building slabs and footings, paved area, pipe, drainage structure, embankments, etc.) are completed.

F. All dewatering required by pumping and drainage shall be performed without damage to the excavation, pipe trench, pavements, pipes, electrical conduits, other utilities and any other work or property. Existing or new sanitary sewers shall not be used to dispose of drainage.

1.4 SUBMITTALS

A. Dewatering Plan: Prior to installation of the dewatering system, submit design data showing the following, for review by Engineer:

1. Locations and associated construction where dewatering is required.

2. Specific methods and devices proposed for dewatering.

3. Details on protection at the inlet and outlet of pumps, method for floating the pump intake, or other methods to minimize and retain the sediment.

4. Proposed location of dewatering discharge and details of infiltration basins or other discharge location. Per the General Permit, where feasible and appropriate, dewatering wastewaters will be infiltrated into the ground.

5. Details on any containment berm construction when dewatering earth materials.

6. Identification of a contingency plan for emergency operations should the dewatering operation prove inadequate to meet the dewatering need or is found to be causing unacceptable turbidity problems (e.g., alternative discharge locations or use of a portable sediment tank). If turbidity or siltation problems are not adequately controlled by the contingency plan, then the operation will be ceased and a revised dewatering plan submitted for approval prior to further implementation.

1.5 REGULATORY COMPLIANCE

A. Comply at all times with the following as applicable to the Project:

1. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities, (DEP-PED-GP-015), latest revision. Conditions of such permit, other conditions of approval or authorizations, and any Stormwater Pollution Prevention Plans shall become part of the Contract Documents.

2. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer (DEP-PERD-GP-007), latest revision. The conditions of such permit, other conditions of approval or authorizations, and any supplemental plans shall become part of the Contract Documents.

3. Connecticut Department of Energy and Environmental Protection General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (DEP-PED-GP-020), latest revision. The conditions of such permit, other conditions of approval or authorizations, and any supplemental plans shall become part of the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Surface Drainage: Intercept and divert precipitation, and surface water, away from excavations through the use of temporary diversion swales, temporary sediment traps, pipes, sumps or other approved means.

B. Drainage of Excavated Areas: Provide and maintain ditches of adequate size to collect surface and seepage water, which may enter the excavations. Divert the water into sumps and storm drains or pump into drainage channels or storm drains. When water is to be diverted into a storm drain, provide dewatering settling basins, or other accepted apparatus, such as fractionation tanks, as required to reduce the amount of fine particles, which may be carried into the drain. If a storm drain becomes blocked due to dewatering operation, it shall be cleaned by the Contractor at his own expense.

3.2 DEWATERING

A. Where feasible and appropriate, dewatering wastewaters will be infiltrated into the ground. Dewatering wastewaters discharged to surface waters will be discharged in a manner that minimizes the discoloration of the receiving waters. The following measures will be employed to ensure that dewatering wastewaters will not cause scouring or erosion or contain suspended solids in amounts that could reasonably be expected to cause pollution:

B. Divert surface waters away from areas needing dewatering.

C. Consider if well points and sumps can be used to lower the groundwater table reducing the need for settling facilities.

D. For sites that don't require continuous pumping, pump work areas before construction activities begin each work day.

E. Provide filtration near the suction intake.

F. Locate pumps, intake sumps, and other intake structures in areas which will not require constant moving, when possible.

G. Locate pump discharge facilities (portable, permanent, or bio-filtering structures) such that a minimum disturbance of existing wetlands and watercourses is incurred.

H. Provide protection at outlets from pumping operations to dissipate pumping surges and prevent erosion at the point of discharge.

I. Maintain the water level at such lowered elevations that no danger to structures can occur because of the buildup of excessive hydrostatic pressure on the subgrade, or bottom of trench, unless otherwise permitted by Engineer.

J. Do not allow water to accumulate in excavations. At all times during construction, provide ample means and devices with which to remove promptly and dispose properly of all water entering roadway, trench, and structure excavations and keep them dry until the structures to be built thereon are completed.

K. No pipe/culvert/structure shall be laid in water. No masonry shall be laid in water, and no water shall be allowed to rise over masonry (either concrete or brick) in 24 hours after being placed. Nor shall moving water be allowed to rise over masonry for four days. In no event shall water be allowed to rise so as to set up unequal pressures in the structures until the concrete or mortar has set at least 24 hours. The Contractor shall constantly guard against the possibility of flotation of pipe or structures after installation. He shall place adequate backfill promptly in accordance with Section 31 2310 - Earthwork to prevent this occurrence, and his method of handling drainage and carrying on these operations shall always be adequate to prevent flotation.

END OF SECTION

SECTION 31 2543

GEOTEXTILES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Furnishing and installation geotextile materials for the separation of earth materials.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.

B. American Society for Testing and Materials (ASTM)

1. ASTM D3786 - Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.

2. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.

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

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

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

6. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

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

C. Code of Federal Regulations (CFR)

1. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.560 through 1926.562 including Appendices A through F.

1.3 QUALITY CONTROL

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

1.4 SUBMITTALS

A. Submit to Engineer for approval material specifications, manufacturer's product data, and shop drawings for all materials furnished under this Section.

B. Connection details for geotextile.

C. Proposed mechanical connection devices.

1.5 DELIVERY, STORAGE AND HANDLING

A. Follow geotextile manufacturer's recommendations for packaging, transportation, and delivery to ensure materials are not damaged. Furnish the geotextile fabric in a wrapping that protects the fabric from ultraviolet radiation and from abrasion due to shipping and hauling.

B. Geotextile shall be stored on a prepared surface (not wooden pallets) and should not be stacked more than two rolls high. Storage shall be such that the geotextile is protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or cold, or other damaging circumstances. Temporary storage at the Project Site shall be away from standing water such that crushing or flattening of roll goods does not occur.

PART 2 PRODUCTS

2.1 FILTRATION GEOTEXTILE

A. Filtration Geotextile shall be utilized for subsurface drainage.

1. Composition: Nonwoven, polypropylene staple fibers.

2. Physical properties:

Mechanical and Physical Properties of Filtration Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength, Ultimate	ASTM D 4632	Pounds	110
Grab Tensile Strength, Elongation at Utlimate	ASTM D 4632	Percent (%)	50
Trapezoid Tear Strength	ASTM D 4533	Pounds	50
Mullen Burst Strength	ASTM D 3786	psi	225
Puncture Strength	ASTM D 4833	Pounds	60
Apparent Opening Size (AOS)	ASTM D 4751	(U.S. Sieve)	70

Permittivity	ASTM D 4491	sec^{-1}	1.7
Flow Rate	ASTM D 4491	gal/min/ft2	135
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70
Physical Properties	Test Method	Unit	Average Roll Value
Weight	ASTM D 3776	oz/yd^2	4.0
Thickness	ASTM D 5199	Mils (mm)	44 (1.12)

2.2 SEPARATION GEOTEXTILE

A. Separation Geotextile shall be utilized to separate layers of earth materials.

1. Composition: Woven geotextile made of 100% polypropylene slit film yarns.

2. Physical properties:

Mechanical and Physical Properties of Separation Geotextile

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength, Ultimate	ASTM D 4632	Pounds	250
Grab Tensile Strength, Elongation at Utlimate	ASTM D 4632	Percent (%)	15
Trapezoid Tear Strength	ASTM D 4533	Pounds	90
Mullen Burst Strength	ASTM D 3786	psi	450
Puncture Strength	ASTM D 4833	Pounds	100
Apparent Opening Size (AOS)	ASTM D 4751	(U.S. Sieve)	40
Permittivity	ASTM D 4491	sec^{-1}	0.05
Flow Rate	ASTM D 4491	gal/min/ft2	4
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70

PART 3 EXECUTION

3.1 GENERAL

A. Placement of a geotextile fabric is required to separate crushed stone from the surrounding soils or layers of varying earthen materials in backfill locations.

B. Install geotextile as shown on the Drawings or as called-for in the Specifications.

C. Ensure that geotextile is protected during installation from clogging, tears, and other damage.

3.2 PIPE OR DRAINAGE SYSTEMS

A. Provide smooth side and bottom trench surfaces so the fabric does not bridge depressions in the soil and is not damaged by rock projections.

B. Use fabric of a width to permit a minimum trench-width overlap across the backfill at the trench top.

C. Lay the fabric flat in the prepared trench without stretching. Lay the top of the fabric back on the sides to allow for the placement of the aggregate backfill and pipe.

D. Overlap ends of rolls an amount equal to the trench width prior to fabric placement. Where pockets or cavities occur in the trench bottom or sides, fill them with acceptable granular material to prevent distortion or damage to the fabric.

E. Backfill aggregate and install pipe in a manner to prevent damage to the fabric. Compact aggregate backfill and overlap the fabric across the trench top. Do not allow the fabric to be exposed for more than 2 weeks without covering with backfill.

3.3 LAYER SEPARATION AND STABILIZATION

A. Place fabric on a normally prepared subgrade area attending the full width of the sub-base layer being protected.

B. Place fabric in a loose and unstretched condition to minimize shifting, puncture, and/or tearing. Overlap fabric roll-ends and edges a minimum of 12 inches with adjacent material.

C. Place subbase material within 2 weeks after placement of fabric to minimize exposure. Place sub-base material in a manner to minimize slippage of the fabric. If excessive slippage occurs, use steel securing pins per manufacturer’s guidelines.

END OF SECTION

SECTION 31 3700

RIP RAP

PART 1 GENERAL

1.1 SUMMARY

A. This Section defines requirements for the procurement and placement of rip rap.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Rip rap shall be used to protect waterways from water damage.

PART 2 PRODUCTS

2.1 RIP RAP

A. Rip Rap material shall consist of sound, tough, durable and angular rock, free from decomposed stones or other defects impairing its durability. The size of a stone as hereinafter specified shall be its least dimension. Broken concrete or rounded stones are not acceptable. The type of material to be used shall be as noted on the plans, in the special provisions or as may be ordered by the Engineer.

1. Intermediate Rip Rap: This material shall conform to the following gradation:

Gradation of Intermediate Rip Rap

Stone Size	% of the weight (mass)
18 inches	0
10 inches to 18 inches	30-50
6 inches to 10 inches	30-50
4 inches to 6 inches	20-30
2 inches to 4 inches	10-20
Less than 2 inches	0-10

B. Bedding: The bedding material for rip rap shall conform to the specifications of the material indicated on the Drawings.

PART 3 EXECUTION

3.1 GENERAL

A. The area to be protected by rip rap shall be accurately shaped prior to placing of any bedding material or rip rap. Where bedding material is called for, it shall be placed on the prepared area and compacted to the depth, lines and grades indicated on the Drawings.

B. Rip rap shall be placed to its full course thickness in one operation in such a manner as to produce a reasonably well-graded mass of rock without causing displacement of the underlying material.

C. The finished surface shall be free from pockets of small stones and clusters of larger stones. Placing this material by methods likely to cause segregation of the various sizes of stone will not be permitted.

D. Rearranging of individual stones by mechanical or hand methods will be required to the extent necessary to obtain a reasonably well-graded distribution of the specified stone sizes.

E. The completed course shall be of the specified thickness and to the lines and grades as shown on the plans or as ordered by Engineer.

END OF SECTION

SECTION 32 1216

BITUMINOUS CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Bituminous concrete paving for driveways.

2. Bituminous concrete paving for the basketball court.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR).

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut Department of Transportation (ConnDOT).

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.

2. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, Supplemental Section 4.06 – Bituminous Concrete (Revised 3/17/14).

3. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, Supplemental Section M.04 – Bituminous Concrete (Revised 1/28/15).

D. American Association of State High and Transportation Officials (AASHTO).

1. AASHTO M-17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.

2. AASHTO M 82, Cutback Asphalt (Medium-Curing Type) .

3. AASHTO M-208 - Standard Method of Test for Unconfined Compressive Strength of Cohesive Soil-ASTM Designation D 2166.

4. AASHTO M-320 - Standard Specification for Performance-Graded Asphalt Binder.

5. AASHTO R-26 - Standard Recommended Practice for Certifying Suppliers of Performance-Graded Asphalt Binders.

6. AASHTO R-29 - Standard Practice for Grading or Verifying the Performance Grade of an Asphalt Binder.

7. AASHTO T-27 - Sieve Analysis of Fine and Course Aggregates.

8. AASHTO T-84 - Specific Gravity and Absorption of Fine Aggregates.

9. AASHTO T-85 - Specific Gravity and Absorption of Coarse Aggregates.

10. AASHTO T-96 - Standard Method of Test for Resistance to Degradation of small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

11. AASHTO T 104 Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

12. AASHTO T-209 - Maximum Specific Gravity and Density of Bituminous Paving Mixtures.

13. AASHTO T-245 - Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

E. American Society for Testing and Materials (ASTM)

1. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.

2. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

1.3 SPECIFICATIONS

A. All work performed under this Section shall conform to the Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, Supplemental Section 4.06 – Bituminous Concrete (Revised 3/17/14). This Specification is hereby incorporated into this Section by reference.

PART 2 PRODUCTS

2.1 GENERAL

A. All work performed under this Section shall conform to the Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004, Supplemental Section M.04 – Bituminous Concrete (Revised 1/28/15). This Specification is hereby incorporated into this Section by reference.

PART 3 EXECUTION

3.1 GENERAL

A. Contractor shall install all pavements as specified in the location and to the grades as shown on the Drawings and/or approved by Engineer. Materials, methods of construction, and type and thickness of pavement courses shall be as shown on the Details of the Drawings and as specified herein.

B. Owner and its representatives shall have access to all parts of the Work under construction at all times.

3.2 SPECIFICATIONS

A. Execute the work of this Section in accordance with the Standard Specifications for Roads,

Bridges and Incidental Construction, Form 816, 2004, Supplemental Section 4.06 – Bituminous Concrete (Revised 3/17/14). This Specification is herby incorporated into this Section by reference.

END OF SECTION

SECTION 32 12 17

BITUMINOUS CONCRETE SIDEWALK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Bituminous concrete surfaced sidewalk constructed on a gravel or reclaimed miscellaneous aggregate base course in the locations and to the dimensions and details shown on the plans or as directed by Engineer and in accordance with these specifications.

B. Work shall also include all associated items and operations necessary and required to complete the installations, including, but not limited to, surface preparation, finishing and cleanup.

C. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. United States Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004.

1.3 SUBMITTALS

A. Submit Shop Drawings, manufacturer’s literature, material certificates or other data indicating compliance with these Specifications.

PART 2 PRODUCTS

2.1 BASE COURSE

A. Broken or crushed stone, gravel, or a mixture thereof.

B. Broken or crushed stone

1. The product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces.

C. Bank or crushed gravel

1. Sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. Crushed gravel shall be the manufactured product resulting from the deliberate mechanical crushing of gravel with at least 50% of the gravel retained on the No. 4 sieve having at least one fractured face.

D. Base Course shall be graded as follows:

Gradation of Base Course (ConnDOT Grading "A")

Sieve	Percent Passing by Weight
3 ½"	100
1 ½"	55-100
1/4"	25-60
No. 10	15-45
No. 40	5-25
No. 100	0-10
No. 200	0-5

2.2 BITUMINOUS CONCRETE SURFACE

A. ConnDOT "Class 2" in accordance with Section 32 1216 – Bituminous Concrete Pavement.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavation, including removal of any existing sidewalk, or driveway, shall be made to the required depth below the finished grade, as shown on the plans or as directed by the Engineer. All soft and yielding material shall be removed and replaced with suitable material.

3.2 FORMS

A. When the bituminous concrete is spread by hand, forms shall be used.

B. Forms shall be of metal or wood, straight, free from warp and of sufficient strength to resist springing from the impact of the roller. If made of wood, they shall be of 2- inch surfaced plank except that at sharp curves thinner material may be used; if made of metal, they shall be of an approved section.

C. All forms shall be of a depth equal to the depth of the sidewalk and shall be securely staked, braced, and held firmly to the required line and grade.

D. All forms shall be cleaned and oiled each time they are used.

3.3 BASE COURSE

A. Gravel for the base course shall be uniformly spread to the required depth and thoroughly compacted with a roller with a mass of not less than 500 pounds.

3.4 BITUMINOUS CONCRETE SURFACE

A. Surface shall be constructed in accordance with the requirements of Section 32 12 16 – Bituminous Concrete Pavement, except that the material may be spread by hand and thoroughly compacted by multiple passes of a roller weighing (with a mass) of not less than 500 pounds.

B. In sections inaccessible to the roller, the base course, surface course and backfill shall be hand-tamped with tampers weighing not less than 12 pounds, the face of which shall not exceed 50 square inches in area.

3.5 BACKFILLING AND REMOVAL OF SURPLUS MATERIAL

A. The sides of the sidewalk shall be backfilled with suitable material thoroughly compacted and finished flush with the top of the sidewalk or driveway.

B. All surplus material shall be removed and the Project Site left in a neat and presentable condition to the satisfaction of Engineer.

END OF SECTION

SECTION 32 1623

CURBING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Bituminous concrete lip curb.

B. Work shall also include all associated items and operations necessary and required to complete the installations, including, but not limited to, surface preparation, finishing and cleanup.

C. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. United States Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004.

D. American Society for Testing and Materials (ASTM)

1. ASTM C33 - Standard Specification for Concrete Aggregates.
2. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
3. ASTM C150 - Standard Specification for Portland Cement.
4. ASTM D235 - Standard Specification for Mineral Spirits (Petroleum Spirits).
5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes
6. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
7. ASTM C309 - Standard Specification for Liquid Membrane - Forming Compounds for Curbing Concrete.
8. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
9. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

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

11. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

12. American Concrete Institute (ACI)

13. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

E. American Association of State High and Transportation Officials (AASHTO)

1. AASHTO M 6 - Standard Specification for Fine Aggregate for Portland Cement Concrete.

2. AASHTO M 85 - Standard Specification for Portland Cement (Chemical and Physical).

3. AASHTO M 133 - Standard Specification for Preservatives and Pressure Treatment Processes for Timber.

4. AASHTO M 213 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

5. AASHTO M 233 - Standard Specification for Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete.

6. AASHTO M 240 - Standard Specification for Blended Hydraulic Cement.

7. AASHTO T11 - Standard Method of Test for Materials Finer Than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.

8. AASHTO T21 - Standard Method of Test for Organic Impurities in Fine Aggregate for Concrete.

1.3 SUBMITTALS

A. Submit Shop Drawings, manufacturer’s literature, material certificates or other data indicating compliance with these Specifications.

1.4 DELIVERY, STORAGE AND HANDLING

A. Curbing shall be protected against staining, chipping, and other damage. Cracked, badly chipped, or stained units will be rejected and shall not be employed in the Work.

PART 2 PRODUCTS

2.1 BITUMINOUS CONCRETE LIP CURBING

A. Bituminous concrete for curbing shall be as specified in Section 32 1216 – Bituminous Pavement.

PART 3 EXECUTION

3.1 GENERAL

A. Trenching, excavation, backfilling, and compaction shall be completed in accordance with Section 31 2310 - Earthwork, except as modified within this Section.

3.2 BITUMINOUS CONCRETE LIP CURB

A. General Requirements

1. Bituminous curbing shall be constructed by the use of an approved self-propelled extruding curb machine equipped with a material hopper, distributing screw and curb forming device capable of placing the bituminous mixture to the required lines, grades and proper curb cross-section. Prior to the placement of any curb, Contractor shall submit a detail of the cross-section of the curb mold that he proposes to use to Engineer for approval.

B. Surface Preparation

1. When curbing is to be placed on existing bituminous pavements, concrete pavements or newly laid bituminous pavements which have been in place more than twenty-four (24) hours, the surface on which the curb is to be placed shall be swept and cleaned, thoroughly dried, and immediately prior to placement of the curb, the surface to be occupied by the curb shall be given an application of tack coat material. Particular care shall be exercised to prevent spread of tack coat material beyond the area to be occupied by the curb. Recently placed bituminous concrete pavement, which have been placed less than twenty-four (24) hours prior to placement of the curb need only be thoroughly swept and cleaned.

C. Placing and Compaction

1. The hot bituminous mixture shall be placed in the hopper of the curb paver without segregation and extruded through the mold form to provide the proper compaction and surface texture.

2. The curb paver shall be properly supported and weighted during operation along the edge of the pavement and shall be guided along string or chalk lines to maintain the proper alignment and level of the completed curb.

3. Any portions of the completed curb, which are not satisfactorily compacted, or show signs of sagging, cracking, or distortion, or do not conform to the required lines, grades or cross-section for any reason, and which cannot be satisfactorily repaired during construction, shall be removed and replaced at no additional cost to the Owner.

D. Joints: Bituminous curb construction shall be a continuous operation in one direction only, to eliminate frequent joints. When the placing of the curb is discontinued for a length of time that permits the mixture to become chilled, the curb shall be cut in a true vertical plane and the exposed end painted with a thin uniform coat of hot asphalt cement just prior to placing the fresh curb mixture against the previously constructed curb to insure a continuous bond.

END OF SECTION 321623

SECTION 32 3300

BOLLARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Installation of traffic control bollards

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCES

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. American Society for Testing and Materials (ASTM)

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated and Welded and Seamless.

2. ASTM A366 - Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

3. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Tubing in Rounds and Shapes.

4. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.

5. ASTM D5893 - Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

C. State of Connecticut

1. State Building Code, including all Amendments, Supplements, and Errata.

D. United States Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

E. United States General Services Administration, Federal Standards.

1. Federal Standard No. 595 - Colors Used in Government Procurement.

1.3 PERFORMANCE REQUIREMENTS

A. Bollard installs as a single unit with specified dimensions and is secured in the ground.

1.4 SUBMITTALS

A. Submit Shop Drawings, manufacturer's literature, material certificates or other data indicating compliance with these Specifications.

B. Submit testing data for concrete as required by Section 03 3200 - Site Cast-in-Place Concrete.

1.5 DELIVERY, STORAGE AND HANDLING

A. Supply: Bollard units of all types must be supplied by a single manufacturer having the resources to provide consistent quality in appearance and physical properties.

B. Materials shall be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging.

C. Store units to avoid damage from moisture, abrasion, and other construction activities.

PART 2 PRODUCTS

2.1 STEEL BOLLARDS

A. New single bit cast steel tube as shown on the Drawings, free from surface blemishes and defects where exposed to view in the finished installation.

B. Steel Tube: ASTM A53/A53M, dimensions as indicated on the Drawings.

C. Painting and Cleaning: After fabrication of units, all tool marks and surface imperfections shall be removed and exposed faces of all welded joints dressed smooth. Coat with a standard rust-inhibitive primer.

D. Primed (Standard): Apply standard rust inhibitive primer per manufacturer standard application instructions.

2.2 CONCRETE

A. Concrete shall be as specified in Section 03 3200 - Site-Cast-in-Place Concrete.

2.3 PRIMER

A. Waterborne primer, acrylic or modified acrylic, suitable for use on exterior metal surfaces.

B. Drying time. The dry-to-touch time shall be a maximum of one hour, and the dry-to-recoat time shall be a maximum of 4 hours when tested in accordance with ASTM D 1640.

2.4 PAINT

A. Waterborne paint, acrylic or modified acrylic, suitable for use on exterior metal surfaces

B. Color: FS 13591 (yellow).

C. Drying time. The dry-to-touch time shall be a maximum of one hour, and the dry-to-recoat time shall be a maximum of 4 hours when tested in accordance with ASTM D 1640.

2.5 JOINT FILLER

A. One-part, cold-applied silicone that cures to a durable, flexible, low modulus silicone rubber joint seal, ASTM D5893.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install bollards at the locations indicated on the Drawings.

B. Install bollards level and true to the specific depths and exposures as indicated on the Drawings.

C. Provide temporary bracing as required to maintain desired installation until concrete has cured.

D. Protect newly-installed bollards from damage or movement.

3.2 PAINTING

A. Primer: If not factory primed, apply primer in accordance with manufacturer's guidelines. Apply primer at temperatures between 50 °F and 100 °F and a relative humidity no higher than 85 percent.

B. Paint: Apply paint of the color selected in accordance with manufacturer's guidelines. Apply paint at temperatures between 50 °F and 100 °F and a relative humidity no higher than 85 percent. Protect freshly-painted surfaces from damage.

END OF SECTION

SECTION 32 9200

TURF AND GRASSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

2. Hydroseeding.

3. Erosion-control material(s).

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

1.2 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

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

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

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

1. All use of pesticides shall conform with the Connecticut DEEP requirements.

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

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

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

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For standardized ASTM D 5268 topsoil.

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

1.4 QUALITY ASSURANCE

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

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Certified Landscape Technician - Exterior, with installation maintenance specialty area(s), designated CLT-Exterior.

b. Certified Turfgrass Professional, designated CTP.

c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for turf growth.

a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.6 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Contractor responsible for all maintenance until Substantial Completion.

1. Spring Planting: April 1 - June 15.

2. Fall Planting: August 15 - October 1.

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

1.7 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 90 days from date of planting completion.

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

B. Initial Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established (determined by Landscape Architect and Construction Manager), but for not less than 90 days from date of planting completion.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 PRODUCTS

2.1 SCREENED LOAM

A. Screened Loam shall be "coarse sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA" Classification System". Screened Loam has the following mechanical analysis:

	Textural Class	Percentage of Total Weight	Average Percentage
C.	Sand(0.05 - 2.0mm dia. range)	45 - 75	60
D.	Silt (0.002 - 0.05mm dia range)	15 - 35	25
E.	Clay(Less than 0.002mm dia. range)	5 - 20	15

F. Coarse Sandy loam shall have: less than 30% fine /very fine sand, and 50% or more medium/coarse/very coarse sand.

G. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area which has never been stripped, as noted above, the location of the source of the Loam must be submitted to the Engineer. Screened Loam shall not contain less than 3 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended, prior to site delivery, by the addition of composted leaf mold or peat moss. Use of organic amendments is accepted only if random soil sampling indicates a through incorporation of these materials. No mixing or amending of Loam will be permitted on site. The Loam shall not be delivered when in a wet or frozen condition.

H. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½" in the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter as determined by the Parks, Recreation, and Cemetery Department. Screened Loam shall fall within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum great than 200 parts per million.

I. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.

J. The Engineer will reject any material delivered to the site that, after post-delivery testing, does not meet these specifications. If the delivered screened loam does not meet the specifications stated in this document the delivered screened loam will be removed by the contractor at the contractors expense and at the time of rejection.

K. The Contractor shall take representative samples of topsoil from the site and from topsoil to be hauled in and shall submit samples to a Soil Testing Laboratory for chemical analysis, and physical analysis. The Contractor shall indicate to the testing agencies that turf is to be planted and who the Owner is. The Contractor shall forward to the Owner two copies of analysis and recommendations of the testing agencies.

L. Topsoil, which has been stockpiled on the site, may be used provided it can be made to comply with these Specifications herein for screened loam.

M. All loam provided from off-site sources shall be brought to the site meeting all specification requirements. There must be no mixing or amending of soil on site. No loam shall be spread prior to screening. The loam must not be handled or moved when in a wet or frozen condition.

N. To assure loam borrow purchased and topsoil stockpiled fulfills specified requirements regarding textural analysis, organic matter content, and pH, soil testing results will be obtained by the Contractor and submitted to the Owner's Representative for approval one (1) month before any soil is delivered to the site.

2.2 SEED

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

B. Seed Species: State-certified seed of grass species as follows:

C. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

SEED VARIETY	PERCENT
CREEPING RED FESCUE	50
PERENNIAL RYEGRASS	30
KENTUCKY BLUEGRASS	10
CHEWINGS FESCUE	10

2.3 TURF REINFORCEMENT

A. High density polyethylene, UV-stabilized, rhomboidal extruded ground protection mat as manufactured by TENAX Corporation, 4800 E. Monument Street, Baltimore, MD. (website:www.tenaxus.com) or engineer approved equal.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.

2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.

3. Provide lime in form of ground dolomitic limestone or calcitic limestone depending on recommendation from soil analysis.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

H. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.5 ORGANIC SOIL AMENDMENTS

A. Amendments, fertilizers, and conditioners shall be recommended in the Topsoil Test Report.

B. Compost: The compost shall be a stable, humu-like material produced from the aerobic decomposition of organic residues. The Carbon/nitrogen ration shall be in the range of 10:1 to 25:1. The organic matter shall be at least 40% on an oven dry basis. 100-percent of the material shall pass a ½ inch screen. Soluble salts shall not exceed 0.4 mmhos cm-1. The pH shall be between 5.5 to 8.0. No man-man inert debris such as glass, metal, wood, masonry shall be visible and shall not exceed 1% dry weight.

1. Heavy metals regulated by the EPA measured in the parts per million shall not exceed the allowable limits.

C. Organic fertilizers are derived from several sources. Bonemeal in first paragraph below is organic and primarily phosphorous, has an alkaline reaction, and is nonburning. Other organic fertilizers include blood meal, cottonseed meal, seaweed meal, soybean meal, alfalfa meal, and blends of these materials.

D. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

E. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

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

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

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

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.6 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous

materials harmful to plant growth. Mix ASTM D 5268 topsoil with the soil amendments and fertilizers in the quantities recommended by the soil analysis to produce planting soil.

B. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with another specified planting soil when quantities are insufficient.

2. Mix existing, native surface topsoil with the soil amendments and fertilizers in the quantities recommended by the soil analysis to produce planting soil.

C. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the soil amendments and fertilizers in the quantities recommended by the soil analysis to produce planting soil.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

C. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of <2 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

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

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

F. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.8 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as

required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 EXECUTION

3.1 EXAMINATION

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

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

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

3.2 PREPARATION

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

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.

2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Verify topsoil placement has been completed and accepted. Verify required permeability has been tested and approved. All disturbed areas not developed otherwise shall be developed as lawn as indicated on the Drawings and as specified. Provide additional topsoil where and as

required to properly meet all proposed finish grades. Remove weeds, debris, foreign matter and stones having any dimensions greater than ¾''.

C. Fine grade to a smooth uniform surface Grades shall be within specified tolerances. The entire area shall present an even grade with no depressions where water will stand. Topsoil shall be smooth blended to existing finish grades around trees, erosion control devices and adjacent existing conditions, maintain exiting surface drainage patterns. Smoothly round-off all top and toe of slopes. Reinstall erosion control devices and protective fencing as required.

D. For spring seeding provide sidurn for pre-emergence crabgrass control. Repeat applications as needed and in accordance with the manufacturer's recommendation.

E. Determine the bulk density of the topsoil prior to approval of finish grade, using an approximate method outlined in C.A. Black (ed) Methods of Soil Analysis, Part 1, American Society of Agronomy, 1965. Final bulk density of the topsoil shall have a mean value of approximately 1.35 g cm-3 (85 lbs. per cu. ft) taken from 5 samples from each field with no value exceeding 1.40 g cm-3 (88 lbs. per cu. ft.).

F. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (10 inches in areas used for staging, parking, or construction activity). Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.

2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

    b. Reduce elevation of planting soil to allow for soil thickness of sod.

G. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply superphosphate fertilizer directly to surface soil before loosening.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.

4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

H. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Final smoothing is to leave a firm and level surface with no soft spots. Limit finish grading to areas that can be planted in the immediate future.

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

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

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

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

3.5 PREPARATION FOR TURF REINFORCEMENT MATERIALS

A. Reduce subgrade elevation soil to allow for thickness of reinforcement system. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade so that installed mat is within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions.

B. Install reinforcement mat and fasten according to manufacturer's written instructions.

C. Before planting, fill cells of reinforcement mat with planting soil and compact according to manufacturer's written instructions.

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

3.6 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft.. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.7 HYDROSEEDING

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

1. Mix slurry with nonasphaltic tackifier.

2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre.

3.8 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.

2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.9 TURF MAINTENANCE

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

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches. The contractor shall provide all irrigation equipment and water as necessary to irrigate the seeded areas daily with ¼ acre inch of water per day using 3 sets to keep the surface moist and to maintain soil moisture at or near field capacity so that the seedbed does not dry out and

adequate rooting takes place. The amount of water per dy and the number of sets may be adjusted at the request of the Owner. The irrigation schedule shall further be adjusted after the seedling plants and sod are rooted. The quantity of water used per day shall be recorded and reported daily to the Construction Manager for the first three week from seeding and weekly thereafter.

C. Mow turf at 5 day intervals commencing as soon as the seedlings in the seeded areas reach 2 inches in height. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

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

2. Mow turf-type tall fescue to a height of 2 to 3 inches.

D. Turf Post Fertilization: Apply fertilizer after initial mowing and when grass is dry.

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

3.10 SATISFACTORY TURF

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

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds, stones, debris, and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 2 by 2 inches.

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

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

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

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

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

END OF SECTION

SECTION 33 1900

WATER SUPPLY SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water distribution piping.
2. Pipe fittings and required accessories.
3. Yard hydrants.
4. Connections to existing water systems.
5. Disinfection and testing of new systems and appurtenances.

B. Contractor shall coordinate work between all Subcontractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

1.2 REFERENCE STANDARDS

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR)

29 CFR 1926, Safety and Health Regulations for Construction

C. American Society for Testing and Materials (ASTM)

ASTM B88 - Standard Specification for Seamless Copper Water Tube.

1. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
2. ASTM D3139 - Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
3. ASTM A536 - Ductile Iron Castings
4. ASTM D1557 - Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3))

D. American National Standards Institute (ANSI)

1. ANSI 61 - Drinking Water System Components - Health Effects

E. American Water Works Association (AWWA)

1. AWWA C104
2. AWWA C550 - Standard for Protective Epoxy Interior Coatings for Valves and Hydrants.

3. AWWA C651 - Disinfecting Water Mains.

4. AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In.-12 In. (100 mm-300 mm), for Water Transmission and Distribution.

5. AWWA C800 - Standard for Underground Service Line Valves and Fittings.

1.3 QUALITY ASSURANCE

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

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

C. Maintain all temporary facilities and controls in proper and safe condition throughout the progress of the work.

1.4 SAFETY

A. Contractor shall conduct all excavation activities in conformance with applicable regulations, including those relating to warning signs, excavation safety, sheeting, shoring, and stabilization.

B. Contractor shall provide and maintain barricades, signs, lights, etc., required for the protection of personnel, materials and property. Temporary barricades, etc. shall conform all applicable codes and regulations, and shall be lighted at night with lanterns, flares and reflectorized paint as required for safety. Adapt barricades, signs, lights, etc. to evolving site conditions throughout the progress of the work.

C. Provide other safety devices as required, including adaptation of such safety devices to changing site conditions, to prevent unauthorized entry to construction areas and open excavations. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

D. Contractor shall properly design and furnish all labor, materials, equipment, and tools necessary to completely construct the excavation support system, permanent or temporary, including sheet piling, trench shields, trench boxes, timber trench shoring, pneumatic/hydraulic shoring, steel sheeting or sheeting using other materials, sloping and benching. All of the proper materials and all equipment necessary to protect employees in excavations against cave-ins shall be furnished and installed.

E. Any time an excavation is to remain open, at a minimum, provide full enclosure with safety barriers and fencing, warning signs, and additional safety control measures as appropriate.

1.5 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings, descriptive literature, or both, showing pipe materials and appurtenances to be furnished. Shop Drawings shall be submitted to Engineer for approval prior to ordering materials.

2. Shop drawings showing the configuration, dimensions, layout, and spacing of major and minor components such as pipe, joints, restraints, valves, and other proposed details

of assembly. Show in large-scale details any unique assembly, and/or installation requirements.

B. Copies of manufacturer-provided installation instructions, operation instructions, and maintenance material for all equipment furnished under this Section.

C. Manufacturer's warranties and associated warranty registration data in Owner's name. Submit two (2) copies of each warranty to Engineer in the manufacture's/supplier's standard form or if there is no standard form available, in a form specified by Engineer.

D. As-Built Drawings.

1.6 DELIVERY, STORAGE AND HANDLING

A. Storage of pipe, fittings, valves, hydrants and other water line appurtenances on the site shall be in accordance with the manufacturer's recommendations, subject to the approval of Engineer.

B. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, fittings, valves, hydrants, and other water line appurtenances. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying and no piece shall be installed which is found to be defective. Any damage to pipe and fitting coatings shall be repaired as directed by Engineer.

C. Pipe, fittings, valves, hydrants and other water system appurtenances which are defective from any cause, including damage caused by handling, and determined by Engineer as non-repairable, shall be unacceptable for installation and shall be replaced at no cost to the Owner.

D. Pipe, and all water system appurtenances that are damaged or disturbed through any cause prior to acceptance of the work shall be repaired, realigned or replaced as required by Engineer at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. The drawings are diagrammatic only and are intended to indicate the extent, but not all details, of the system, which shall be constructed. All materials and fittings are not shown; but the Contractor shall furnish and install all materials and fittings required for the complete system.

2.2 WATER SERVICE

A. HDPE Piping meeting AWWA C901/C/906 and ASTM D2239.

B. Water Service Fittings: Fittings shall be in conformance with ASTM D2683.

2.3 BEDDING

A. Sand.

B. When clay, wet, soft or silty soil conditions prevail, 3/4-inch crushed stone shall be used for bedding.

PART 3 EXECUTION

3.1 GENERAL

A. All water pipes, fittings, valves and other appurtenances shall be installed at the locations as shown on the Drawings and/or directed by Engineer.

B. The proposed location and vertical alignment may be altered to avoid conflicts with existing and proposed utilities, as approved by Engineer.

3.2 WATER SERVICES

A. Service Pipe: Care shall be exercised in placing and laying of services to prevent kinks or sharp bends and contact with sharp stones or ledge which would damage to the pipe. At least 6 inches of sand shall be placed adjacent to, under, and above the pipe, and no stone larger than 2 inches shall be placed over the pipe until the depth of backfill above the pipe is in excess of 1 foot.

3.3 POLYETHYLENE ENCASEMENT

A. Installation of polyethylene encasement shall be in accordance with the recommended procedures contained in ANSI A21.5-99/AWWA C105 and when directed by Engineer Water Department or Engineer.

B. Care shall be taken during backfilling to prevent damage to polyethylene wrap. backfilling shall be in accordance with AWWA C600-99.

3.4 PRESSURE TESTING

A. Hydrostatic and leakage test shall be conducted in accordance with AWWA Standard C600-99 and C900-97, as well as NPPA 13, 2002 edition (10.10.2.2.4) and as directed by Engineer. Testing shall be conducted by a certified Independent Water Testing Company.

B. Conduct pipe tests after concrete thrust blocks (if used) have cured to the required 3,000-psi strength. Fill pipe 24 hours prior to testing, and apply test pressure to stabilize system. Use only potable water.

C. Prior to pressure testing, the entire pipe section shall be flushed to remove any rocks or debris, which may have inadvertently entered the pipe during construction.

D. All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.5 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure without loss for 2 hours.

E. The permitted amount of underground piping leakage shall be as follows:

1. The amount of leakage at the joints shall not exceed 2 qt/hr (1.89L/hr) per 100 gaskets or joints, irrespective of pipe diameter.

2. The amount of allowable leakage shall be permitted to be increased 1 fl oz (30 ml) per inch valve diameter per hour for each metal-seated valve isolating the test section.

F. in Interior piping in vaults, buildings, etc. shall have zero leakage.

G. Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair them. Pipe will be accepted only when leakage is zero, or less than the allowable amount. Approval does not absolve the Contractor from responsibility if leaks develop later within the period of warranty.

3.5 DISINFECTION

A. Before being placed in service, all new water pipe shall be chlorinated in accordance with AWWA C651-99 Standard for Disinfecting Water Mains or MDC requirements/regulations, whichever is the more stringent.

B. The location of the chlorination and sampling points will be determined by the MDC in the field. Taps for chlorination and sampling shall be installed by Contractor. Contractor shall uncover and backfill the taps as required.

C. The pipe section being disinfected shall be flushed to remove discolored water and sediment from the pipe. a 25-mg/l chlorine solution in approved dosages shall be inserted through a tap at one end while water is being withdrawn at the other end of the pipe section. The chlorine concentration in the water in the pipe shall be maintained at a minimum 25-mg/l available chlorine during filling. To assure that this concentration is maintained, the chlorine residual shall be measured at regular intervals in accordance with procedures described in Standard Methods and AWWA M12, Simplified Procedure for Water Examination [Section K].

D. During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the pipe supplying the water. Chlorine application shall not cease until the entire pipe section is filled with chlorine solution. The chlorinated water shall be retained in the pipe for at least a twenty-four hour period. the treated water shall contain chlorine residual throughout the length of the pipe section as indicated in AWWA C651-99.

E. Following the chlorination period, all treated water shall be flushed from the pipe section and replaced with water from the distribution system. Prior to disposal of treated water the Contractor shall check with local authorities to determine if the discharge will cause damage to the receiving body or sewer and, if required, the Contractor shall neutralize the chlorinated water in accordance with AWWA recommendations. Bacteriological sampling and analysis of the replacement water may then be made by the Contractor in full accordance with AWWA C651-99. A minimum of three samples shall be taken by the Contractor at locations directed by Engineer along the length of water pipe being chlorinated and sent to a State approved private laboratory for analyses. The Contractor shall rechlorinate if the samples show presence of coliform, and the pipe section shall not be placed in service until all of the repeat samples show no presence of coliform.

F. Furnish two copies of a Certificate of Disinfection Report to Engineer and one copy to Engineer.

G. Contractor shall pay all costs for all testing, flushing, chlorinating, laboratory analyses, sampling, water supply and municipal charges.

3.6 AS-BUILT DRAWINGS

A. Contractor shall be solely responsible for complying with the requirements of local permitting authorities for preparation and submittal of as-built drawings. The requirements for the preparation of as-built drawings as defined herein shall be considered the minimum requirements of Engineer, but shall in no way relive Contractor from satisfying the requirements of local permitting authorities.

B. As work progresses, record the following on two (2) sets of Drawings:

1. All changes and deviations from the design in location, grade, size, material, or other feature as appropriate.

2. Any uncharted locations of utilities or other subsurface feature encountered during installation, including the characteristics of such uncharted utility or subsurface feature such as utility type, size, depth, material of construction, etc.

C. Recording of changes shall be clearly and neatly marked in red pen or pencil. All changes shall be noted on the appropriate Drawing sheets.

D. Make measurements from fixed, permanent points on the Project Site to accurately locate the work completed. Such measurements shall consist of at least three (3) ties showing the distance of each item relative to each of the fixed, permanent points.

E. As-Built Drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new construction. As-Built drawings shall also contain any additional information required by Engineer.

END OF SECTION

SECTION 33 4000

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Installation of precast concrete culvert flared ends.

B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.

C. Contractor is responsible for all health and safety.

D. Contractor is solely responsible for obtaining permits or approvals which may be required to perform the work of this section, including all costs, fees and taxes required or levied. Notify and obtain such permits or approvals from all agencies having jurisdiction prior to starting work.

1.2 REFERENCE STANDARDS

A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.

B. Code of Federal Regulations (CFR)

1. 29 CFR 1926, Safety and Health Regulations for Construction.

C. American Concrete Pipe Association (ACPA).

1. ACPA 01-103 - Concrete Pipe and Box Culvert Installation (latest revision and applicable supplements thereto).

D. American Association of State High and Transportation Officials (AASHTO).

1. AASHTO H20 - Standard Specifications for HS-20, Highway Loading.

2. AASHTO M105 - Standard Specification for Gray Iron Castings.

3. AASHTO M198 - Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.

4. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.

5. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter.

E. State of Connecticut Department of Transportation (ConnDOT)

1. Standard Specifications for Roads, Bridges and Incidental Construction, Form 816, 2004 and any supplements.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings, descriptive literature, or both, showing pipe materials and appurtenances to be furnished. Shop Drawings shall be submitted to Engineer for approval prior to ordering materials.

2. Shop drawings showing the configuration, dimensions, layout, and spacing of major and minor components such as pipe, joints, couplings, restraints, and other proposed details of assembly. Show in large-scale details any unique assembly, pipe/pipe transitions, pipe/structure transitions, and/or installation requirements.

B. Copies of manufacturer-provided installation instructions, operation instructions, and maintenance material for all equipment furnished under this Section.

C. Manufacturer's warranties and associated warranty registration data in Owner's name. Submit two (2) copies of each warranty to Engineer in the manufacture/supplier standard form or if there is no standard form available, in a form specified by Engineer.

D. As-Built Drawings.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this Section. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a timely manner.

B. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

C. Sample pipe for testing, when requested by Engineer, shall be furnished by Contractor in sufficient numbers. The Contractor and/or the pipe manufacturer shall make the facilities and services for making the load tests available.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage

1. Manufacturer shall package the pipe and other drainage materials in a manner designed to deliver the pipe to the Project Site neatly, intact, and without physical damage. Transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. Inspect materials delivered to site for damage; store with minimum of handling.

2. Unloading of the pipe and other drainage materials should be controlled so as not to collide with the other pipe sections or fittings, and care should be taken to avoid chipping or spalling, especially to the spigots and bells. For manhole sections, cone sections, bases, fittings and other precast appurtenances, utilize lifting holes or lifting eyes provided.

3. In cold weather conditions, use caution to prevent impact damage. Handling methods considered acceptable for warm weather may be unacceptable during cold weather.

4. Storage:

a. Store materials on site in enclosures or under protective coverings. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

b. Store solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials under cover out of direct sunlight. Provide additional storage measures in accordance with the manufacturer's recommendations. Discard materials if storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

c. Cement, Aggregate, and Reinforcement: As specified in Section 033200 – Site Cast-in-Place Concrete.

PART 2 MATERIALS

2.1 GENERAL

A. Products furnished under this Section which are damaged or found defective in any way prior to being set in place and final acceptance, may be rejected. Engineer may reject an entire lot of pipe should the sample pipe from such lot fail to meet requirements.

2.2 CONCRETE FLARED END SECTION

A. Conforming to ConnDOT Form 816.

2.3 MORTAR

A. Mortar: ASTM C 387.

1. Portland Cement: ASTM C 150, Type I.

2. Sand: ASTM C 144.

3. Hydrated Lime: ASTM C 207.

4. Water: Potable.

5. Mix proportions for manhole rims and covers: 1 part portland cement, 2 parts sand, and 1/4 part hydrated lime by dry volume. Hydrated lime shall not exceed 10 percent by weight of the total dry mix. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5-1/2 gallons of water per sack of cement.

6. Mix Proportions for invert construction: 1 part portland cement and 2 parts sand by volume. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5-1/2 gallons of water per sack of cement.

2.4 BEDDING

A. Bedding for Drainage Structures: Granular Fill.

PART 3 EXECUTION

3.1 CLEANING

A. At the completion of the Work, clean all piping, structures and open drainage courses, through and to which water from this construction is directed, to the satisfaction of Engineer.

3.2 AS-BUILT DRAWINGS

A. Contractor shall be solely responsible for complying with the requirements of local permitting authorities for preparation and submittal of as-built drawings. The requirements for the preparation of as-built drawings as defined herein shall be considered the minimum requirements of Engineer, but shall in no way relive Contractor from satisfying the requirements of local permitting authorities.

B. As work progresses, record the following on two (2) sets of Drawings:

1. All changes and deviations from the design in location, grade, size, material, or other feature as appropriate.

2. Any uncharted locations of utilities or other subsurface feature encountered during installation, including the characteristics of such uncharted utility or subsurface feature such as utility type, size, depth, material of construction, etc.

C. Recording of changes shall be clearly and neatly marked in red pen or pencil. All changes shall be noted on the appropriate Drawing sheets.

D. Make measurements from fixed, permanent points on the Project Site to accurately locate the work completed. Such measurements shall consist of at least three (3) ties showing the distance of each item relative to each of the fixed, permanent points.

E. As-Built Drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new construction. As-Built drawings shall also contain any additional information required by Engineer.

END OF SECTION