SECTION 02 10 00
SITE PREPARATION

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for site preparation.

B. The work includes:

1. Protection of existing vegetation, utilities, and pavements to remain.
2. Maintenance of Erosion Control
3. Survey / measurement requirements to stake out the work.

1.2 RELATED SECTIONS

A. Other specification Sections that relate to the work of this Section include:

1. Section 31 00 00 – Earthwork

1.3 GENERAL

A. All activities shall be prohibited outside the limits of work, unless approved otherwise by the Engineer.

1.4 SITE CONDITIONS

A. The Owner will maintain, as far as practical, site conditions existing during the bidding period.

B. Actual site condition variations that differ from those of the bidding period that affect site preparation operations shall be brought to the attention of the Owner prior to the commencement of any site work.

C. Clear and restore areas used for the Contractor's convenience at no additional expense to the Owner. Restore such areas to a condition acceptable to the Engineer, including mulching, seeding, and planting.

1.5 SUBMITTALS

A. None required.

PART 2 PRODUCTS

A. NONE

PART 3 EXECUTION

3.1 PROTECTION

A. Always maintain vehicular access to Cemetery for funerals and visitation.

B. The Contractor shall flag the trees to be protected to prevent damage from equipment and shall protect existing trees that are to remain.

C. The Contractor shall be liable for all damage and/or disturbance to existing trees and shrubs not otherwise designated for clearing and removal. When the Contractor's operations damage trees and/or other vegetation to remain, comparable replacement shall be performed as approved by the Engineer at No cost to the Owner.

3.2 UTILITIES

A. Notify all corporations, companies, individuals, or local authorities owning, or having authority over, utilities running to, through or across areas to be affected by demolition operations.

B. Locate and identify existing utilities that are to remain and protect them from damage.

3.3 STAKE OUT

A. The Contractor shall provide control stakes to locate the work and suitable benchmark. The contractor shall provide all necessary measurements and instrument survey to locate the feature and work based on this information.

3.4 PROVISIONS FOR THE CONTROL OF EROSION

A. The Contractor shall take sufficient precautions, as approved by Engineer, during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumen, calcium chloride or other polluting materials harmful to humans, fish, or other life, into the water supplies and surface waters. Special precautions shall be taken in use of construction equipment to prevent operations which promote erosion.

1. The Contractor shall maintain erosion control.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 02 10 00

SECTION 02 21 00

SURVEY

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.

1.2 RELATED DOCUMENTS

A. Before submitting a bid, the Contractor shall make a thorough examination of the conditions of the site, checking the requirements of the Plans and Specifications with the existing conditions.

B. No claim for extra compensation or extension of time will be allowed on account of the Contractor's failure to estimate properly the quantities, locations and measurements of all items required to complete the work which could be discerned from visiting the site.

C. The Contractor shall report any discrepancies to the Engineer and request an interpretation.

D. Site Plans provided as part of the Contract Documents.

1.3 UTILITY NOTE

A. Existing utilities, where shown hereon, are approximate. The Contractor shall be responsible for properly locating and coordinating any on-site activity with Dig-Safe and the appropriate utility company and maintaining existing utility system service. Dig-Safe shall be notified per the Commonwealth of Massachusetts Statute Chapter 82, Section 40, at 1-888-344-7233. No guarantee is implied or intended as to the accuracy, location or that all utilities and/or subsurface structures are shown. The Contractor shall verify size, location and inverts or utilities and structures as required prior to the start of construction.

END OF SECTION 02 21 00

SECTION 02 24 00

ENVIRONMENTAL ASSESSMENT

PART 1 GENERAL

1.1 GENERAL

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools, and equipment and performing all work required for the prevention of environmental pollution during and because of construction operations under this contract.

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

C. The 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 the regulation, law or guideline is provided herein.

D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance with this Section.

1.2 NOTIFICATION

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Engineer may order stoppage of all or part of the work until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor because of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was complying.

1.3 AIR POLLUTION CONTROL

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

B. Comply with the Massachusetts Department of Environmental Protection Regulation 7.07 – Open Burning, and Regulation 7.09 – Dust, Odor, Construction, and Demolition, and attention is called to Regulation 7.25 – Enforcement Provisions.

1.4 PREVENTION OF WATER POLLUTION AND PROTECTION OF WILDLIFE

A. Comply with the requirements of Section 42 of the Massachusetts Clean Waters Act, Chapter 21 of the Massachusetts General Laws, as amended.

B. During the performance of the work, the Contractor shall take sufficient precautions in the conduct of operations necessary to avoid contaminating water in adjacent waterways. All earthwork, grading, moving of equipment, water control in foundation areas, and other operations likely to create silting, shall be planned and conducted to avoid 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 to avoid affecting nearby waterways. Under no circumstance shall pollutants or polluted water be discharged into the environment.

1.5 AREA OF CONSTRUCTION ACTIVITY

A. Insofar as possible, the Contractor shall confine his construction activities to those work areas defined by the plans and specifications. 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.

1.6 CHEMICAL CONSTRUCTION CONTROL

A. Exercise every reasonable precaution to prevent or minimize the chemical contamination of soil on the job site caused by spilling or leaking of oil and other chemicals used in the construction operations.

1.7 PROTECTING AND MINIMIZING EXPOSED AREAS

A. The Contractor shall control erosion and sedimentation as stated herein and in accordance with Section 01 57 00 – Temporary Controls.

B. Leave existing pavement or ground covering in place until the last possible moment prior to earth excavation for purposes of erosion and dust control. The Contractor shall limit the area of land that is exposed and free from vegetation during construction.

1.8 LOCATION OF 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. The Contractor's storage and staging area locations shall require written approval of the Engineer prior to use. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

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

1.9 PROTECTION OF LANDSCAPE

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner and Architect/Engineer. 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. The 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 the Engineer and Owner. 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 the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may direct the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 02 10 00 – Site Preparation.

D. Cultivated hedges, shrubs, and other plants that could be injured by the 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 as directed by the Engineer.

1.10 DISCHARGE OF DEWATERING OPERATIONS

A. Any water that is pumped and discharged from the trench and/or excavation shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. The pumped water shall be filtered through baled hay, a vegetative filter strip or a vegetative filter strip or a vegetative channel to trap sediment occurring because of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

1.11 DUST CONTROL

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed, and specified under Section 02 56 20 – Dust Control.

B. Calcium chloride shall only be used in areas allowed by state and local regulations.

END OF SECTION 02 24 00

SECTION 02 24 00

ENVIRONMENTAL ASSESSMENT

PART 1 GENERAL

1.1 GENERAL

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools, and equipment and performing all work required for the prevention of environmental pollution during and because of construction operations under this contract.

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

C. The 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 the regulation, law or guideline is provided herein.

D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance with this Section.

1.2 NOTIFICATION

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Engineer may order stoppage of all or part of the work until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor because of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was complying.

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

B. Comply with the Massachusetts Department of Environmental Protection Regulation 7.07 – Open Burning, and Regulation 7.09 – Dust, Odor, Construction, and Demolition, and attention is called to Regulation 7.25 – Enforcement Provisions.

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B. During the performance of the work, the Contractor shall take sufficient precautions in the conduct of operations necessary to avoid contaminating water in adjacent waterways. All earthwork, grading, moving of equipment, water control in foundation areas, and other operations likely to create silting, shall be planned and conducted to avoid 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 to avoid affecting nearby waterways. Under no circumstance shall pollutants or polluted water be discharged into the environment.

1.5 AREA OF CONSTRUCTION ACTIVITY

A. Insofar as possible, the Contractor shall confine his construction activities to those work areas defined by the plans and specifications. 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.

1.6 CHEMICAL CONSTRUCTION CONTROL

A. Exercise every reasonable precaution to prevent or minimize the chemical contamination of soil on the job site caused by spilling or leaking of oil and other chemicals used in the construction operations.

1.7 PROTECTING AND MINIMIZING EXPOSED AREAS

A. The Contractor shall control erosion and sedimentation as stated herein and in accordance with Section 01 57 00 – Temporary Controls.

B. Leave existing pavement or ground covering in place until the last possible moment prior to earth excavation for purposes of erosion and dust control. The Contractor shall limit the area of land that is exposed and free from vegetation during construction.

1.8 LOCATION OF 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. The Contractor's storage and staging area locations shall require written approval of the Engineer prior to use. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

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

1.9 PROTECTION OF LANDSCAPE

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner and Architect/Engineer. 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. The 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 the Engineer and Owner. 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 the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may direct the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under the provisions of Section 02 10 00 – Site Preparation.

D. Cultivated hedges, shrubs, and other plants that could be injured by the 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 as directed by the Engineer.

1.10 DISCHARGE OF DEWATERING OPERATIONS

A. Any water that is pumped and discharged from the trench and/or excavation shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. The pumped water shall be filtered through baled hay, a vegetative filter strip or a vegetative filter strip or a vegetative channel to trap sediment occurring because of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

1.11 DUST CONTROL

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the contractor shall furnish and spread the material, as directed, and specified under Section 02 56 20 – Dust Control.

B. Calcium chloride shall only be used in areas allowed by state and local regulations.

END OF SECTION 02 24 00

SECTION 03 30 00

SITE CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for concrete cast-in-place on the site.

B. The work includes cast-in-place foundations to support the future free-standing cremation niche wall, concrete sidewalks/patios, and bar foundations for gravestones.

1.2 RELATED SECTIONS

A. Sections which relate to the work of this Section include:

1. Section 31 00 00 – Earthwork

1.3 REFERENCE STANDARDS

A. References herein are made in accordance with the following abbreviations and all work under this Section shall conform to the latest editions as applicable.

1. American Concrete Institute (ACI)

a. ACI 301 - Specifications for Structural Concrete for Building

b. ACI 305R - Hot Weather Concreting

c. ACI 306R - Cold Weather Concreting

d. ACI 316R - Recommendations for Construction of Concrete Pavements and Concrete Bases

2. American Society for Testing and Materials (ASTM)

a. ASTM 185 - Welded Wire Steel Fabric for Concrete Reinforcement

b. ASTM 615 - Deformed and Plain Billot Steel Bars for Concrete Reinforcement

c. ASTM C33 - Concrete Aggregates

d. ASTM C94 - Ready-Mixed Concrete

e. ASTM C143 - Slump of Portland Cement Concrete

f. ASTM C150 - Portland Cement

g. ASTM C171 - Sheet Materials for Curing Concrete

h. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method

i. ASTM C260 - Air Entraining Admixtures for Concrete

j. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete

k. ASTM C494 - Chemical Admixtures for Concrete

3. Concrete Reinforcing Steel Institute (CRSI)

a. CRSI - Manual of Standard Practice.

4. Americans with Disabilities Act and State Regulations

1.4 QUALITY ASSURANCE

A. Work and materials for construction of the cement concrete walks shall conform to ACI 316R. Other cast-in-place concrete shall conform to ACI 301.

B. Work, materials, and color of the wheelchair ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) and State standards, whichever is more stringent.

C. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features shown 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.

1.5 SUBMITTALS

A. Description of methods and sequence of placement for each type of specially finished concrete, including description of methods and sequence of placement.

B. Manufacturer's product data for the following:

1. Form release agent.

2. Preformed joint filler.

1.6 TESTING

A. The Owner may employ an independent testing laboratory to inspect and evaluate concrete paving and other cast-in-place concrete work.

B. Testing of materials and installed work may occur at any time during progress of the work. Rejected materials and installed work shall be removed and replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 STEEL REINFORCEMENT

A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, deformed.

1. Bars employed as dowels shall be hot-rolled plain rounds.

B. Steel wire: ASTM A82, plain cold drawn steel.

C. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Supports for Reinforcement: Bolsters, chairs, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric in place shall be wire bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1).

2.2 PORTLAND CEMENT CONCRETE

A. Portland cement concrete shall:

1. Have a maximum water cement ratio of 0.45 conforming to ACI 316R.

2. Be Air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1 percent and shall be evaluated in accordance with ASTM C260.

3. Placed with a slump not less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.

4. Use cement conforming to ASTM C150, Type I or II. Only one color of cement, all the same manufacturer, shall be used for the work.

5. Use fine and coarse aggregates conforming to ASTM C33.

6. Contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.

7. Contain 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 the Engineer in each case.

2.3 COLORED CONCRETE

A. Not Required.

2.4 CURING MATERIALS FOR UNCOLORED CONCRETE

A. Curing shall be accomplished by the following methods:

1. Moist curing with burlap covering.

2. Curing paper, non-staining, fiber reinforced laminated Kraft bituminous product conforming to ASTM C171. Four mil polyethylene sheeting may be substituted for curing paper.

3. Curing compound, a resin-base, white pigmented compound conforming to ASTM C309, Type 2.

2.5 EXPANSION JOINTS

A. Expansion joint filler shall be performed, non-bituminous type conforming to ASTM D1752, Type II, like Seal tight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equivalent.

1. Pre-molded filler shall be one piece for the full depth and width of the joint.

B. Smooth dowel shall be hot rolled plain steel dowel bonded at one end and operating in smooth close-fitting sleeve (of same material) at the other.

2.6 FORMS

A. Cylindrical Forms: Sonotube Fibre Forms, wax-impregnated strippable forms manufactured by Sonoco Products Company, General Products Division, ABS or PVC plastic reusable forms, or approved equivalent.

B. Forms for Exposed Finish: Plywood, metal, metal-framed plywood faced, or other acceptable panel materials. Plywood shall be APA Ref. 1 B-B (Concrete Form), Class I Exterior Grade plywood or B-B or A-C Class I high density overlay concrete form plywood. Form work materials shall produce smooth, continuous, straight and level surfaces.

C. Forms for Unexposed Finish: Plywood, lumber, or metal, with lumber dressed on at least two edges and one side.

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

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

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE

A. All concrete for walkways shall be placed on a prepared stable subbase.

B. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade, subbase, base, or pavement, subsequent backfill and compaction shall be performed as required by the Engineer and as specified in Section 31 00 00, Earthwork.

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

D. The Engineer will inspect the prepared subgrade. Subgrade shall be approved for installation of the gravel base course. Disturbance to subgrade caused by inspection procedures shall be repaired.

3.2 BASE COURSE

A. Base course for concrete paving shall be pavement subbase course or gravel base materials specified in Section 32 11 00, Base Courses, as shown on the Drawings.

B. Width of base course shall extend beyond edge of the proposed pavement as shown on the Drawings.

C. Material shall be placed in lifts no more than 6 inches thick, compacted measure. Each lift shall be separately compacted to specified density.

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

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

3. Surface irregularities which exceed 1/2 inch as measured by means of a 10-foot-long straightedge, shall be regraded and recompacted.

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

E. The base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with the base course material.

3.3 STEEL REINFORCEMENT

A. Before being placed in position, reinforcing steel 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 delay in placing concrete after reinforcement is in place, bars shall be reinspected and cleaned when required.

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

C. Unless otherwise shown on the Drawings, reinforcing shall extend within 2 inches of form work and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 inches.

D. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel shall be securely wired in the required position and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be installed in a number and arrangement approved by the Engineer.

3.4 FORMS

A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits.

1. Provide Class A tolerances for concrete surfaces exposed to view.

2. Provide Class C tolerances for other concrete surfaces.

B. Construct forms to provide for openings, offsets, sinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, and inserts, and other features required for the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent cement paste from leaking.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and other features for easy removal.

D. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.5 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork the anchorage devices and other embedded items required for work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screen strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.6 PREPARING FORM SURFACES

A. Coat contact surfaces of forms with an approved, non-residual, low-VOC form-coating compound before placing reinforcement.

3.7 CONCRETE PLACING

A. Equipment, methods of mixing and placing, and precautions to be observed as to weather, and condition of base shall meet the requirements of ACI 316R.

B. The Engineer shall be notified of scheduled concrete placement sufficiently in advance of start of operation to allow preliminary inspection of the work, including subgrade, forms, and reinforcing steel.

C. Work shall not be performed during rainy weather or when temperature is less than 40°F (4.4°C).

D. Adjacent work shall be protected from stain and damage. Damaged and stained areas shall be replaced or repaired to equal their original conditions.

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 which has set or partially set, before placing shall not be used. Retempering of concrete will not be permitted.

G. Concrete shall be thoroughly vibrated, or otherwise consolidated to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.

H. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar 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 the thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.8 FINISHING

A. Concrete surfaces shall be screeded and finished true to line and grade, and free of hollows and bumps. Surface shall be dense and smooth.

1. Finished concrete surface for concrete foundations for niche walls shall be floated to a smooth and uniform surface. Surfaces shall not deviate more than 1/8 inch in 10 feet.

2. Finished concrete surfaces for walkways and floor slabs shall be wood-floated and steel troweled, or broom finished, to a uniform surface. Surface shall not deviate more than 1/8 inch in 10 feet.

B. 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 surface, but before it has completely set, brooms shall be drawn across the surface 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 brooming operation.

C. Immediately following finishing operations, arises at edges and both sides of expansion joints shall be rounded to a 1/4-inch radius. Control joints to be tooled shall be scored into slab surface with scoring tool. Adjacent edges of control joint shall at same time be finished to a 1/4-inch radius.

D. Where finishing is performed before end of 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.

E. Sidewalk wheelchair ramps shall have a coarse broom finish perpendicular to the direction of travel.

3.9 CURING

A. Concrete shall be kept continuously damp from time of placement until end of specified curing period or cured by other methods. Water shall not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations, surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.

B. Concrete surfaces shall be cured by completely covering with curing paper or 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. Concrete cured with a curing compound shall have the compound 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.

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

3.10 EXPANSION JOINTS

A. Expansion joints shall be 1/2 inch wide and located where shown on the Drawings. Expansion joints shall be troweled in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab and full length of the expansion joint.

1. For concrete walks, pavements, and pads, depth of joint filler shall be placed to form a 1-1/4 inch deep recess for sealant and backer rod below finished concrete surface.

2. Use of multiple pieces to make up required depth and width of joint will not be permitted.

3.11 CONSTRUCTION JOINTS

A. Construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.

1. Butt joint with dowels or thickened edge joint shall be used if construction joints occur at control joint locations.

2. Keyed joints with tie bars shall be used if the joint occurs at any other location.

3.12 CONTROL JOINTS

A. Control joints shall be tooled into the concrete slab, with 3-inch-wide border and troweled edges, in pattern shown on the Drawings, or every 4 feet on center (o.c.) maximum. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workers without damage to the slab, but before slab has achieved its final set.

B. Scoring shall cut into slab surface at least 1 inch, but in no case not less than 25 percent of slab depth.

3.13 COLD WEATHER CONCRETING

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

B. Details of handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. Procedures shall be in accordance with provisions of ACI 306R.

3.14 HOT WEATHER CONCRETING

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with icy water. Every effort shall be made to minimize delays which will result in excessive mixing of the concrete after arrival on the site.

B. During periods of excessively hot weather (95°F., or above), ingredients in the concrete shall be cooled with cold mixing water to maintain the temperature of the concrete at permissible levels in accordance with the provisions of ACI 305. Any concrete with a temperature above 95°F., when ready for placement, will be rejected.

C. 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.

3.15 PROTECTION OF CONCRETE SURFACES

A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 03 30 00

SECTION 03 30 53

PRECAST CONCRETE LAWN CRYPTS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, and equipment to excavate, provide and install precast cement concrete lawn crypts (double depth) as detailed on the drawings.

B. The Contractor shall study the Site Plan for any underground utilities which might be a hazard or damaged by the work.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers 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. The manufacturer shall have been fabricating and supplying similar vaults for a minimum of five (5) years.

PART 2 MATERIALS

2.1 MATERIAL ASPECTS

A. Minimum concrete 5,000 psi. (All components including interim selves shall be concrete).

B. All chambers 26 high" by 30 wide" clear.

C. Interim shelf to have 6 x 6 #6 wwf with 4 3/8"stainless hooks welded to it.

D. Cover to have 6 x 6 #6 wwf with 2-1/2" rebar and 4-stainless hooks.

E. Crypts are to be installed w/ 1 1/2" maximum separation between crypt side walls.

F. All spaces between crypts shall be filled with clean compacted sand.

PART 3 EXECUTION

3.1 LAYOUT

A. The contractor shall use control points provided by BSC Group to establish key control points. Remaining lay out shall be by the Contractor.

3.2 INSTALLATION

A. Waste materials, including excavated material is specified in section 31 00 00 “Earthwork”.

B. The base of the crypts locations is to be covered with a uniform layer of crushed stone to facilitate a uniform installation of the crypts and to assure that they do not settle after installation.

C. All crypts are to be overseen by the contractor using suitable cranes with slings/cables and chains. Any damaged crypts are to be removed from the site. The contractor shall operate in a safe condition during all crypt moving activities.

D. A spacer board shall be placed between crypts during the installation to provide and installation crypts at 3'-0" on center and the void space filled with compacted dry sand for the full height of the crypt. Any settlement between the crypts shall be repaired by the contractor.

E. All crypts are to be covered with 18 inches minimum cover at final grade and shall be witnessed with a vertical piece of reinforcing steel prior to backfilling to aid in locations of the corners of rows of vaults after finished grade is achieved.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum additive Alternate #1 contract.

END OF SECTION 03 30 53

SECTION 03 35 34

STAMPED COLORED CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

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

B. Section Includes:

1. Integrally colored concrete pool area

2. Concrete stamping / imprinting.

3. Curing of integrally colored concrete.

C. Related Sections:

1. Section 03 30 00 – Site Cast in Place Concrete

1.2 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 301 "Specification for Structural Concrete for Buildings."

2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."

3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."

4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."

5. ACI 305R "Recommended Practice for Hot Weather Concreting."

6. ACI 306R "Recommended Practice for Cold Weather Concreting."

B. American Society for Testing and Materials (ASTM):

1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."

2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."

3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

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

1. AASHTO M194 "Chemical Admixtures."

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical data sheets for the following:

1. Colored admixture.

2. Curing compound.

3. Imprinting / texturing tools.

B. Design Mixes: For each type of integrally colored concrete.

C. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.

D. Provide photographs of similar installation.

E. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with 10-years' experience in the production of specified products.

B. Installer Qualifications: An installer with five years' experience with work of similar scope and quality.

C. Comply with the requirements of ACI 301.

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

E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

A. Integrally Colored Concrete Environmental Requirements:

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

2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.

3. Comply with professional practices described in ACI 305R and ACI 306R.

B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

1.7 PRE-JOB CONFERENCE

A. One week prior to placement of integrally colored concrete a meeting will be held to discuss the Project and application materials.

PART 2 PRODUCTS

2.1 MATERIALS

A. Colored Admixture for Integrally Colored Concrete

1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are lime proof and ultra-violet resistant.

2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.

B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.

C. Curing and Sealing Compound: Curing and sealing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.

D. SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:

1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.

2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects Landscape Architect can examine.

2.2 COLORS

A. Concrete Color

1. Cement: Owner shall approve Color.

2. Sand: Color shall be locally available natural sand approved by Owner.

3. Aggregate: Concrete producer's standard aggregate complying with these specifications.

4. Colored Admixture: As approved by Owner.

B. Curing Compound: Color to match integrally colored concrete.

2.3 CONCRETE MIX DESIGN

A. Portland cement concrete shall:

1. Have a maximum water cement ratio of 0.45 conforming to ACI 316R.

2. Be Air-entrained type conforming to ASTM C94. Air content by volume shall be 6 percent + 1 percent and shall be evaluated in accordance with ASTM C260.

3. Placed with a slump not less than 3 inches nor greater than 4 inches, determined in accordance with ASTM C143.

4. Use cement conforming to ASTM C150, Type I or II. Only one color of cement, all the same manufacturer, shall be used for the work.

5. Use fine and coarse aggregates conforming to ASTM C33.

6. Contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C494, Type A.

7. Contain 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 the Engineer in each case.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install concrete according to requirements of Section 03 30 00 "Site Cast-In-Place Concrete."

3.2 CURING

A. Cure concrete according to requirements of Section 03 30 00 "Site Cast-In-Place Concrete."

3.3 TOLERANCES

A. Minor variations in appearance of integrally colored concrete, which are like natural variations in color and appearance of uncolored concrete, are acceptable.

END OF SECTION 03 35 34

SECTION 05 50 00

METAL LOT CORNER MARKERS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, equipment, and materials to install lot corner markers as shown on the plans or specified herein. The engineer will provide surveyed control points in an AutoCAD file for the contractor's use in the installation of lot corner markers.

1.2 SUBMITTALS

A. Submit to the Owner's ENGINEER catalog cut of the proposed markers.

PART 2 PRODUCTS

2.1 LOT MARKER REQUIREMENTS

A. Lot corner markers shall be of cast aluminum with a 4" diameter cap with lot numbers cast into the cap with an 8-inch minimum steel spike shank as manufactured by Andover Marker (508 822-3127), Joseph Defontes (603-632-5780), Cemetery Funeral Supply (800-277-9878) Kernco (973 714 0572) or approved equal.

PART 3 EXECUTION

3.1 GENERAL

A. Lot corner markers shall be installed only once the lawn is established.

B. Verify the number of numbered lot corner markers and the number of blank lot corner markers required to be cast for each section prior to ordering.

C. Lot Corner markers shall be installed to an accuracy is 1 inch or half plus or minus 1 inch and located at the foot left corner of the lots.

D. The orientation of the markers shall be such that the lot numbers shall be set to read looking from the foot to the head of the grave.

E. Markers shall be set in the ground (commonly using a sledgehammer) such that the disk is flush with or no deeper than 1-inch below finish grade.

F. Blank lot corner markers shall be set as needed to completely delineate the limits of lots. I.E. Lot corners not marked by numbered lot corner markers.

G. It is recommended that the lot corner markers be laid out and remain temporarily set into the ground with the remining portion of the marker above grade to allow for verification of location, sequence, and orientation prior to being pounded flush with the ground surface.

H. The Engineer shell verify a lot of corner marker installation and prepare a plan for the Cemetery use indicating the markers as installed. Improperly located or orientated markers shall be removed and reset by the Contactor at no additional cost to the owner.

END OF SECTION 05 50 00

SECTION 10 75 00

FLAGPOLES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, and equipment to install fiberglass reinforced flagpoles as specified in Plans.

B. Flagpole features shall include hinged access panel and interior rope and pulley.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers 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.

PART 2 MATERIALS

2.1 PRODUCTS

A. Flagpoles shall be fiberglass reinforced plastic (FRP) ground set flagpole model # PLP 50 as manufactured by PLP Composite Technologies (or other approved equal).

B. Poles shall have an overall length as indicated in plans. The butt diameter shall be 10.0" and the top diameter shall be 4.0". The pole weight shall be 350 lbs. with a total shipping weight of 535 lbs.

C. The poles shall be manufactured of fiberglass woven roving and polyester resin with more than 75% of the reinforcing fiberglass in the vertical plane resulting in an axial tensile strength exceeding 40,000 psi. Model shall be designed and built to withstand winds of 120 m.p.h. unflagged.

D. The flagpoles shall have an ENTASIS taper and a smooth high-gloss surface of high build modified polyester. The color shall be white.

E. Poles shall be equipped with standard fittings for the following: gold anodized ball; cast aluminum cleat; polyester halyard; swivel snaps with vinyl covers; fiberglass flash cover; fiberglass ground sleeve; and double sheave fiberglass stationary truck.

F. Flagpole shall have hinged panel to access interior rope and pulley.

END OF SECTION 10 75 00

SECTION 12 14 20

GRANITE BENCHES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, and equipment to install granite benches as indicated in plans/drawings.

1.2 REFERENCES

A. None

1.3 SUBMITTALS

A. Shop drawings/cut sheet from Granite bench manufacturer.

PART 2 MATERIALS

2.1 PRODUCTS

A. Granite benches shall be constructed as shown on drawings. Color of granite shall be determined.

PART 3 EXECUTION

3.1 INSTALLATION

A. All workers shall be qualified craftsmen experienced in the installation of units specified. All exposed surfaces shall be free from defects when complete.

B. All materials shall be installed and managed in accordance with manufacturers written instructions and be level and plumb.

C. All construction shall be subject to the approval of the Engineer.

END OF SECTION 12 14 20

SECTION 12 14 19

OBELISKS & MONUMENTS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and the General Provisions of Contract, including General and Supplementary Conditions and Division 1 and 2 specification sections, apply to work of this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation and Fill (See Section 31 23 00)
B. Site Cast-in-Place Concrete (See section 03 30 10)

1.03 DESCRIPTION OF WORK/MATERIALS

Provide labor, materials, and equipment necessary to complete the final monument design and construction of obelisk monument including:

- Six (6) Carved monuments as outlined on the drawings.

A. Monuments shall be identical in material, shape, and size. This stone shall be Bethel White Granite.

B. Engravings to be determined shall be sand blasted sunken text set in frosted panels based in layouts approved by the Owner.

C. Size of sand blasted sunken text will be proportionally similar on all monuments and determined by the final design of the monuments. The sides and rear of the monuments shall be thermal treated, and the engraved panel face “steel” finished. The monuments are to be pinned to the concrete footing by stainless steel pins as designed by the monument supplier.

1.04 SUBMITTALS

A. Prior to preparation of final shop drawings, a detailed plan of the two monument and base shall be provided along with stone samples including color and finish and sample text lines for general approval.

B. Prior to carving any text or insignia’s, final scaled plans shall be provided for each monument for confirmation by the Owner.

1.05 QUALITY ASSURANCE

A. The monument supplier shall have a proven long-term history of providing quality monuments and shall have control of the quarry, carving, finishing, delivery, and installation of the monuments.

1.06 DELIVERY AND STORAGE

A. Contractor is responsible for transporting all materials and equipment necessary to complete the job. Protect monuments before and during installation using shipping crates or suitable alternative.

1.07 PROTECTION OF WORK

A. It is the responsibility of Contractor throughout the duration of the project until final acceptance. All work deemed unacceptable by the Owner or Owner's Representative will be removed and repaired at no cost to the Owner.

B. If monuments are installed after cremation niches and lawn crypts, the contractor shall provide adequate protection to ensure that the crypts are not damaged by cranes or delivery vehicles.

PART 2: EXECUTION

2.01 INSTALLATION

A. Installation shall result in a plumb, level, and uniform appearance of all monuments. Supplier identification tags may be set at the rear base of the monuments if desired by the supplier. No scratches/chips in the monuments shall occur during installation. Damages monuments shall be replaced.

B. The installation of the monuments shall be by the monument manufacturer who shall be responsible for all delivery, storage, and installation of the monuments. Monuments shall be installed by staff proficient in the installation and knowledge of such work and shall be approved by Owner and/or the Owner’s representative.

2.02 CLEAN UP

A. The Contractor shall be responsible for a total clean-up of project daily. The Owner and/or Owner's Representative shall insist on the site being clean at the end of each working day.

B. During setting, protect installed monuments from traffic by sawhorses and or warning tape and shipping cases. All monuments shall remain covered until dedication.

C. Final clean up shall consist of the Contractor removing all remaining equipment, material, debris, and any other object created during construction off site.

2.03 INSPECTION AND GUARANTEE

A. Contractor shall guarantee all work, including materials and workmanship, for a period of 1 year from the date of acceptance (as specified in writing by the Owner). The Contractor shall make any interim repairs as necessary to maintain the monument in level and plumb condition. The Contractor shall receive no additional compensation for maintenance and restoration under the guarantee.

B. Further the monument supplier shall provide a written perpetual warranty forever against defects in workmanship or quality. This shall include free replacement of any monument

proven defective in materials (cracking, fading discoloration) or workmanship at any future date.

END OF SECTION 12 14 19

SECTION 31-00 01

TEMPORARY CONTROLS

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for temporary erosion and sedimentation control provisions.

B. The work includes:

1. Providing all temporary erosion and sedimentation control measures shown on the Drawings and required by the Engineer during the life of the Contract to control soil erosion and water pollution.

2. The installation and maintenance of silt fence, berms, ditches, sedimentation basins, construction exits, fiber mats, catch basin filters, straw, netting, gravel, trenches, mulches, grasses, slope drains and other approved erosion control devices or methods.

3. Preparation of an EPA Stormwater NPDES permit and Stormwater Management Report under the 2012 Construction General Permit and monitoring/documenting of the site during construction.

1.2 RELATED SECTIONS

A. Sections which relate to the work of this Section include:

1. Section 02 10 00—Site Preparation
2. Section 31 23 19—Dewatering
3. Section 32 92 00—Turf and Grasses

1.3 LAWS AND REGULATIONS

A. The Contractor shall comply with the various laws and regulations including the Massachusetts Wetland Protection Act and EPA's NPDES requirements.

1.4 SUBMITTALS

A. Prior to the start of the construction, the Contractor shall submit to the Engineer for acceptance, schedules for temporary and permanent erosion and sediment control work, and grading. No work shall be started until the control schedules and methods of operations have been accepted by the Engineer.

B. Copy of EPA Notice of Intent and Stormwater Management Report.

C. Provide copies of inspection reports at completion of project.

1.5 REFERENCES

A. Massachusetts Highway Department (MHD), Standard Specification for Highways and Bridges, latest edition, hereinafter referred to as MHDSSHB.

PART 2 PRODUCTS

2.1 MATERIALS

A. Erosion Seed for quick growing grasses, such as wheat, rye, or oats, shall be in accordance with MHDSSHB Section M6.03.1 Erosion Seed.

B. Hay bales shall be individually banded with twine (nylon or other synthetic material is not acceptable) a minimum of two bands for bale, approximately two feet six inches (2'-6") in length.

C. Stakes for hay bales shall be standard one-half inch (1/2") reinforcing steel rods, steel pickets, two inches by two inches (2"x2") wood stakes or approved equivalent.

D. Silt fence fabric shall be 100X, as manufactured by Mirafi, or approved equal.

E. Catch Basin Filters shall be "Silt Sak" by Jennian, "Dandy Bag" by Dandy Products, "Drain Pac," or approved equivalent.

PART 3 EXECUTION

3.1 EROSION CONTROL-GENERAL

A. Erosion and sediment controls shall be in placed prior to any soil disturbing activities including, but not limited to, clearing and grubbing, earthwork, dewatering, and excavation work.

B. All disturbed soils shall be stabilized, either permanently or temporarily, within two (2) weeks of disturbance.

C. At a minimum, the following shall apply:

1. In cross country areas, brush and stumps shall not be removed until 1 week prior to the start of pipe laying in that area or as directed by the Engineer. The existing ground surface shall be disturbed as little as possible until no more than 1 week prior to the start of pipe laying.

2. Staked bales of hay shall be provided at points where drainage from the work site leaves the site, to reduce the sediment content of the water. Sufficient bales of hay shall be provided such that all flow will filter through the hay. Other methods which reduce the sediment content to an equal or greater degree may be used as approved by the Engineer.

3. Drainage leaving the site shall flow to water courses in such a manner as to prevent erosion.

4. Loaming and seeding or mulching of cross-country areas shall take place as soon after laying of the pipeline as practicable. This shall be considered part of the pipeline work, and full payment for the pipeline work need not be made until it has been completed.

D. Measures for control of erosion must be adequate to assure that turbidity in any receiving water will not be increased more than 10 standard turbidity units (s.t.u.), or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted.

E. In cross country areas when excavating in wetlands or river floodplain, where no temporary diversion structure is required, the excavated material shall be placed within the limits of the construction easement shown on the construction drawings.

F. When it becomes necessary, the Engineer will inform the Contractor of construction procedures and operations that jeopardize erosion control provisions. If these construction procedures and operations are not corrected promptly, the 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 the Contractor for additional compensation from the Owner nor for an extension of time to complete the Work.

G. The 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.

H. The 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.

I. 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.

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

K. The Contractor shall remove sediment from erosion control facilities as required, and as directed by the Engineer. The Contractor shall modify and improve erosion control facilities and replace deteriorated hay bales and other devices as required, and as directed by the Engineer.

L. Temporary and permanent erosion and sedimentation control measures are shown on the Drawings. The Contractor shall strictly adhere to the provisions. Additionally, temporary measures shall be constructed to accommodate field conditions that develop during construction.

M. Temporary sedimentation basins shall be employed as required during construction. Sedimentation shall be periodically removed from the basins and from behind erosion and sedimentation control devices. The Contractor shall direct all possible site runoff to the temporary sedimentation basins.

N. The temporary sedimentation basins shall be maintained from the start of construction until construction of the permanent detention basins is completed, and perimeter areas are stabilized. A temporary outlet shall be constructed above the expected sediment levels. Construction of the basins shall be sequenced so that the temporary outlet is installed, and basin embankment is constructed with the material available from the initial site excavations.

3.2 HAY BALES (IF REQUIRED)

A. Hay bales shall be installed at the following locations, as required by the Engineer, and as shown on the Drawings:

1. Toe of slope of embankment construction to filter all runoff flowing to off-site discharges.

2. Toe of temporary earthwork stockpile slopes.

3. Across construction ditch prior to entry into drainage system or waterway.

4. Each side of completed drainage inlets.

5. Other locations shown on the Contract Drawings or designated by the Engineer.

B. Tightly abut hay bales to form a continuous barrier. Secure bales in place with two stakes per bale. The bales shall be trenched 4 inches into the ground, unless noted otherwise by the local Conservation Commission. Soil shall be constructed on the upside slope side of the bales. Deteriorated, destroyed, or rotted bales shall be replaced immediately. Sediment shall be removed and disposed of periodically from behind the hay bales. The accumulated sediment shall not be allowed to rise above the mid height of the bale. All sediment, hay bales and appurtenances shall be removed and disposed of at the completion of the Contract, and as otherwise directed by the Engineer.

3.3 SILT FENCE

A. Silt fence shall be installed as shown on the Drawings.

B. Supporting posts shall be spaced 4 feet on center and driven at least two feet into the ground. Posts shall be 2-inch square or heavier wood posts, or standard steel posts.

C. Fabric shall be anchored in a 4-inch-deep trench dug on the upslope side of the posts. The trench shall be at least 6 inches wide. The fabric shall be laid in the trench, backfilled and compacted.

D. Fabric rolls shall be spliced at posts. The fabric shall be overlapped 6 inches, folded over and securely fastened to posts.

3.4 CATCH BASIN FILTERS

A. Catch Basin Filters shall be installed in catch basins likely to receive runoff from disturbed areas.

B. Catch Basin Filters shall be cleaned regularly and maintained until the area is stable.

3.5 MAINTENANCE AND CLEAN UP

A. The Contractor shall inspect erosion control devices immediately after each storm event and at least daily during prolonged rainfall and maintain them in good operating condition for the life of the contract. Hay bales shall be replaced when deteriorated, and as directed by the Engineer.

B. The Contractor shall inspect the condition of diversion dikes and ditches, filter berms, interceptor dikes, sediment basins and other erosion and sedimentation control devices after each rainstorm and during major storm events. Repairs shall be made as necessary and as directed by the Engineer.

C. Accumulated sediment trapped by erosion and sedimentation control devices shall be removed as required, and as directed by the Engineer.

D. During construction, temporary outlets of the drainage systems shall direct the flow to temporary or permanent sedimentation basins.

E. Temporary soil erosion and sedimentation control devices shall be removed and adjacent areas outside the limits of grading restored upon completion of the work or when directed by the Engineer. Upon removal of the temporary controls, the site shall be restored to original condition.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 31-00 01

SECTION 31 00 02

SITE WATERING AND DUST CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. This section of the Specifications covers the control of dust at the work site.

B. Dust control shall be the responsibility of the Contractor and dust control operations shall meet the requirements of the Commonwealth of Massachusetts Department of Environmental Protection 310 CMR 7.09: Air Pollution Control Regulations. Water and/or calcium chloride are acceptable for controlling dust.

1.2 RELATED WORK

A. The following Sections contain work related to this Section:

1. Section 02 24 00 Environmental Assessment

2. Section 31 00 00 Earthwork

3. Section 31 00 01 Temporary Controls

PART 2 MATERIALS

2.1 MISCELLANEOUS

A. Acceptable materials and equipment for dust control use shall consist of the following or equivalent thereof:

1. Twenty (20) mil thick PVC coverings.

2. Potable water.

3. Motorized street sweeper.

2.2 CALCIUM CHLORIDE

A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

B. Calcium chloride failing to meet the requirements of the specifications, or which has become caked or sticky in shipment may be rejected by the Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Always maintain dust control throughout the construction period. Control measures will be required in all areas as well as for stockpiles, temporary traffic ways, and all other areas where dust may develop.

B. Leave existing pavement or ground covering in place until the last possible moment prior to earth excavation for purposes of dust control.

C. Provide positive methods and apply dust control materials to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from dispersing into the atmosphere. These provisions do not supersede any specific requirements for methods of construction or applicable Conditions of the Contract regarding performance obligations of the General Contractor.

D. Dust control procedures shall be monitored by the Clerk of the Works (or person of similar position in responsible charge of the construction site) and shall be subject to on-site review by authorities having jurisdiction, including the Engineer.

E. Earthwork may be halted as deemed necessary should dust control procedures prove inadequate.

F. Stockpiles

1. Cover stockpiles in their entirety at the end of each day with a PVC, polypropylene or mylar covering. Securely anchor covering to prevent its removal and tearing during heavy winds. Maintain coverings and replace as necessary to assure constant covering and protection of all stockpiled materials.

G. Construction Vehicles

1. Clean all soil and debris from wheels of all construction vehicles and cover earth loads prior to leaving the construction site. The Contractor shall use the construction entrance/exit shown on the plans.

H. Ramps and Public Streets

1. All temporary ramps and streets shall be swept daily or as required to prevent dust being a public nuisance.

PART 4 CALCIUM CHLORIDE

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas that will not be adversely affected by the application. See Section 02 24 00, ENVIRONMENTAL ASSESSMENT.

B. Calcium chloride shall be uniformly applied at the rate of 1 1/2 pounds per square yard or at any other rate as directed by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The Engineer shall determine the number and frequency of applications.

END OF SECTION 31 00 02

SECTION 01 74 00

SITE CLEANUP AND WASTE MANAGEMENT

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Execute cleaning during progress of the work and at completion of the work.

B. Furnish all labor, materials, equipment, and incidentals necessary to complete the work under this Section that includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved.

C. When applicable, the Contractor will perform the work in accordance with other sections of this Specification. When no applicable Specification exists, the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.

1.2 DISPOSAL REQUIREMENTS

A. A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

A. NOT USED

PART 3 EXECUTION

3.1 DURING CONSTRUCTION

A. Execute daily cleaning to keep the work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations.

B. Provide onsite containers for the collection of waste materials, debris, and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in onsite containers.

C. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.2 FINAL CLEANING

A. Requirements: At the completion of work and immediately prior to final inspection, clean the entire project as follows:

1. Thoroughly clean, sweep, wash, and polish all work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the ENGINEER.

2. Direct all subcontractors to similarly perform, at the same time, an equivalent thorough cleaning of all work and equipment provided under their contracts.

3. Remove all temporary structures and all debris, including dirt, sand, gravel, rubbish, and waste material.

4. Should the CONTRACTOR not remove rubbish or debris or not clean the buildings and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.

B. Employ experienced workers, or professional cleaners, for final cleaning.

C. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.

F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.

G. Replace air-handling filters if units were operated during construction.

H. Clean ducts, blowers, and coils if air-handling units were operated without filters during construction.

I. Vacuum clean all interior spaces, including inside cabinets.

J. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

K. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

L. Clean interior of all panel cabinets, pull boxes, and other equipment enclosures.

M. Wash and wipe clean all lighting fixtures, lamps, and other electrical equipment which may have become soiled during installation.

N. Perform touch-up painting.

O. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

P. Remove erection plant, tools, temporary structures, and other materials.

Q. Remove and dispose of all water, dirt, rubbish, or any other foreign substances.

3.3 FINAL INSPECTION

A. After cleaning is complete the final inspection may be scheduled. The inspection will be done with the OWNER and ENGINEER.

END OF SECTION 01 74 00

SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the work specified in this section, and as shown on the Drawings.

B. This task includes the excavation and filling required to develop burial areas and driveways, install the concrete foundations, concrete walks, and concrete slabs. The work of this section includes but is not necessarily limited to:

1. Excavation, fill, and backfill, including compaction as indicated or required for the creation of niche foundations and to the lines and grades indicated on the Drawings.

2. Provision of earthen fill from an approved offsite source. No soil from off-site shall permitted to be brought on site without analysis for contamination for conformance with the Massachusetts Contingency Plan with soils meeting the Reportable Concentrations RC-S1 standards.

3. Processing / screening of earth from on site or offsite to it to remove all stones over 4 inches in diameter prior to placement in grave areas. (Non-grave areas may use common fill).

4. Excavation and disposal of unsuitable or excess materials on-site as directed by the owner. Excavation shall include removal and satisfactory disposal of all unclassified material encountered throughout the site.

5. Rough grading, including placement, moisture conditioning and compaction of fills and backfills.

6. Placement of base and subbase course materials under structures, slabs, and footings, including compaction.

7. The removal, hauling and stockpiling of suitable excavated materials for subsequent use in the work. Stockpiling shall include protection to maintain materials in a workable condition.

8. Rehandling, hauling, and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and such other operations.

9. Dust control shall be completed by the spraying of water as required and shall be the responsibility of the Contractor and dust control operations shall meet the requirements of the Commonwealth of Massachusetts Department of Environmental Protection 310 CMR 7.09: Air Pollution Control Regulations

10. Protection of existing memorials, pavements, and utilities to remain.

11. Furnishing and installing all sheeting, shoring, and bracing of structural and trench excavations.

12. Providing products in sufficient quantities to meet the project requirements.

13. Obtaining all required permits, licenses, and approvals of appropriate municipal and utility authorities, prior to commencing the work of this Section, and pay costs incurred therefrom.

C. Contractor shall be responsible for notifying all owners of affected utilities and for contacting Dig Safe at least 72 hours prior to excavation.

1.2 DEFINITIONS

A. Unacceptable material is soil material that does contain organic silt, peat, vegetation, wood or roots, stones, or rock fragments over 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. Percentage of rock shall be determined by the Contractor's independent testing laboratory. (Laboratory shall be approved by the Owner).

B. Surplus material is excavated acceptable material that cannot be utilized elsewhere on the site as backfill or embankment fill, or as otherwise directed by the Engineer.

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, foundations, pavements, curbs, piping, railroad track and ties, cobblestones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.

B. Rock Excavation: Rock is defined for payment purposes as stone or hard shale in original ledge, boulders over two cubic yards ($2yd^3$) in volume in open areas and one cubic yard ($1yd^3$) in volume in trenches, and masonry or concrete that cannot be broken or removed by normal job equipment (power shovels, scoops, or D-8 bulldozers with ripper attachment) without the use of explosives or drills. The classification does not include materials that can be removed by means other than drilling and blasting or drilling and wedging but which, for reasons of economy in excavating, the Contractor prefers to remove by drilling and blasting. The word "trenches" shall mean excavation having vertical sides the depths of which exceed the width, made for drain, sewer, water, and gas pipes; electric and steam conduits; and the like.

C. HAZARDOUS WASTE

1. The Contractor shall be familiar with the State Department of Environmental Protection (DEP) Hazardous Waste Regulations 310 CMR 30.00 and the Massachusetts Contingency Plan (MCP) 310 CMP 40.00 when conducting earthwork operations.

2. In general, a hazardous waste (contaminated with oil or hazardous materials) is a waste or combination of wastes which, because of its quantity, concentration or physical, chemical or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or 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 stored, treated, transported, or disposed of, or otherwise managed. (Additional criteria and characteristics to determine if a waste is hazardous are contained in 310 CMR 30.111, 30.112 and 30.120 through 30.125).

1.4 LAWS AND REGULATIONS

A. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

1.5 QUALITY ASSURANCE

A. The Engineers presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineers, nor any observations and testing performed by him, nor any notice of failure to give notice shall excuse the Contractor from defects discovered in his work.

B. Costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to Owner.

1.6 SUBMITTALS

A. The Engineer will be responsible for the approval or rejection of the suitability of all materials.

B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the Owner or Engineer.

C. For use of fabrics or geogrids, submit manufacturer's literature for approval by the Engineer.

1.7 COORDINATION

A. Prior to start of earthwork the Contractor shall arrange an on-site meeting with the Engineer and Cemetery Foreman for the purpose of establishing the Contractor's schedule of operations and cemetery requirements (i.e., funerals).

B. As construction proceeds, the Contractor shall be responsible for notifying the Engineer prior to the start of earthwork operations requiring observation and/or testing.

1.8 SUBSURFACE SOIL DATA

A. It is the Contractor's responsibility to make interpretations and to draw conclusions based on the character of materials to be encountered and the impact of his work based on his expert knowledge of the area and of earthwork techniques.

B. The Drawings showing existing ground elevations are only for whatever use the Site Work Contractor may make of them with no responsibility on the part of the Surveyors, the Owner, or their Representatives for the accuracy and/or the reliability of the information given.

1.9 TOLERANCES

A. Construct finished non-paved surfaces to plus or minus 1 inch of the elevations indicated. Complete embankment slopes to plus or minus six inches of the slope line (toe or tip) shown. Maintain the moisture content of fill materials as it is being placed within plus or minus two percent of the optimum moisture content of the material as determined by the laboratory tests herein specified.

1.10 APPROVALS

A. No earthwork materials will be accepted on the jobsite without written approval from the Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Common Fill/Ordinary Borrow shall conform to MHDSSHB Specification Section M1.01.0.

B. Gravel Borrow shall conform to MHDSSHB Specification Section M1.03.0, Type b.

C. Topsoil shall conform to MHDSSHB Specification Section M1.07.0.

D. Loam Borrow shall conform to MHDSSHB Specification Section M1.05.0.

E. Dumped Rip Rap shall conform to MHDSSHB Specification Section M 2.02 2.

F. Filter Fabric shall conform to MHDSSHB Specification Section M 9. 50.0 Type II.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Contractor shall control the grading so that ground is pitched to prevent water from running to excavated areas, eroding slopes, damaging other structures, or adjacent properties.

B. Perform dewatering operations in accordance with Section 02401 to maintain excavated subgrades in a dry condition.

C. Control dust during the course of the contract.

D. Construction Traffic. Disperse travel paths of traffic and construction equipment over entire width of compacted surfaces to aid in obtaining uniform compaction. Protect exposed soil layers with high moisture content from excessive wheel loads.

E. Use of Materials Found of Site

1. Suitable excavated materials shall be used for embankment, backfill, or any other purpose as directed, and the material shall be placed and compacted in a manner conforming to the specifications for the work required at no additional cost to the Owner.

2. Suitable material that cannot be readily placed shall be stockpiled at the jobsite in an area designated by the Engineer and used in the manner and purpose described above. All work necessary to stockpile and re-handle suitable material will be at no additional cost to the Owner and will be included in the Contract price for the excavation it was obtained from. If the Contractor desires to store suitable material off the jobsite, or remove suitable material from the jobsite, written permission shall be obtained from the Engineer.

3. All unsuitable material and suitable material not required for the proper completion of the Contract will be loaded and hauled and disposed of offsite by the Contractor.

4. Do not excavate or remove any material from within the site, which is not within the excavation, as indicated, without written authorization from the Engineer.

F. Salvaging Topsoil. Salvage topsoil within the neat lines as indicated, or as otherwise designated by the Engineer, and stockpile at the jobsite at locations approved by the Engineer. Prevent topsoil from contamination by other materials and provide adequate drainage and erosion protection. Clear, grub, and rough-grade storage areas so that the maximum amount of stockpiled material will be available for reuse.

G. Stockpiling of Excavated Material. Establish excavated material stockpiles on site only in locations where they will not interfere with the progress of the work and only as approved by the Engineer. Offsite stockpiling and re-handling, if required, shall be the responsibility of the Contractor, at no additional expense to the Owner. Such offsite stockpiling shall require written permission from the Engineer.

H. Disposal of Surplus and Unsuitable Material. Haul from site and dispose of excavated materials which are excess or are determined to be unsuitable for embankment and backfill, at no additional expense to the Owner.

I. Unfavorable Weather. Do not place, spread, roll, or compact fill material that is frozen or thawing, or during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.

J. Maintenance of Excavation, Slopes and Embankments.

1. Excavate and remove material outside the limits of excavation which in the opinion of the Engineer, is unsuitable and constitutes potential slides, and material which comes into excavations for any reason including the driving of piles therein.

2. Maintain slopes and embankments until final completion and acceptance of the work. Promptly repair slides, slip outs, washouts, settlements, and subsidence which occur for any reason, and refinish the slope or embankment to the original lines and grades or as required by the Engineer.

3. 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 Interpretation, Subpart P – Trenches and Shoring, and to all other applicable codes, rules, and regulations of the federal, state, and local authorities.

3.2 OBSTRUCTIONS NOT INDICATED AND NOT VISIBLE

A. All available information was used to establish the location of pipes, drains, structures, and utilities, as shown on the Drawings. However, accuracy and completeness of such drawings cannot be guaranteed. Therefore, if the Contractor encounters such items within the indicated limits of excavation which will be damaged if work is to continue or which will cause delays, notify the Engineer immediately so the obstruction can be addressed and documented for payment, as authorized by the Owner.

3.3 TEST PITS

A. The contractor may excavate test pits as he/she feels warranted.

3.4 GENERAL EXCAVATION REQUIREMENTS

A. Excavate to the lines and grades indicated. Exercise care to preserve the material below and beyond the lines of excavation. Where excavation is conducted, through error, below indicated grade or beyond the lines of excavation, backfill to the indicated grade and compact with approved fill at no additional cost to the Owner, and at the direction of the Engineer.

B. Limits of the excavation shall allow for adequate working space for installing forms and as required for safety of personnel. Cut excavations in solid rock accurately to the neat lines indicated, or, if not indicated, to the width of the trench.

C. Excavation for the convenience of the Contractor shall conform to the limits acceptable to the Engineer and shall be at no additional cost to the Owner. Contractor shall not over excavate below proposed design grades for the purpose of obtaining borrow for use off-site.

D. When any excavation is extended beyond the limits indicated, backfill, and compact the additional excavated area with material indicated to be under the pipe, conduit, or structure which was being excavated for, at no additional cost to the Owner.

E. Limit the length of trench open at any one time as to eliminate interference with traffic and the operations of others and to reduce conditions dangerous to personnel, equipment, and existing site improvements, all according to site conditions. Attention is drawn to the General Conditions requiring permits, in particular the Trench Permit shall be obtained, if required.

F. Excavate by use of hand tools when within 2 feet of existing pipes, conduits, or other structures.

G. Remove topsoil with minimal cut into subsurface from areas to be excavated. Stockpile for reuse elsewhere on-site, as necessary. Maintain stockpiles to prevent migration of fines into adjacent drainage channels or waterways.

3.5 SUBGRADE PREPARATION AND PROTECTIONS

A. General Requirements

1. All subgrade areas shall be made ready for fill by removal of all organic material, topsoil, loose fill, unsuitable soils, and deleterious materials, as directed by the Engineer.

3.6 PLACEMENT AND COMPACTION OF MATERIALS

A. General Requirements

1. The soils testing laboratory will determine the optimum moisture content to achieve the maximum dry density for all soils specified or indicated to be compacted to a percentage of its maximum dry density.

2. Unless other material is indicated or specified, place excavated acceptable material for backfilling trenches and around structures and filling for embankments. The composition of these materials and tests performed to determine moisture-density relationships will govern both their acceptability for backfill and method best suited for their placement and compaction. If sufficient excavated acceptable material is not available from the excavations, provide backfill material of ordinary borrow, or as otherwise directed by the Engineer.

3. Provide adequate pumping and drainage facilities to keep the excavation area dry from groundwater and/or surface runoff so that it does not adversely affect construction procedures or cause excessive disturbance of underlying natural ground. Refer to Section 31 23 19.

4. Compaction by puddling or jetting is prohibited.

5. Protect fill area by grading to drain and providing a smooth surface, which will readily shed water. Grade the surface of the areas in such a manner as to prevent ponding of surface runoff water in areas to receive compacted fill. Refer to Section 31 23 19.

6. Do not place frozen fill. Do not place fill on frozen ground.

7. Placement of fill shall not begin prior to observation and approval of subgrade conditions by Engineer.

8. To the extent that is practicable, each layer of fill shall be compacted to the specified density the same day it is placed. Fill shall be placed in horizontal layers. Where the horizontal layer meets a natural rising slope, the layer shall be keyed into the slope by cutting a bench during spreading of preceding lift.

9. Prior to backfilling between foundation wall and excavation limits, remove unsuitable material, including rubbish, organic materials, or other debris.

10. Do not commence filling operations until Engineer and/or Architect have observed conditions.

11. Protect foundations, footings, foundation waterproofing, and site utilities during backfilling. Repair damage at no cost to Owner.

12. Backfill shall not be placed against masonry, concrete or walls until they are braced or have cured sufficiently to develop strength necessary to withstand, without damage, pressure from backfilling and compacting operations.

13. Provide shoring, sheeting, and/or bracing of excavations as required to assure complete safety against collapse of the earth at the side of excavations. Alternatively, lay back excavations to a stable slope.

14. Upon completion of the work, the final ground surface shall be left in a firm, unyielding, true, uniform condition, free from ruts. Repair disturbed areas caused by equipment traffic at no cost to Owner.

B. Equipment

1. Compaction equipment used in open areas where space permits shall consist of vibratory rollers weighing at least 10,000 pounds.

2. Compaction equipment for fill against foundation walls and in other confined areas shall be accomplished by means of drum-type, power-driven, or by hand-guided vibratory plate compactors.

C. Compaction

1. Compaction Requirements

a. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

AREA	Min. Deg. of Compaction
Pavement base and subbase courses	95%
Subbase for foundations and piers	95%
General fill below pavement subbase	90%
Trench backfill (outside building):	
-Below pipe to spring line	95%
-Spring line to 1 ft. above pipe	90%
- 1 ft. above pipe to pavement subbase or finish grade	93%
Landscape Areas	90%

*Compactions percentages are based on the laboratory derived Maximum Density values.

2. Moisture Control

   a. Discontinue backfilling and compaction from November to April (wet season) unless the Contractor demonstrates successful moisture and compaction control techniques to achieve the indicated or specified density requirements.

   b. Fill material that is too wet for proper compaction shall be harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill at his expense.

   c. Fill material that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be applied until the optimum moisture content is reached, as determined by the soil testing laboratory, as specified in paragraph 3.05.A.1.

   d. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

   e. The Contractor shall continue to compact until the indicated or specified density requirements are achieved.

3. Placement and Lift Thickness of Material

a. Distribute material such that stones and lumps do not become nested, causing voids between stones. Distribute such that voids are filled with fine materials regardless of compaction method.

b. Deposit and spread material in uniform parallel layers not to exceed 12 inches (12") in thickness when utilizing heavy compaction equipment, and 6 inches (6") when utilizing light hand-operated compaction equipment.

D. Trench backfill and compaction:

1. Begin backfilling and proceed until completed after the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections required under their applicable specification sections, and concrete or masonry within the trench have reached their design strength to support all loads.

2. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.

3. Compact material around circumference of pipe by hand tamping 6-inch layers of indicated material in the area between the trench wall and the pipe to meet density requirements stated herein.

4. Compact material above the pipe by tamping or mechanical means if trench width is wide enough to accommodate the compaction equipment and if the load from the equipment does not damage the pipe.

E. Fill and Backfill Under and Around Structures:

1. Use gravel borrow, crushed stone, or fine aggregate for fill and backfill material under structures. Place and compact material in 6-inch lifts to the specified degree of compaction as specified herein.

2. Use excavated acceptable material to backfill around structures, except as otherwise indicated on the Drawings or specified herein. Backfill around retaining walls shall be crushed stone or gravel, as indicated on the Drawings.

3. Do not place backfill against or on concrete structures until they have attained the strength capable of withstanding the loading to which they will be subjected.

4. Place material evenly around structures to maintain equal soil pressure on all sides of the structure.

3.7 OBSERVATION AND TESTING

A. The Owner may perform on-site observation and testing during the earthwork phase of the construction operations.

3.8 DISPOSAL OF SURPLUS, UNACCEPTABLE OR HAZARDOUS MATERIAL

A. No excavated material shall be removed from the site or disposed of by the Contractor unless approved by the Engineer.

B. Surplus excavated acceptable materials shall be loaded and hauled to the surplus soil area within the cemetery.

C. Disposal of all unacceptable, surplus, and hazardous materials shall be in accordance with all applicable local, state, and federal regulations.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 31 00 00

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Cutting of trees and other vegetation

2. Removal of roots and related growth.

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

C. Code of Federal Regulations (CFR)

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

1.3 DEFINITIONS

A. 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.

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

C. 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.

1.4 SAFETY REQUIREMENTS

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

B. Contractor shall provide and maintain barricades, warning signs, 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. Provide warning signs and other temporary construction safety devices necessary for proper completion of the work in compliance with applicable safety regulations.

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are trained, experienced, and as required licensed, 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.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Secure the work area and take precautions for preventing injuries to persons or damage to property in or about the work. Protect structures, utilities, sidewalks, pavements and other facilities or sensitive areas from damage by clearing and grubbing operations.

B. Establish all required erosion and sedimentation controls prior to initiating work.

3.2 CLEARING AND GRUBBING

A. Clear, grub, remove, and dispose of all vegetation and debris within the limits of construction, as designated on the plans or as required by Engineer. Contractor shall remove only those trees and shrubs necessary to allow for the construction. The work shall also include the preservation and protection of all vegetation designated to remain.

B. A preconstruction meeting shall be held with Engineer, Owner, local authorities, property owner(s) and other appropriate personnel, if required, prior to any clearing.

C. The area within the limits of construction or as designated shall be cleared and grubbed of all trees, stumps, roots, brush, undergrowth, hedges, heavy growth of grasses or weeds, debris, and rubbish of any nature which, in the opinion of Engineer, is unsuitable for foundation material. Nonperishable items that will be a minimum of five (5) feet below the finish elevation of the earthwork or slope of the embankment may be left in place.

D. Contractor shall provide barricades, fences, coverings, or other types of protection necessary to prevent damage to existing improvements, not indicated to be removed, and improvements on adjoining property. All improvements damaged by this work shall be restored to their original condition or to a condition acceptable to the owner or other parties or authorities having jurisdiction.

E. Protection of Trees and Vegetation: Contractor shall protect existing trees and other vegetation indicated on the Drawings to remain in place against cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or

excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary fences or barricades as required to protect trees and vegetation to be left standing at no additional cost.

F. Trees and shrubs that are to remain within the construction limits will be indicated on the Drawings or conspicuously marked on the Project Site. Unless otherwise noted, trees within the construction limits shall become the property of the Contractor and shall be removed from the site.

G. Carefully and cleanly cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of utilities or other subsurface improvements. Contractor shall provide protection for roots and branches over 1 ½ inches diameter that are cut during construction operations. Temporarily cover all exposed roots with wet burlap to prevent roots from drying out. Provide earth cover as soon as possible.

H. Damaged trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified tree surgeon.

I. Trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified arborist.

J. All brush, treetops, stumps, and debris shall be hauled away and disposed of in accordance with all applicable laws and regulations. Contactor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes his property and is not to be reused in construction. Sale of material on the site is prohibited. Debris from the site shall be removed in such a manner as to prevent spillage. Keep pavement and area adjacent to site clean and free from mud, dirt, dust, and debris always.

K. The method of stripping, clearing, and grubbing the site shall be at the discretion of the Contractor. However, all stumps, roots and other debris protruding through the ground surface or in excavated areas shall be completely removed to a minimum depth of 18 inches below surface and/or subgrade whichever is lower and disposed of off the site by the Contractor, at his expense.

L. Marginal Areas: In marginal areas, with Engineer's permission, remove trees where the following conditions exist.

1. Root Cutting: When clearing up to the "clearing limits," the Contractor shall also remove any tree which is deemed marginal such that when the roots are cut, and the tree could be rendered unstable by the effects of high winds and in danger of toppling into either the right-of-way or onto private property.

2. Slender Bending Trees: Where young, tall, thin trees are left unsupported by the clearing operation, and are likely to bend over into the right-of-way, Contractor, during the clearing operation, shall selectively remove those trees which are located outside and adjacent to the clearing limits and any right-of-way or easement as well. During construction and during the one-year warranty period, the Contractor shall remove such young trees that overhang into the right-of-way or cleared area.

M. Stripping of Topsoil: Remove the existing topsoil to a depth of 6 inches or to the depth encountered from all areas in which excavation will occur. The topsoil shall be stored in stockpiles, separate from the excavated material, if the topsoil is to be respread. Otherwise, material shall be disposed of off-site at Contractor's expense.

3.3 DISPOSAL

A. Contactor shall consolidate and clean-up debris resulting from clearing and grubbing operations continuously with the progress of the work.

B. All brush, treetops, stumps, and debris resulting from clearing and grubbing operations shall be hauled away and disposed of in accordance with all applicable laws and regulations. Any materials salvaged by Contractor from clearing and grubbing operations shall be promptly removed from the Project Site.

C. Contractor will be responsible for obtaining all applicable permits and paying all fees for the disposal of excess material.

D. Sale of material on the Project Site is prohibited.

E. Burning of material is prohibited.

END OF SECTION 31 11 00

SECTION 31 22 19

FINISH GRADING

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section of the Specifications and related drawings describes requirements pertaining to finish grading and temporary grassing work.

B. Related work specified elsewhere:

1. Section 31 00 00 – Earthwork

2. Section 32 91 13 – Soil Preparation

3. Section 32 92 00 – Turf and Grasses

4. Section 32 90 00 – Planting

1.2 STANDARDS

A. Grass seed shall conform to tolerances for germination and purity in accordance with applicable standards of U.S. Department of Agriculture.

B. Availability of various elements contained in all fertilizers shall conform to standards of the Association of Official Agricultural Chemists.

C. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103, USA as Published in “Compilation of ASTM Standards in Building Codes”.

1.3 SUBMITTALS TO CIVIL ENGINEER

A. Product Data: Manufacturer's current catalog cuts and specifications of the following:

1. Fertilizer

2. Mulch

3. Grass seed mix

PART 2 PRODUCTS

2.1 TOPSOIL

A. Topsoil shall comply to requirements in Section 32 91 13 Soil Preparation.

B. All topsoil necessary to complete the work shall be obtained from topsoil stockpiles from grading and excavating operations and from approved topsoil sources on the site. In the event additional topsoil is required, it shall be obtained from approved sources off the site. Topsoil shall be natural, friable, topsoil characteristic of representative soils in the vicinity that produce

heavy growths of crops, grass, or other vegetation. Topsoil shall be free from tree roots, stones, and other materials that hinder grading, planting, and maintenance operations, and free from noxious and other objectionable weed seeds and toxic substances.

C. Topsoil borrows areas used on the site shall be neatly trimmed, drained, and grassed after borrowing excavations are completed.

D. At Contractor's expense, topsoil shall be analyzed by a reputable laboratory with reference to grass species specified and the report shall contain fertilization and soil amendment recommendations. Furnish laboratory reports to the Architect of Record. The Architect of Record will accept or reject the topsoil based on the laboratory report prior to use.

2.2 TEMPORARY GRASS SEED

A. Temporary grass seed shall be composed of domestic annual ryegrass, which shall evaluate to minimum percentages, purity and germination specified.

Germination Minimum	Purity Minimum
90%	95%

2.3 FERTILIZER

A. Provide a commercial grade fertilizer manufactured in accordance with the recommendations of the State Agricultural Board.

B. Fertilizer shall be a grade containing the appropriate plant food elements as determined by the soil test.

C. Deliver the acceptable fertilizer in standard size bags, showing weight, analysis, and manufacturer's name. Store in weatherproof storage place in such manner that its effectiveness will not be impaired.

2.4 GROUND LIMESTONE

A. Ground limestone (calcium carbonate) shall have the following analysis: at least 95 percent to pass 20 mesh sieves; at least 55 percent to pass 60 mesh sieves; and at least 40 percent to pass 100 mesh sieves.

B. Total carbonates shall be not less than 80 percent of 44.8 percent calcium oxide equivalent; for purpose of calculation total carbonates are considered as calcium carbonate.

2.5 HYDRO MULCH FOR TEMPORARY EROSION CONTROL

A. Hydro mulch shall be used for all temporary erosion control.

B. Hydro mulch shall be composed of wood cellulose fiber and contain no germination- or growth inhibiting factors. It shall be colored green to allow visual metering in its application and have the property of being evenly dispersed and suspended when agitated in water.

PART 3 EXECUTION

3.1 DEPOSITING, SPREADING AND PREPARATION OF TOPSOIL AREAS

A. Do not start work until after construction work on structures, walks, curbs, walls, and paved areas has been substantially completed, and rough grading has been completed, inspected, and accepted. The grassing work shall be accomplished only when satisfactory results can be expected. When conditions such as drought, excessive moisture, high winds, or other factors prevail to such an extent that satisfactory results are not likely to be obtained the work shall be stopped. The work shall be resumed only when the desired results are likely to be obtained. All grassing operations shall be conducted across the slope.

B. Prior to spreading topsoil, the subgrade shall be pulverized to a minimum depth of two inches with equipment capable of obtaining proper pulverization of the soil. The prepared subgrade condition shall be reviewed and approved by Landscape Architect prior to topsoil spreading.

C. Topsoil shall be uniformly distributed and evenly spread to a minimum thickness of 6 inches. Topsoil shall be spread so that planting can proceed with little additional soil preparation or tillage.

D. Any finished grade that is not free from lumps and foreign material as described in Paragraph 2.1 will not be acceptable.

E. After placement, finish grade topsoil to levels, grades and contours as shown. Maintain surfaces to indicated finished grades. Deposit whatever additional topsoil may be required to take care of any settlement or erosion up to date of final acceptance. Rake surfaces upon which additional topsoil is to be deposited or otherwise prepare to insure proper bond.

F. The General Contractor is responsible for final grades on the site.

G. Till to provide a good seed bed. Hand tools such as a lawn rake, grading rake, steel tine speed rake, potato hook or spiker aerator or mechanical equipment such as a verticutter, disc harrow, scarifier rake, tine harrow, etc., shall be used during cultivation operations.

H. These tools and equipment plus any other that the Contractor desires to use shall be employed during spreading of smooth draining grades and a fine graded surface upon which to receive seed.

3.2 AREAS OF GRASSING

A. All areas disturbed by construction and grading operations shall be hydroseeded with temporary lawn grasses.

3.3 SLOPE AND DITCH TREATMENT

A. The following seed mix shall be installed on slope more than one vertical to three horizontals: New England Erosion Control /Restoration Mix for Dry Sites as manufactured by New England Wetland Plants, Inc, 800 Main Street, Amherst, MA, 413-256-1752 or approved equal. The seed mix shall include Creeping Red Fescue, Annual Ryegrass, Timothy, White Clover, Little Bluestem, Red Top and Side-oats Gramma-grass.

B. Apply at rate of 35 pounds per acre or as recommended by seed mix manufacturer.

3.4 LIMESTONE APPLICATION

A. Apply ground limestone (at a rate as determined by the soil test) and thoroughly incorporate into the top 4 inches of soil.

3.5 FERTILIZER APPLICATION

A. Apply fertilizer at a rate as determined by the soil test.

B. Rework soil to remove all foreign matter and lumps as specified in preparation of topsoil areas.

3.6 HYDROSEEDING

A. Hydroseed shall be applied with hydraulic equipment at the rate of 1,000 pounds to 1,500 pounds of hydro mulch per acre. Hydro mulch shall be added to the water slurry in the hydraulic seeder after the proportionate quantities of seed, fertilizer and other accepted materials have been added.

B. The slurry shall be sprayed uniformly on the surface of the soil.

3.7 TEMPORARY LAWNS

A. Annual Ryegrass (Lolium Multiflorum) at 250 lb./acre shall be added to water slurry.

B. The temporary lawns shall be maintained by the Contractor until the preparation for permanent lawn is started.

3.8 SMOOTHING ALL LAWNS

A. If the lawn surface has become bumpy and uneven during planting or because of washing during a heavy rain, begin smoothing operations at the time of first mowing. Apply topsoil to low spots in the lawn in light applications (up to 1/2 inch deep) to produce a smooth surface.

3.9 MAINTENANCE

A. Provide maintenance from start of work until Grand Opening. Maintenance includes watering of lawns, re-fertilization, weeding, mowing, cleaning up and edging, repairs of all washouts and gullies, repairs or protection, and other necessary work of maintenance. Maintain slopes against erosion.

3.10 EROSION

A. Contractor shall anticipate a certain amount of erosion after completion of grassing and he shall continue to re prepare, add topsoil, re fertilize, and re plant eroded areas using sod, or hydro mulch in areas where erosion persists, until the grass is acceptable in all respects. Contractor shall pay special attention to slopes steeper than 1:4 for acceptable grass establishment.

3.11 MOWING

A. Mowing shall be accomplished with acceptable mowing machines as often as necessary in accordance with good turf establishment practices.

B. Grasses shall be mowed to a height of two (2) inches when growth reaches three (3) inches or as directed by Owner's Representative.

C. Mowing shall include removal of clippings.

3.12 WATERING

A. During establishment, grassed areas shall be moist through the upper 4 inches of soil.

3.13 CLEANUP

A. Before inspection of work, and before acceptance, paved areas that are soiled or stained by operations of work of this Section shall be cleaned. Clean by sweeping or washing and remove all defacements or stains.

B. At the completion of work from this Section, the Contractor shall remove construction equipment, excess materials, and tools. Cart away from site any debris resultant from work of this Section and dispose in a legal manner off the Owner's property.

3.14 INSPECTION AND ACCEPTANCE

A. The Contractor shall, after his personal inspection, request an acceptance inspection by the Landscape Architect of Record.

B. After acceptance, maintenance will be assumed by the Owner or his designated representative.

3.15 CONDITION UPON ACCEPTANCE

A. No erosion shall exist.

B. Bare or thin spots more than 5 percent of any area will not be acceptable.

END OF SECTION 31 22 19

SECTION 31 23 00

EXCAVATION AND FILL

PART 1 GENERAL

1.1 GENERAL

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

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

C. Coordinate work with that of all other trades affecting or affected by the Work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 DESCRIPTION OF WORK

A. Work to be done under this Section includes, but is not limited to, providing all labor, materials, equipment, and incidentals as necessary to the conduct and complete the Work specified herein and shown on the Drawings.

1. Excavate all materials, including soil, boulders, abandoned utilities, existing building foundations, pavements, curbs, and all other unsuitable materials as necessary to construct the improvements shown on the Drawings.

2. Preserve and protect existing and new site improvements during the Work.

3. Over-excavate fill, organic soils and other unsuitable materials to suitable foundation bearing strata.

4. Prepare, grade, shape, compact and protect all subgrades, backfills, and ground surfaces as shown on the Drawings.

5. Furnish materials from approved off-site source(s) as required to complete the Work.

6. Place and compact backfill materials to construct the improvements shown on the Drawings.

7. Segregate, handle, stockpile, manage, and reuse suitable excavated materials as specified herein.

8. Manage and legally dispose off-site all excess or unsuitable generated materials that cannot be reused on-site in accordance with the requirements of Section 31 23 01 (Excavated Soils and Materials Management Plan). Manage groundwater in accordance with the requirements of Section 31 23 19 (Construction Dewatering).

9. Provide and install drainage structures and systems, sewer systems, water systems and associated piping for the exterior as shown on the Drawings.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 01 - Excavated Soil and Material Management Plan

B. Section 31 23 19 - Construction Dewatering

C. Section 31 23 17 - Lateral Support of Excavation

1.4 DEFINITIONS AND REFERENCE STANDARDS

A. Owner

B. Engineer

C. Site Improvements: When used in the context of "protecting adjacent site improvements" shall include, but not be limited to, buildings, utilities, pavements, roadways, slabs, sidewalks, curbs, foundations, and all other improvements and features that are outside the limits of the site, or those elements within the limits of the site that are to remain.

D. Zone of Influence (ZOI): The zone containing the bearing soils for soil-supported structures. The ZOI is defined by imaginary lines extending 2 ft laterally from the outside lower edges of a soil bearing structure and down a 1 horizontal to 1 vertical slope to the top of the natural, inorganic bearing soils or other approved bearing soils.

E. ASTM: Specifications of the American Society for Testing and Materials

F. AWS: Standard Code for Welding in Building Construction (American Welding Society)

G. AASHTO: American Association of State Highway and Transportation Officials

H. ACI: American Concrete Institute

I. PCI: Prestressed Concrete Institute

J. Code: Sixth Edition of Massachusetts State Building Code

K. USEPA: United Stated Environmental Protection Agency

L. DEP: Massachusetts Department of Environmental Protection

M. OSHA: Occupational Health and Safety Administration

N. MCP: Massachusetts Contingency Plan

O. MHDSSHB: Massachusetts Highway Department Standard Specifications for Highways and Bridges, most recent edition.

1.5 PROJECT CONDITIONS

A. These documents are made available to the Contractor for information only. The subsurface conditions information presented in this document, as applicable, is for information only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.

1.6 QUALITY CONTROL

A. The Engineer will observe the Contractor's earthwork activities, including temporary excavation support system installation, excavation, dewatering, subgrade preparation, drainage system, sewer system and water system installation, and backfilling. The Contractor shall provide sufficient notice to the Engineer to allow the Engineer to be present to observe and evaluate the Work.

B. The Engineer will conduct field and laboratory testing to confirm compliance with the requirements of this Section. Field and laboratory testing will be conducted in general conformance with ASTM or other applicable reference standards. The Engineer may also conduct vibration monitoring, as necessary. The Contractor shall cooperate with the Engineer in all respects to facilitate any testing or observations.

C. The presence of the Engineer shall not relieve the Contractor of its responsibility to perform the Work in accordance with the Contract Documents, nor shall it be construed to relieve the Contractor from full responsibility for the means and methods of construction, protection of site improvements against damage, and for safety on the construction site.

D. The Contractor shall adhere to the applicable requirements of the Standard Specifications, OSHA Standards, and to all other applicable ordinances, codes, statutory rules, and regulations of federal, state, and local authorities having legal control over the Work of this Section and other applicable Sections.

E. The Contractor may conduct additional field and laboratory testing or screening tests for its own information at no additional cost to the Owner.

F. Work not in conformance with the specified requirements shall be improved, or removed and replaced, at no additional cost to the Owner. All costs related to testing of nonconforming Work or materials shall be paid for by the Contractor at no additional cost to the Owner.

G. Tolerances

1. Construct finished soil and backfilled surfaces to plus or minus ½-in. of the grades and elevations indicated on the Drawings.

2. Maintain the moisture content of fill material as it is being placed to levels that allow for compaction to the specified degree of compaction.

1.7 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, foundations, pavements, curbs, piping, railroad track and ties, cobblestones, footings, bricks, concrete, previously abandoned drainage structures and utility structures abandoned and not removed by the utility and debris.

B. Rock Excavation: Rock is defined for payment purposes as stone or hard shale in original ledge, boulders over two cubic yards (2yd3) in volume in open areas and one cubic yard (1yd3) in volume in trenches, and masonry or concrete that cannot be broken or removed by normal job equipment (power shovels, scoops, or D-8 bulldozers with ripper attachment) without the use of explosives or drills or hoe-rams. The classification does not include materials that can be removed by means other than drilling and blasting or drilling and wedging or hoe-ramming

but which, for reasons of economy in excavating, the Contractor prefers to remove by drilling and blasting. The word "trenches" shall mean excavation having vertical sides the depths of which exceed the width, made for drain, sewer, water, and gas pipes; electric and steam conduits; and the like.

1.8 SUBMITTALS

A. General

1. The Contractor shall forward submittals to the Engineer a minimum of two weeks prior to any planned work related to the Contractor's submittals.

2. The time(s) for submittals is the minimum required by the Engineer to review, comment, and respond to the Contractor. The Engineer may require resubmission(s) for several reasons. The Contractor is responsible for scheduling specified submittals and resubmittals to prevent delays in the work.

3. The Contractor's submittals shall be reviewed by the Engineer prior to conducting any work.

4. The Contractor's submittals shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts, retained by the Contractor.

5. Review of the Contractor's submittals by the Engineer does not relieve the Contractor of the responsibility for the adequacy, safety, and performance of the Work.

B. Backfill Materials and Equipment

1. Proposed types and sources of all fills and backfill materials, including topsoil. For each type of soil to be utilized as fill or backfill, the Contractor shall deliver two, 50 lb. bag samples from each borrow source or supplier to the Engineer's laboratory for review and laboratory testing. Do not import any material to the site unless accepted by the Engineer in writing. With each sample provide the following documentation:

a. Location of borrow source site, including name of the owner or facility name with contact phone number, street address, city, and state.

b. Present and past usage of the source site and material.

c. All existing report(s) associated with an assessment of the source site as relates to the presence of oil or hazardous materials.

2. Site Characterization of Off-Site Borrow Sources:

a. If the materials are not from a commercial borrow pit and/or are suspected of containing oil and/or hazardous materials based on the Engineer's review of the submitted data described above, the Contractor shall submit the below-listed chemical test data on the material. The cost of any required testing shall be the responsibility of the Contractor. The Engineer will review the data and determine its acceptability for use on site. All sampling of soils for chemical testing shall be performed by a person experienced in sample collection and either: 1) a Professional Engineer or Licensed Site Professional registered in the Commonwealth of Massachusetts, 2) a Professional Geologist registered in the

Commonwealth of Massachusetts, 3) a certified groundwater of environmental professional, or 4) an authorized representative of the one of the persons listed above. All testing of samples of each material shall be by a DEP-certified laboratory.

b. Total Petroleum Hydrocarbons (EPA Method 9071/418.1) every 150 cy.

c. Extractable and Volatile Petroleum Hydrocarbons every 150 cy.

d. Volatile Organic Compounds (EPA Method 8260) every 250 cy.

e. PCB and Pesticides (EPA Method 8080) every 250 cy.

f. Thirteen Priority Pollutant Metals (EPA Method 6000-7000 series) every 250 cy.

g. Acid-Base Neutrals (EPA Method 8270) every 300 cy.

h. TCLP (for a particular parameter) if the measured concentration for that parameter exceeds twenty times the RCRA Hazardous Waste TCLP Regulatory criteria.

3. Submit additional material samples every 5,000-cu. yd. throughout the course of the Work, if requested by the Engineer, to evaluate the consistency of the source or process, at no additional cost to the Owner.

4. Details of compaction equipment, including descriptions, product literature, specifications, and ratings, proposed for use in compacting fill and backfill materials.

C. Exterior Perimeter

1. Manufacturer's literature and technical data for: (1) drainage pipe, sewer pipe, water pipe solid pipe, tees, wyes, bends, reducers, and other pipe fittings; and (2) filter fabric (geotextile).

2. Source and 50-lb bag sample for Drainage Fill (Refer to Section 1.6 for additional requirements).

3. As-built plans of drainage systems if as-built layouts differ from design layouts.

PART 2 PRODUCTS

2.1 MATERIALS

A. Granular Fill: shall consist of clean, aggregate sand and gravel material free of organic material, loam, trash, snow, ice, frozen soil, or other deleterious material well graded within the following limits:

Sieve Size (ASTM D422)	Percent Passing by Weight
3 in.	100

No. 4	30-90
No. 40	10-50
No. 200	0-5

1. Granular Fill shall be used below structural slabs, sidewalks, footings, exterior slabs, and at other locations shown on the Drawings or indicated in the Specifications. Granular Fill shall also be used to backfill above, below and to the sides of new site structures and utilities and below pavements unless otherwise noted on the Drawings or approved by the Engineer.

B. Ordinary Fill: Ordinary Fill shall consist of well-graded, natural, mineral soil free from organic materials, loam, wood, snow, ice, frozen soil cinders, asphalt, brick, concrete, trash, debris and other weak, compressible, or deleterious materials.

1. Ordinary Fill shall not contain particles larger than 4 in. in maximum dimension and shall have a maximum of 80 percent passing the No. 40 sieve and a maximum of 30 percent passing the No. 200 sieve. It shall have a maximum dry density of at least 120 pounds per cubic foot and have physical properties such that it can be readily spread and compacted to the specified densities in a reasonable length of time. The material shall not contain materials subject to decay, decomposition, or dissolution.

2. On-site fill soils containing chemical contaminants at concentrations less than Method-1 S-1 as listed in the MCP may be used as Ordinary Fill if approved by the Engineer. The Contractor shall mechanically screen on-site soils to remove debris prior to reuse as directed by the Engineer. Only those soils approved by the Engineer shall be reused on-site.

C. Gravel Borrow: shall conform to the requirements of item M1.03.0 Types a, b, and c of the MHD Standard Specifications for Highways and Bridges, dated 1988. Gravel Borrow of the type indicated shall be used at the locations shown on the Drawings or indicated in the Specifications.

D. Sand Borrow: shall conform to the requirements of item M1.04.0 Types a and b (as applicable) of the MHD Standard Specifications for Highways and Bridges, dated 1988. Sand Borrow of the type indicated shall be used at the locations shown on the Drawings or indicated in the Specifications.

E. Processed Gravel: shall conform to the requirements of item M1.03.1 of the MHD Standard Specifications for Highways and Bridges, dated 1988. Processed Gravel shall be used at the locations shown on the Drawings or indicated in the Specifications.

F. Dense-Graded Crushed Stone: shall conform to the requirements of item M2.01.7 of the MHD Standard Specifications for Highways and Bridges, dated 1988. Dense-graded crushed stone shall be used at the locations shown on the Drawings or indicated in the Specifications.

G. ¾-in. Crushed Stone (Drainage Fill): shall conform to the requirements of item M2.01.4 of the MHD Standard Specifications for Highways and Bridges, dated 1988. Crushed stone (¾-in.) shall be washed at the source facility to remove fine-grained soils.

H. Pipe Bedding Material: shall consist of Granular Fill unless otherwise noted on the Drawings or indicated in the Specifications.

I. Geotextile (Filter Fabric): shall consist of six ounces per square yard minimum, needle-punched, non-woven, synthetic, chemically resistant non-biodegradable fabric. Geotextile shall be used to prevent fine-grained soils from migrating into coarse grain materials as judged necessary by the Engineer, and at the locations shown on the Drawings or indicated in the Specifications.

J. Lean Concrete: shall have a maximum 28-day compressive strength of f'c = 1,500 psi, unless otherwise noted, with a maximum slump of 6 in. Lean concrete may be used to backfill excavations in lieu of Compacted Granular Fill at locations proposed by the Contractor and approved by the Engineer.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the site and all work prepared by others and report to the Engineer in writing any conditions detrimental to the proper and timely completion of the Work of this Section. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 GENERAL REQUIREMENTS

A. Excavation, backfilling, and other earthwork activities shall conform with the Contract Documents and submittals that are acceptable to the Engineer. No work shall be performed unless it is conducted under the observation of the Engineer, and in accordance with the submitted schedule and sequence.

B. Always prevent erosion at the site.

C. All excavated material, excluding contaminated soil and groundwater if present, shall be removed from the site and shall be legally disposed of by the Contractor in accordance with Section 02221 (Excavated Soils and Materials Management Plan). Manage groundwater in accordance with the requirements of Section 02140 (Construction Dewatering). All excavated material will become the property of the Contractor.

D. Use of On-Site Materials

1. Some existing on-site soils are considered suitable for reuse as Ordinary Fill. The Contractor shall reuse those on-site soils approved by the Engineer as Ordinary Fill at the locations shown on the Drawings and/or indicated by the Engineer. The Contractor shall conduct all on-site reuse activities, including screening and stockpiling, at no additional cost to the Owner.

2. If unanticipated contaminated material is suspected or encountered during an excavation, the Contractor shall halt construction activities in that area, and contact

the Owner or Engineer as soon as possible. The Owner or Engineer will provide direction on how to proceed and disposition of the excavated material.

E. Stockpiling of Material

1. Establish material stockpiles on-site only at locations that are acceptable to the Engineer, will not interfere with the progress of the work, and will not damage existing structures. Off-site stockpiling is not permitted unless otherwise approved by the Engineer. Rehandling, if required, shall be the responsibility of the Contractor at no additional expense to the Owner.

F. Unfavorable Weather

1. Freezing Weather:

a. Fill materials and/or concrete shall not be placed on snow, ice, frozen subgrades, or uncompacted frozen soil.

b. Fill materials and lean concrete shall not be frozen when placed or be allowed to freeze prior to or after compaction or placement. At the end of each day's work during freezing weather, the last lift of fill, after compaction, shall be rolled by a smooth wheeled roller to eliminate ridges of uncompacted soil. Fill materials and lean concrete shall be covered with insulating tarps or heated during freezing weather. The Contractor shall suspend backfilling operations and placement of lean concrete when air temperatures are below 32oF if directed by the Engineer.

c. Soil bearing surfaces below completed slabs and foundations shall be protected against freezing, before and after concreting. Frost protection shall be provided in a manner acceptable to the Engineer as soon as possible after foundations or structures are constructed.

d. Do not excavate to full indicated depth when freezing temperatures may be expected, unless the mat, footing, or slab is poured immediately after the excavation has been completed. Protect the excavation from frost if placing of concrete is delayed. Where footings, slabs or mud mats are exposed to freezing temperatures, they shall be protected to prevent damage to the concrete by freezing or frost penetration into the soil upon which they rest. Where foundations are exposed over the winter during construction, provide at least 2.5 ft. of earth cover above the bottom surface of concrete, plus hay or other protection if temperatures are severe, as directed by the Engineer.

2. Wet Weather:

a. If fill material placement, spreading, rolling, or compaction operations are interrupted by rain or other unfavorable conditions, do not resume such operations until ascertaining that the moisture content and density of the previously placed soil are as required by these specifications.

G. Maintenance of Excavations and Slopes

1. Stability of excavations and job safety are the sole responsibility of the Contractor.

2. Shoring and bracing of trenches and other excavations shall be in accordance with the requirements of the Department of Labor Occupational Health and Safety (OSHA) 29 CFR 1926 dated October 31, 1989, and subsequent amendments and revisions.

H. Coordinate excavation activities to limit movements indicated in Section 02150 (Underpinning) and Section 02401 (Lateral Support of Excavation).

3.3 EXCAVATION

A. General Requirements

1. 1. Excavate to the lines and grades indicated, and no deeper unless approved.

2. Excavate and backfill using appropriate methods and equipment in sufficient quantity, models, and sizes to perform the work in the minimum time possible.

3. Coordinate the sequence of excavation with all construction activities, including installation of instrumentation, bracing, construction dewatering, wintry weather protection, placements of structures, etc.

4. Conduct excavation in such a manner that movements of temporary excavation support systems are minimized and damage to adjacent buildings, structures and utilities is prevented.

5. Coordinate the rate of excavation with ground conditions encountered in the field and observations from instrumentation as necessary to prevent movement and loss of ground during excavation and support operations.

6. Prevent disturbance to soil subgrades.

7. Exercise care to preserve the material below and beyond the lines of all excavations. Where excavation is carried below required grade, backfill to the structure subgrade according to methods and materials approved by the Engineer.

B. When excavation has reached required subgrade elevations, notify the Engineer, who will observe the excavation and bearing conditions. After review by the Engineer, the excavation may be required to proceed deeper due to Contractor disturbance of the subgrade, variation in subsurface conditions, or the presence of unsuitable soils at the design subgrade level. Replace the excavated material with Granular Fill or Lean Concrete as directed by the Engineer. Conduct additional excavation and backfilling at no additional cost to the Owner.

C. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Excavation for the convenience of the Contractor shall conform to limits acceptable to the Engineer and shall be at no additional cost to the Owner.

D. Unauthorized Excavations

1. Unauthorized excavation consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer shall be at the Contractor's expense.

2. Backfill and compact unauthorized excavations with Granular Fill or Lean Concrete as specified for authorized excavations unless otherwise directed by the Engineer.

3.4 TRENCH EXCAVATION

A. Excavate trenches for utilities, drain and sewer pipes, and utility structures by the open cut method except where tunneling or jacking is indicated or approved by the Engineer.

B. Excavate trench to permit pipe, conduit, or structure to be laid or constructed at the elevation, slope and depth of cover indicated on the Drawings, and at uniform slopes between indicated elevations. Make trenches no wider than indicated and do not widen by scraping or loosening materials from the sides during construction or operation of equipment in or adjacent of the trench or by surcharging excavation with material piled next to the trench. Keep sides firm and undisturbed until backfilling and compaction has been completed.

C. When pipe, conduit or structures are to be laid in gravel or crushed stone bedding, excavate trench by machine to indicated aggregate subgrade. Compact any disturbed material at the bottom of the trench to 95 percent prior to placing the bedding material.

D. When pipe, conduit, or structures are to be laid directly on the bottom of the trench, do not excavate the lower part of the trenches to subgrade by machinery. Remove last of material by use of hand tools and form a flat or shaped bottom, true to grade, so that pipe or structure will have a uniform and continuous bearing.

E. In paved areas, saw cut pavement on the neat lines at the width indicated for the trench. After compacting the backfill, restore pavement to a condition equivalent to that existing at the start of construction. Restore pavement damaged outside the neat lines at no additional cost to the Owner.

F. Trench Excavation in Fill:

1. Place and compact to 95 percent of maximum density indicated fill material to top of proposed fill or to a minimum height of 1 foot above top of pipe or structure, whichever is less, when pipe or structure is to be laid in fill.

3.5 ROCK EXCAVATION

A. Cross Sectioning: When rock is encountered during excavation, it shall be uncovered and exposed, and the Engineer shall be notified in writing by the Contractor before rock-removal work proceeds. The areas in question shall then be measured, and payment shall be determined. Excavation of material in question before agreement by the Engineer as to the character of the material, or failure to notify the Engineer or to take measurements will forfeit the Contractor's right to payment for rock excavation. The quantity of rock to be removed shall be based on the limits established below. Measurements shall be made by a Registered Surveyor, paid for by the Contractor, and approved by the Engineer.

B. Measurement: Excavation of rock, as defined in paragraph 1.4.B, if ordered in writing by the Engineer with the prior written approval of the Owner, measured in place within the Contract limits as defined on the Plans or in any duly authorized modifications thereto. Measurement for rock excavation will be made for:

1. Foundations within the limits of the concrete lines as defined by the working plans or by duly authorized modifications thereto, plus twelve inches (12") outside the vertical concrete lines and twelve inches (12") below base.

2. Pipe trenches to a depth of six inches (6") below the bottom of the bell and for a width equal to the inside diameter of the pipe, plus fifteen inches (15") beyond the inside diameter on each side, provided that overlapping computed volumes of any ledge or boulder excavation shall be paid for only once.

3. Paved areas to the underside of the respective subbase for such areas.

4. Lawns and planting areas to a depth of twenty-four (24") below finished grade.

5. Any foreseen rock or boulder encountered, which must be removed for construction of the work defined on the plans or in modification thereto, shall be measured in its original position to the limits of clearly defined vertical construction lines and to the depth required for the defined construction; payment will be at the unit prices stated above.

C. Blasting:

1. The Driller and Geotechnical Engineer shall log the bottom elevation of all drill holes made for blasting within the building area.

2. No blasting shall be done without the Engineer's approval. Written permission and approval of methods must be obtained from the local government authority.

3. Contractor shall, before doing any blasting work, present to the Engineer written certificate of insurance showing evidence that his insurance includes coverage for blasting operations.

4. Experienced powder men or persons who are licensed or otherwise authorized to use explosives shall do blasting. Accurate records shall be maintained, noting location of each blast, time of detonation, total explosive weight in each blast, maximum explosive weight per delay in each blast hole, and designation of delay cap used in each hole.

5. Explosives shall be stored, overseen, and employed in accordance with state and local regulations, or, in the absence of such, in accordance with the provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, Inc. and in accordance with applicable OSHA regulations.

6. The amount of vibration and air blast overpressure generated by blasting shall not exceed regulatory statutes or directives established by state, local or other governing authorities, such as but not limited to, 527 CMR 13.091. In no case shall the maximum Peak Particle Velocity (PPV) exceed the limits indicated on figure B-1, Appendix B, of the United State Bureau of Mines Report of Investigations, RI8507, 1980 (copy attached). These limits shall apply at all existing and under construction structures, utilities as well as at property and construction limits. (The Engineer may designate lower levels at sensitive structures.)

7. Contractor shall take great care to do no damage to existing buildings, foundations, glazing and trees to remain. All damage caused by Contractor's blasting operations shall be repaired to the full satisfaction of the Engineer at no additional cost to the Owner.

3.6 STRIPPING, SCREENING, AND STOCKPILING OF TOPSOIL (LOAM)

A. Stripping: Prior to starting general excavation or building renovations, all topsoil from areas to be excavated, filled, regraded, and resurfaced shall be stripped to its full depth and stockpiled in approved locations for later reuse. All stockpiled loam shall be protected from wind and water erosion as specified in Section 02270 – Erosion and Sedimentation Control. All stockpiled topsoil shall be evaluated for suitability as loam as specified, performed, and paid for in Section 02900 Planting, Lawns, and Fine Grading. If topsoil cannot meet the specifications for loam as specified under the Sections, it may be used as ordinary fill if it meets the requirements as specified. All topsoil that is found under paved areas shall be stripped and either used as fill, if it meets the requirements for fill, or removed from the site and disposed of in a legal manner. Under no condition may topsoil be taken away from the premises without approval by the Owner's Representative. Do not strip without a clear understanding of existing soil, planting, and site conditions to be preserved.

B. Contractor shall have the existing topsoil evaluated for reuse as loam as specified, performed, and paid for in Section 02900 Planting, Lawns, and Fine Grading, and submit the results to the Owner's Representative for review. Stockpiled topsoil may be used as general borrow for fill under lawn and landscaped areas provided that the material conforms to the specifications of this Division 2 Section, EARTHWORK, for testing and general borrow.

C. Loam borrow that is deemed by the Owner's Representative to be suitable for reuse on site as loam shall be mechanically screened through a ¾ inch by 6-inch screen prior to stockpiling operation. Remove and discard all debris left from the screening operation off site in a legal manner.

D. Topsoil shall be deemed unsuitable and shall be removed from the site and legally disposed if one of the following cannot be achieved:

1. Topsoil which is not suitable for use as general borrow under the work of the Division 2 Section, EARTHWORK.

2. Topsoil which is not suitable for use as loam borrow as specified and evaluated under the requirements of Section 02900 Planting, Lawns, and Fine Grading.

E. Contractor shall not remove existing topsoil from the contract limits of Work without the written approval of the Owner's Representative. The Contractor shall not remove topsoil from the contract limits of Work if forbidden to do so by local Town or City bylaws.

3.7 EXCAVATION, FILLING AND GRADING AROUND TREES

A. Excavate within drip line of trees only were indicated or directed. Notify Owner's Representative prior to any excavation.

B. Maintain existing grade within drip line of trees, unless otherwise indicated.

C. Place no fill within drip line of existing trees, unless otherwise shown on the Drawings.

3.8 SUBGRADE PREPARATION AND PROTECTION

A. General

1. Complete the excavations to the required subgrade elevations allowing for subbase material, mud mats, bedding layers, plus any additional depth required to accommodate the drainage layer, geotextile, pipes, pavements, sidewalks, etc.

2. All subgrades must be observed and accepted by the Engineer prior to placement of Granular Fill, Lean Concrete, or any structure over the subgrade.

3. Where noted by the Engineer, backfill all holes or voids encountered outside of minimum excavation limits with materials approved and accepted by the Engineer.

4. Backfill all holes and low points that will not otherwise be removed in the course of the work with materials acceptable to the Engineer to the subgrade elevation indicated on the Drawings.

B. Soil Subgrades

1. Foundations and Slabs

a. Soil subgrades below foundations and slabs shall consist of undisturbed, naturally deposited inorganic soils, Drainage Fill, Granular Fill, or Lean Concrete acceptable to the Engineer, which is placed above the natural inorganic soils. Miscellaneous fill, organic soils, debris, and other unsuitable foundation materials, if encountered at subgrade, shall be over-excavated and backfilled with Granular Fill or Lean Concrete.

b. Excavate materials to 2 ft above the indicated subgrade level by general excavation methods.

c. Excavate the final 2-ft with smooth-edged bucket equipment. Equipment shall not be operated directly on final soil subgrades. Excavation shall progress until undisturbed naturally deposited inorganic soil is achieved. The surface of the glacial deposits shall be made smooth and cleaned of all disturbed material. Back blading of soil surfaces to smooth disturbed soil will not be permitted.

2. Utilities, Pavements and Sidewalks

a. Soil subgrades below utilities shall consist of undisturbed, naturally deposited inorganic soils or compacted imported granular soils that are free of contamination, free of organic matter, stable under proof-compaction, and otherwise suitable to the Engineer. Unsuitable soils or materials present at the subgrade level shall be over-excavated and backfilled with Granular Fill or other materials approved by the Engineer.

C. Backfill Surfaces

1. Backfill surfaces that become disturbed, contaminated with clay, or otherwise unacceptable to the Engineer shall be removed and replaced with acceptable backfill at no additional cost to the Owner.

D. Cold Weather Subgrade Protection

1. When the atmospheric temperature is less than 32o F, the Contractor shall protect excavation subgrades and Lean Concrete from freezing. Wintry weather subgrade protection may consist of an earth fill cover, hay cover, insulation cover, heating, or other means of protecting the subgrade materials from freezing.

2. Subgrades that have been permitted to freeze by the Contractor will be judged to be unsuitable for placement of Lean Concrete or Granular Fill by the Engineer. The Contractor at the Contractor's expense shall conduct additional excavation of subgrade soils that have frozen and replacement with materials acceptable to the Engineer.

3.9 BACKFILLING

A. General

1. Backfilling activities, including placement and compaction, shall not be performed when air temperatures are at or below 32oF.

2. Backfill excavations as promptly as work permits, but not until the subgrade, or below grade construction, is acceptable to the Engineer.

3. Previously placed, and possibly accepted, backfill shall be excavated and replaced at no additional cost if the backfill does not conform to the Contract Documents.

4. During compaction operations, incidental compaction due to traffic by construction equipment other than that used specifically in compaction operations will not be credited toward the required minimum coverages specified.

5. Compaction by puddling or flooding is prohibited.

6. Exercise care in the placement of backfill against walls and directly in contact with waterproofed structures such that stones contained in the backfill do not damage waterproofing.

7. Repair any damage to waterproofing that occurs during placement and compaction operations at no additional cost to the Owner.

8. Control groundwater as required to permit efficient collection and removal with minimal disturbance to materials being placed.

9. Prior to placing backfill materials, complete the specified subgrade preparation.

10. Placement of fill and backfill shall be systematically conducted in the specified uniform layer thicknesses.

11. Measurement of backfill layer or lift thickness shall be conducted in all cases prior to compaction.

12. Backfill excavations as promptly as work permits, but not until completion of the following:

a. Acceptance by the Engineer of construction below finish grade including, where applicable, damp proofing, waterproofing, utility placements, etc.

b. Completion of quality control testing, acceptance by the Engineer and recording locations of underground utilities.

c. Removal of concrete formwork unless formwork is specified to remain in place.

d. Removal of trash and debris.

B. Backfill Materials

1. Backfill materials brought to the site must be obtained from an approved borrow source(s).

2. Backfill materials below the lowest level floor slab shall consist of Granular Fill, Lean Concrete, or Drainage Fill.

C. Compaction Equipment

1. In all cases, the Contractor shall only use compaction equipment that is deemed acceptable by the Engineer.

2. Compact with a minimum of four coverages of acceptable compaction equipment.

3. Compaction in open areas shall be conducted with heavy smooth-wheeled vibratory rollers imparting a dynamic force of at least 25,000 lbs., approved by the Engineer.

4. Compaction in confined areas (against walls, piers, and in trenches) shall be conducted with acceptable equipment such as hand guided vibratory compactors or mechanical tampers as approved by the Engineer.

D. Placement, Compaction, and Protection

1. All backfill material shall be placed "in the dry" on subgrades acceptable to the Engineer. The Contractor shall dewater excavated areas as required to perform the work in such a manner as to preserve the undisturbed state of the approved subgrade material.

2. Backfill materials shall not be placed on snow, ice, frozen subgrades, or uncompacted frozen soil.

3. Backfill materials shall not be frozen when placed or be allowed to freeze prior to or after compaction, placement, or curing. At the end of each day’s work during freezing weather, the last lift of fill, after compaction, shall be followed by a smooth-wheeled roller to eliminate ridges of uncompacted soil.

4. Granular Fill: Place Granular Fill materials in layers not exceeding 10 in. measured prior to compaction in open areas, and 6 in. in confined areas such as adjacent to footings and pipes. Compact each layer with a minimum of four coverages of the equipment described herein to obtain at least 95 percent of maximum dry density as determined by ASTM Test D1557.

5. Drainage Fill: Place Drainage Fill materials in layers not exceeding 6 in. measured prior to compaction. Compact each layer with a minimum of four coverages of the equipment described herein.

6. Ordinary Fill: Place in layers not to exceed 12 in. when utilizing heavy compaction equipment and 8 in. when utilizing light hand operated compaction equipment. Compact to at least 92 percent of maximum dry density as determined by ASTM Test D1557.

7. Compaction Requirements

    a. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	Minimum Degree of Compaction
Below Footings	95%
Below Slabs	95%
Pavement base and subbase courses	95%
Detention Basin Berms	95%
General Fill below pavement subbase	90%
Trench backfill (inside bldg.)	95%
Trench backfill (outside bldg.)	
-Below pipe to spring line	95%
-Spring line to 1 ft. above pipe	90%
-1 ft. above pipe to pavement subbase or finish grade	95%
Landscape Areas:	

-Fills within lawn and plating areas within 18” of finished grade	85% (min.) 90% (max)
-Fills within lawn and planting areas on top 18” of finished grade	85% (min.) 90% (max)

*Compactions percentages are based on the laboratory derived Maximum Density values.

b. In the case of lawn and planting areas, compaction requirements for subgrades and fills shall be considered minimums and maximums within the density percentages called for, and any over-compaction of subgrades or fills which would be detrimental to lawn or planting objectives shall be corrected by loosening subgrades or fills through tilling or other means and re-compacting to specified compaction limits.

8. Moisture Control

a. Discontinue backfilling and compaction from November to April (wet season) unless the Contractor demonstrates successful moisture and compaction control techniques to achieve the indicated or specified density requirements.

b. Fill material that is too wet for proper compaction shall be harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill at his expense.

c. Fill material that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be applied until the optimum moisture content is reached, as determined by the soil testing laboratory, as specified in paragraph 3.5.A.1.

d. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

e. The Contractor shall continue to compact until the indicated or specified density requirements are achieved.

9. Placement and Lift Thickness of Material

a. Distribute material such that stones and lumps do not become nested, causing voids between stones. Distribute such that voids are filled with fine materials regardless of compaction method.

b. Deposit and spread material in uniform parallel layers not to exceed 12 inches (12") in thickness when utilizing heavy compaction equipment, and 6 inches (6") when utilizing light hand-operated compaction equipment.

10. Trench backfill and compaction:

    a. Begin backfilling and proceed until completed after the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections required under their applicable specification sections, and concrete or masonry within the trench have reached their design strength to support all loads.

    b. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.

    c. Compact material around circumference of pipe by hand tamping 6-inch layers of indicated material in the area between the trench wall and the pipe to meet density requirements stated herein.

    d. Compact material above the pipe by tamping or mechanical means if trench width is wide enough to accommodate the compaction equipment and if the load from the equipment does not damage the pipe.

11. Protection: Contractor shall not begin backfilling against walls until the walls and support slabs have sufficiently aged to attain the strength required to resist backfill pressures without damage. Contractor shall correct any damage to the structures caused by backfilling at no added cost to the Owner.

12. Geotextile

    a. Place on approved subgrade in accordance with manufacturer's specifications.

    b. Minimum overlap of adjacent pieces of geotextile shall be 18 in.

13. Exterior Perimeter and Under slab Drainage Piping

    a. Coordinate with other under slab utilities and set pipe at grade required to ensure adequate flow from the system to the sump(s).

    b. Perforations of drainage piping shall be free of foreign matter before installing.

3.10 GRADING AND COMPACTING

A. Fine Grading and Compacting: Shape the subgrade, to a fine surface conforming to the indicated cross section, and compact (granular subgrades only) the top 6 in. to a minimum of 95 percent of the maximum dry density of the subgrade material. Cut down all high spots (exclusive of landscaping drainage sloping), fill depressions and recompact until the surface is smooth and satisfactorily compacted.

B. Grading and Finishing: In areas designated for grading and finishing, rake or machine grade the areas to remove stones over two inches and other unsatisfactory material; fill depressions and finish the surface within the indicated tolerances.

C. Unless noted otherwise in the Drawings or specifications, grades at the perimeter of excavated areas shall be gradually sloped down to existing grades.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Excavation and Backfilling will not be measured but will be paid for as part of the Base Contract Price and shall include furnishing all material, mobilization, labor, equipment, tools, and incidentals necessary to complete the work shown on the Drawings. No separate measurement or payment will be made for acquisition of permits, backfill, equipment, material disposal, temporary excavation support systems, construction dewatering, exploratory test pits for underpinning (Section 02150), stockpiling, police details, material rehandling, surveying, or other associated items or work considered incidental to the conduct the work of this Section.

END OF SECTION 31 23 00

SECTION 31 23 01

EXCAVATED SOILS AND MATERIALS MANAGEMENT PLAN

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Attention is directed to the Contract and General Conditions and all Sections of General Requirements, which are hereby made a part of the Specifications.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

D. The Owner plans a pre-characterization program. Classification of soil to be removed from the site has not yet been determined. The soil quality data will be provided to the Contractor as soon as it is available and will include analytical data on the overall quality of the materials to be excavated.

E. Materials encountered during excavation shall be managed in a manner that ensures the protection of human health, safety, public welfare, and the environment and that complies with the procedures described in these specifications and applicable federal, state, and local laws and regulation, including but not limited to the references in Paragraph 1.4 of this Section. DEP Policies, Regulations and the MCP are subject to revision. Any DEP Policies, Regulations, or MCP revisions issued to supersede the policies and regulations referenced herein shall apply to these specifications.

F. The Contractor shall manage all soil material in a manner that ensures the protection of health, safety, public welfare, and the environment. The Contractor shall be responsible for all work related to legal off-site disposal of excess or unsuitable materials in accordance with the provisions of the Massachusetts Contingency Plan, 310 CMR 40.0000 and all other applicable state and federal laws and regulations including: utilization of LSP-prepared and signed Bills of Lading, Uniform Hazardous Waste Manifests, Material Shipping Records and/or solid waste tracking records; coordination with and transportation to off-site disposal/treatment facilities accepted by the Owner and additional chemical testing as required by disposal facilities. The Contractor shall prepare, and coordinate use of Uniform Hazardous Waste Manifests as required.

G. G. Manage groundwater and surface water runoff that is collected, treated, or discharged at the site as part of construction or a response action in compliance with all applicable provisions of the federal, state, or local laws, regulations, or bylaws and the criteria of this Section and Section 31 23 19 (Construction Dewatering).

1.2 DESCRIPTION OF WORK

A. This Specification Section provides procedures and requirements for excavated soil management. Material classification, stockpiling, on-site reuse, off-site transportation, off-site

disposal and treatment, contingencies are also included. The Contractor shall undertake the following work:

1. Excavate, load and transport soils and materials from the site to legal off-site reuse at landfill facilities or other locations in accordance with the criteria contained herein, and the provisions of the MCP and all other applicable local, state, and federal laws and regulations.

2. Determine the destination facility using the chemical test data provided and contract for off-site reuse directly with each facility, approved by the Owner. The Contractor shall complete and provide all documentation necessary to transport excavated soils and materials from the site to appropriate off-site facilities. This paperwork may include, but not be limited to:

    a. Letters to facilities that provide site history information, chemical test data, and other information requested by the facility necessary for acceptance of excavated soils and materials; and

    b. Letters from facilities documenting acceptance of excavated soils and materials for disposal, reuse, or treatment.

B. The Owner's Environmental Consultant will review and approve Contractor selected disposal facilities, prepare and sign Bills-of-Lading, arrange for Owner signatures and prepare data packages to facilities. The scope of additional testing which may be required by the off-site disposal/recycling facilities shall be determined by the Contractor based on the requirements of the facilities and coordinated with the Owners Environmental Consultant.

1.3 RELATED DOCUMENTS

A. All other sections of the specifications for requirements which affect work of this section whether such work is specifically mentioned in this section.

B. These documents are made available to the Contractor for information only. The subsurface conditions information presented in this document, as applicable, is for information only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.

1.4 REFERENCES

A. DEP: Commonwealth of Massachusetts Department of Environmental Protection.

B. MCP: The Massachusetts Contingency Plan, 310 CMR 40.0000, latest version.

C. LSP: Licensed Site Professional qualified by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals, under MGL Chapter 21A.

D. The Massachusetts Contingency Plan.

1. Management of Remediation Waste: 310 CMR 40.0030

2. Health and Safety Procedures: 310 CMR 40.0018

E. Massachusetts Department of Environmental Protection (DEP) Policies (most current versions):

1. COMM-97-001, Reuse and Disposal of Contaminated Soil at Massachusetts Landfills, dated 15 August 1997.

2. WSC-94-400: DEP "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils.", dated 21 April 1994

3. WSC-402-96; Commonwealth of Massachusetts Underground Storage Tank Closure Assessment Manual."

4. WSC-91-401, “Policy for the Investigation, Assessment, and Remediation of Petroleum Releases: Interim Site Investigation Protocol Document”, dated 9 April 1991.

5. WSC-00-425 “Construction of Buildings in Contaminated Areas”, dated 26 January 2000.

F. Massachusetts Department of Environmental Protection, 310 CMR 30.000, Hazardous Waste Regulations, latest version.

G. Massachusetts Department of Environmental Protection, 310 CMR 16.00 and 19.000, Solid Waste Management Regulations, latest version.

H. Hazwoper: OSHA Regulation 29 CFR 1910.120.

I. Massachusetts Board of Fire Prevention, 527 CMR 9.00, Tanks and Containers, latest version.

1.5 QUALITY CONTROL

A. The Owner's Environmental Consultant will monitor excavated materials on behalf of the Owner to document quantities and the destination of material.

B. The Contractor shall excavate and load materials by Group classification or destination for reuse, or as directed by the Owner's Environmental Consultant based on the criteria herein.

C. The Contractor shall perform the excavation to segregate materials according to their classification determined by the soil quality data. The Contractor shall be responsible for any cross-contamination and/or mixing of materials caused by the Contractor which requires additional segregation, stockpiling, material rehandling, testing, on-site treatment, off-site disposal, or other costs to the project. The Contractor shall perform activities to remediate the cross-contamination, to the satisfaction of the Owner, without cost or delay to the project.

1.6 ENVIRONMENTAL SITE CONDITIONS

A. The general location of the Project

B. Classification of the subject site will be conducted by the Owner prior to the start of construction and information will be provided to the Contractor for soil removal.

1.7 SUBMITTALS

A. Review by the Owner’s Environmental Consultant shall not relieve the Contractor of the responsibility to conform to the requirement of this Section or satisfactory performance of the system.

B. At least fourteen days prior to transport of any material for off-site reuse the Contractor shall submit to the Owner's Environmental Consultant and the Owner the following:

1. Name and location of receiving landfill or other location for all materials taken off-site (including naturally deposited and non-reportable soils) and statement that the landfill or other location is not subject to any pending or ongoing local, state, or federal regulatory actions.

2. A letter from the selected facility(s) which documents acceptance of the material based upon the information provided in the contract documents, Pre-characterization Report, or additional testing together with the facility testing requirements and acceptance criteria.

3. Documentation showing that the concentrations of oil or hazardous materials at the proposed non-landfill location are like or higher than the site soils in accordance with the provisions of 310 CMR 40.0032(3) or that the receiving facility has obtained specific DEP approval to accept material with contaminants less than RCS-1 Reportable Concentrations. Note: 310 CMR 40.0032(3) is referred to as the "anti-degradation" policy in the regulations.

4. A copy of any permits issued by Local Authorities including Conservation Commission, Board or Health or other local authority having control of the proposed filling operations.

C. If, after review, the Owner's Environmental Consultant requires additional information or resubmission for any reason, the Contractor shall submit the required information and allow the Owner's Environmental Consultant 7 days for review. The Contractor is responsible for scheduling the submission of the required submittals and resubmittals to prevent delays in the Work.

D. At least fourteen days prior to reuse of excavated material, the Contractor shall submit a plan and procedure for reuse of excavated material.

E. Within 30 days after off-site transport of any material, the Contractor shall submit all documentation, including, but not limited to, originals of completed Material Shipping Record & Log, Bills-of-Lading, or Uniform Hazardous Waste Manifests documenting transportation of contaminated media.

F. Completed, signed Bill of Lading Records (BWSC-012A and BWSC-012C) are required to be submitted to the DEP within 30 days of the last shipment of material to the receiving facility. The Contractor is responsible for providing completed forms to the Owner's Environmental Consultant for submittal to the DEP. Completed forms shall be provided to the Owner's Environmental Consultant within 15 days after last shipment of material to designated receiving facility.

G. Name, registration number, and qualifications of contractor's personnel who will coordinate off-site disposal with various disposal facilities and coordination of additional sampling and testing if required.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. None

2.2 STOCKPILE/CONTAINMENT MATERIALS

A. Polyethylene: 20 mil thickness

B. Jersey Barriers for definition of work area and stockpile perimeter.

PART 3 EXECUTION

3.1 EXCAVATION

A. The Contractor shall excavate materials in a controlled manner by methods which will permit observation of exposed subsurface soils to identify, evaluate, and segregate any soils/wastes and to eliminate the potential for mixing contaminated soils with uncontaminated soils.

B. Naturally, deposited soils shall not be mixed with urban fill soils during excavation.

C. The Contractor shall excavate beyond the limits of the excavation, or within utility trenches, when directed, to remove localized areas of stained soil which indicate visual, olfactory, or field screening evidence of contamination as judged by the Owner's Environmental Consultant.

3.2 CLASSIFICATION OF SOILS FOR OFF-SITE DISPOSITION

A. Soil material to be excavated will be classified for purposes of off-site reuse according to criteria established by the DEP. Classification will be based on the results of the Pre-characterization Testing Program (not yet conducted). Changes to the classification may be made by the Owner's Environmental Consultants based on field observations, PID screening during excavation, and subsequent field or laboratory analytical testing (as necessary). No soil shall be removed from the site without approval of the Owner's Environmental Consultant.

1. For the purposes of establishing a bid price, and until chemical testing data becomes available, the Contractor shall assume the excavated materials and estimated quantities shall be as listed in 4.2.C.

B. GROUP I - Non-Reportable Soils:

1. Group I-1: Naturally deposited inorganic soils that contain no detectable levels of oil, waste oil, or hazardous materials other than background levels of naturally occurring metals or other natural substances.

2. Group I-2: Naturally deposited inorganic soils that contain low levels of oil, waste oil, or hazardous materials below applicable RCS-1 release notification thresholds specified in CMR 40.0300 and/or background levels of naturally occurring metals or other natural substances and that are not otherwise a hazardous waste, as specified in DEP Policy.

3. Group I-3: Fill soils that contain either no detectable or some detectable level of oil, waste oil or hazardous materials at concentrations less than applicable RCS-1 release notification thresholds specified in CMR 40.0300 and/or background levels of naturally occurring metals and other natural substances and that are not otherwise a hazardous waste, as specified in DEP Policy.

4. Group I soil may be transported off-site without notice or approval from the DEP under the provisions of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0032(3), known as the anti-degradation provision. As a general requirement, the soils shall be taken to an environment with similar background concentrations of any contaminants present in the soil and to a site having an equal or higher reportable concentrations. The Contractor shall submit the proposed soil material destination to the Owner's Environmental Consultant for review and approval.

5. The Contractor shall also submit analytical data that establish the background conditions of the receiving site and documentation indicating approval to receive soil material from local municipal authorities.

6. Group I material removed from the site shall be documented by a Material Shipping Records if the material is reused at a Massachusetts landfill or if required by the receiving location. Alternate tracking documentation may be used if the soil is transported to a suitable similar location.

C. GROUP II - Reportable Soils:

1. Soil material which contains oil, waste oil or one or more hazardous materials at concentrations equal to or greater than a release notification threshold of RCS-1 as specified in 310 CMR 40.0300, and that are not otherwise a hazardous waste, as specified in DEP Policy. Group II Reportable soils shall be managed under a Bill-of-Lading process described in 310 CMR 40.0034 when the materials are transported from the site. It is the requirement of this Contract that Group II-1 soils be reused on-site as backfill subject to geotechnical requirements of Section 02200. Reportable soil will require off-site disposal or treatment at a DEP approved landfill or treatment facility based on the results of the Chemical Testing Program and criteria outlining the following Groups:

   a. Group II-1: Material which meets the COMM-97-001 criteria for disposal at in-state unlined landfills to be reused as daily cover, intermediate cover, and pre-cap contouring material. This material may be transported off-site under a Bill-of-Lading process to a DEP-approved landfill facility.

   b. Group II-2: Material which meets the COMM-97-001 criteria for disposal at in-state lined facilities to be reused as daily cover, intermediate cover, and pre-cap contouring material. This material may be transported off-site under a Bill-of-Lading process to a DEP-approved landfill facility.

   c. Group II-3: Material which meets the WSC-94-400 criteria for in-state recycling or thermal treatment and/or the specific licensing requirements for in-state recycling. This material may be transported off-site to a recycling or treatment facility under a Bill-of-Lading.

   d. Group II-4: Material which contains concentrations of contaminants that exceed lined and unlined landfill reuse as well as in-state recycling acceptance criteria but do meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities. The material must be transported to a state permitted thermal treatment or recycling facility under a Bill-of-Lading or Uniform Hazardous Waste Manifest.

e. Group II-5: RCRA non-hazardous waste material which contains concentrations of contaminants that require shipment under a Uniform Hazardous Waste Manifest to RCRA Subtitle D regional recycling, thermal treatment facilities, or out-of-state permitted disposal facilities.

D. GROUP III – Hazardous Waste:

1. Material which meets specific "listed" or "characteristic" criteria defined in 310 CMR 30.000, the "Massachusetts Hazardous Waste Regulations". Material determined to contain "characteristic" hazardous waste constituents will require on-site treatment to reduce the leachable concentrations of lead, or removal and disposal at an out of state approved RCRA Subtitle C hazardous waste disposal or treatment facility. Group III soils are further classified into the following sub-groups.

a. Group III-1: Hazardous Waste that is not treated on-site and disposed at an out of state approved RCRA Subtitle C hazardous waste disposal or treatment facility.

b. Group III-2: Hazardous Waste that is to be treated on site to remove the characteristic of hazardous waste shall be classified as Group III-2. Following treatment, the material will be reclassified and disposed of at a Group II facility.

E. GROUP IV – Solid Waste:

1. Debris such as granite blocks, asphalt, bricks, wood piles, concrete, steel and building rubble shall be disposed of in a DEP-approved solid waste landfill, or if possible, processed (recycled). These materials shall be transported off-site to a Contractor-selected disposal facility.

3.3 SOIL QUALITY MONITORING DURING EXCAVATION

A. The Contractor shall coordinate all work with the Owner's Environmental Consultant. Excavated soils will be monitored by the Owner's Environmental Consultant during the excavation. Soils will be observed for visual and olfactory evidence of contamination, based on observed discoloration, texture and odor. If odors are noted, excavated material will be monitored with a photoionization detector (PID) to screen for the relative concentration of volatile organic compounds (VOCs). Screening would occur in the excavation area (ambient) and would be periodically performed in the headspace of jar samples. Ambient PID readings would be performed in the work zone and within 6 inches of the excavated material.

B. Soil will remain as classified based on the pre-characterization testing program results unless field observations indicate the material is dissimilar to the representative soil sample for that area of the site. If material is observed to be heavily stained or exhibits unusual odors, the material may require temporary stockpiling and testing by the Owner's Environmental Consultant for purposes of reclassification and off-site disposal.

C. For Group I soils, the Contractor will provide the appropriate shipping record for the disposal location chosen by the Contractor and approved by the Owner.

D. For Group II and Group III-2 materials, the Owner's Environmental Consultant/LSP will provide a Bill-of-Lading as required for the various disposal locations chosen by the Contractor and approved by the Owner.

E. For Group IV materials, the Contractor shall establish a truck shipping record log for off-site disposal that confirms quantity and destination.

3.4 TEMPORARY STOCKPILING OF EXCAVATED MATERIAL

A. Excavated material that requires additional chemical characterization for classification and off-site disposal shall be temporarily stockpiled. Group Classification shall separate stockpiles.

B. Temporary stockpiles of material other than Group I soils shall be placed on polyethylene sheeting, bermed, and securely covered with polyethylene sheeting. Stockpiles shall be shaped and graded to facilitate surface drainage. The Contractor shall respond appropriately to control dust and runoff from stockpiles.

3.5 BILL OF LADING/MATERIAL SHIPPING RECORD PROCESS

A. The Contractor shall manage the off-site disposal process, including submittals to disposal facilities and providing required information for the preparation of all Bills-of-Lading, Material Shipping Records, and coordination with the Owner's Environmental Consultant for additional soils samples and testing if required by the disposal facility.

B. The Contractor shall provide the following information to the Owner's Environmental Consultant for approval:

1. The name and address of the transporter.

2. The name and address of the receiving facility or location.

3. The estimated volume of material that will be shipped to the receiving facility.

4. Written statement from receiving facility that they have reviewed the chemical test data and can legally accept the material at their facility.

C. The Owner and the Owner's Environmental Consultant will provide all interaction with the DEP and will forward the completed Bills-of-Lading to the DEP following receipt from the Contractor.

D. The process to achieve approval at a disposal facility and prepare the required paperwork can take 10 to 15 working days. The Contractor shall be aware of this when scheduling the work.

3.6 TRANSPORTATION OF EXCAVATED MATERIAL

A. The Contractor will be responsible for loading, transporting and proper off-site disposal of all material.

B. Materials removed from the site shall be loaded within the site limits. All trucks leaving the site shall be covered and cleaned of spilled debris that might fall from the trucks during transport. Soil material shall be removed from truck tires within a designated decontamination area prior to leaving the site. Debris shall not be spilled from trucks or tracked from the site onto local streets. Each workday the Contractor shall clean local streets which contain site debris.

3.7 DUST CONTROL

A. The Contractor shall employ dust control measures to minimize the creation of airborne dust during the entire construction process. As a minimum, standard dust control techniques shall be employed where heavy equipment will be traveling such as watering down the site or spreading hygroscopic salts.

B. Trucks and heavy equipment shall be staged and utilized in a manner to limit the tracking of site soils onto city streets.

C. Sweep city streets in the vicinity of the site daily, or more frequently as necessary, during excavation activities.

D. At the determination of the Owner or Owner's Environmental Consultant, if excessive quantities of site soils are tracked from the site, the Contractor shall install mud stops (gravel) and wheel washes at site exit locations.

3.8 CONTINGENCIES

A. If during the work, the presence of potentially hazardous conditions is evident, work in the area shall be terminated. These conditions include, but are not limited to, encountering unknown buried containers, drums, tanks or wastes that are not in containers. The Contractor will secure the area of potentially hazardous conditions to prevent the existence of a health risk or release into the environment.

B. The sources of the event causing the material to be considered suspect will be evaluated by the Owner’s Environmental Consultant. If buried containers, drums or tanks are encountered or if a release of oil or potentially hazardous materials has occurred, the Contractor shall notify DEP Incident Response within the required reporting time (DEP Emergency Notification 932-7681). The Contractor shall notify the City of Braintree Fire Department and state Fire Marshal's office upon discovery of the tank or buried container and obtain permission for removal of buried storage tanks.

C. The impact on the work should be evaluated and, if necessary, a Health and Safety Program could be implemented at the site and (Section 01350) could be created in response to the unforeseen conditions.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. The costs listed below shall include all costs for loading, transporting, disposal, coordination, providing required documentation, and other work incidental to removal of material from the site. No separate measurement or payment will be made for on-site handling, rehandling, reuse, filling, management, stockpiling, equipment, police details, surveying, or other associated items or work considered incidental to the conduct of the Base Contract Bid Price. Measurement methods follow:

1. Group I- Off-site disposal per ton, as transported and disposed at the offsite Facility, by scale at receiving facility measured to nearest 0.1 ton. Quantities of each Subgroup will be measured separately for payment.

2. Group IV-Off-site disposal per ton, as transported and disposed at the offsite Facility, by scale at receiving facility measured to nearest 0.1 ton. Quantities of each Subgroup will be measured separately for payment.

4.2 PAYMENT

A. Except for the items measured in 4.1 above, all work shall be conducted as part of the Base Work and paid for as part of the Contract Base Price.

B. Quantities for disposal are provided in the Contract to establish a Unit Price for the Category. Increases or decreases in quantities or deletion of an entire Category shall not be considered a basis for change in the base price of the Contract or renegotiation of Unit Prices.

C. Disposal Categories and Estimated Quantities:

Material Type	Estimated Quantity	Unit Price	Estimated Cost
Group I – Non-Reportable Soils			
I-1. Naturally, Deposited Soils	2,550 tons	/ton	
I-2. Non-Reportable Natural Deposited Soils	510 tons	/ton	
I-3 Non-Reportable Fill	5,100 tons	/ton	
Group II –Reportable Soils			
II-1. Unlined In-State Landfill	NA		
II-2. Lined In-State Landfill	NA		
II-3. Thermal Treatment or Recycling	NA		
II-4. Out-of-state Recycling or regional Thermal Treatment	NA		
II-5. RCRA non-hazardous waste material	NA		
Group III – Hazardous Waste			
III-1. Disposal of Materials as Hazardous Waste	NA		
III-2. On site treatment of TCLP failed soils	NA		
Group IV – Solid Waste			
IV. Demolition Debris/Rubble	Not Measured for Payment		
Allowance for Additional Chemical Testing	1	Ea.	$3,000

D. Notes:

1. Estimated quantities are based on 4,800 cy of soil material requiring off-site removal, where 1 cy = 1.7 tons. Estimated based on footprint area provided by Perkins + Will for Cohen and NMB, dated 2 December 2004.

2. Utility excavations outside the limits of the building construction not included.

3. NA indicated Material Type Not Anticipated; Contractor not required to submit unit cost at this time.

END OF SECTION 31 23 01

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall prevent surface water and subsurface or groundwater from flowing onto 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. The Contractor shall 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 gravel and rock removal operation. The Contractor may choose any satisfactory method he wishes, subject to the approval of the Owner, for handling groundwater or surface water encountered in the work, provided they perform the dewatering required, and shall assume all responsibility for the adequacy of the methods, materials, and equipment employed. The Contractor shall bear the full cost of providing the dewatering at all times of the year, throughout the construction period, and no additional payment shall be made for this work. The Contractor shall take all precautions necessary to prevent loosening or softening up of the subgrade. In this regard, the Contractor shall always be prepared to alter his construction method or sequence. Dewatering and control of water shall be conducted as necessary to prohibit seepage, groundwater flow or surface infiltration and runoff from in any way undermining or otherwise damaging adjacent structures and utilities.

C. Pumping equipment and devices to safely remove and dispose of all water entering trenches and excavation for structures shall be provided if required. The grade shall be maintained dry during all gravel and stone removal activities. Existing or new sanitary sewers shall not be used to dispose of drainage.

D. The Contractor’s method of dewatering shall maintain the bottom of the excavation always dry.

E. In areas adjacent to water courses, the Contractor shall provide the degree of protection against flooding of the excavation that he deems suitable. Should flooding occur, the Contractor shall restore and repair the excavation as required.

1.2 SUBMITTALS

A. Submit to the Owner’s ENGINEER a plan describing the method and equipment to be used to dewater and drain site excavations.

PART 2 PRODUCTS

A. (NONE THIS SECTION)

PART 3 EXECUTION

3.1 GENERAL

A. Remove water from excavations to prevent softening of the land surface, trenches, and subgrades.

B. Do not allow water to accumulate in excavations. The Contractor shall, always during construction, provide ample means and devices with which to remove promptly and dispose properly of water entering site, trenches, and excavations.

C. Drainage shall be adequate to allow proper gravel operation to occur and to allow for the future use of the site as specified.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 31 23 19

SECTION 03 25 73

STORMWATER MANAGEMENT BY COMPOST (SWPPP)

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for the development, submission, and implementation of the Storm Water Pollution Prevention Plan (SWPPP), which shall be provided by the Contractor.

B. The storm water pollution prevention measures contained in the SWPPP shall be the minimum required by the EPA and the City of Braintree. The Contractor shall provide additional measures to prevent pollution from storm water discharges in compliance with the NPDES and all other local, state, and federal requirements.

C. The Contractor shall NOT begin construction without submitting evidence that a "National Pollution Discharge Elimination System" (NPDES) Notice of Intent governing the discharge of storm water from the construction site for the entire construction period has been filed at least two days prior to construction. It is the Contractor's responsibility to complete and file the NPDES Notice of Intent.

D. The Contractor shall conduct the storm water management practices in accordance with local regulations and governing authorities, the Federal NPDES permit requirements and for any enforcement action taken or imposed by Federal or State agencies. The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

E. As a requirement of the EPA’s NPDES Phase II permitting program, each Contractor and Subcontractor shall execute a Contractor's Certification form, a copy of which is included at the end of this Section.

F. The Contractor shall conform to the SWPPP (prepared by BSC Group and provided separately) and update said Plan as required during the work.

1.2 SUMMARY

A. This Section includes:

1. Compost blanket.

2. Compost filter berm.

3. Compost filter sock.

4. Compost soil management.

1.3 RELATED SECTIONS

A. Sections that relate to the work of this Section include:

1. Section 01 35 00—Special Provisions
2. Sitework (all Sections)
3. Section 01 57 00- Temporary Controls
4. Section 02 24 00 – Environmental Assessment
5. Section 31 11 00 (02230) – Site Clearing: Clearing and Grubbing
6. Section 32 90 00 – Planting

1.4 REFERENCES

A. Guidance Manual "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA 832-R-005).

B. Summary of Guidance Manual "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices" (EPA).

C. Massachusetts Stormwater Management Policy Handbook (Volume I) and Technical Handbook (Volume II) issued by the Massachusetts Department of Environmental Protection, March 1997.

D. Massachusetts Sediment and Erosion Control Guideline for Urban and Suburban Areas, March 1997.

1.5 SUBMITTALS

A. Signed copy of Contractor's Certification.

B. Product data. Unless otherwise indicated, submit the following for each type of product provided under work of this Section:

1. Local/Regional Materials:

a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.

b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.

d. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

2. Biobased materials:

a. Indicate type of biobased material in product.

b. Indicate the percentage of biobased content per unit of product.

c. Indicate relative dollar value of biobased content product to total dollar value of product included in project.

3. Evidence of certification under the U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program.

4. Field Quality Control reports.

1.6 QUALITY ASSURANCE

A. Certification: Provide compost products that are certified to specified product parameters in accordance with the U.S. Composting Council (USCC) Seal of Testing Assurance (STA) Program

1.7 STORM WATER POLLUTION PREVENTION PLAN

A. The Contractor shall review the SWPPP and provide comments and additions (as outlined below) to the Engineer for incorporation into the Final report. The Final SWPPP will be considered a part of these Contract Documents.

B. The following general principles shall be followed by the Contractor during the construction phase:

1. Protect and maintain existing vegetation wherever possible.

2. Minimize the area of disturbance.

3. To the extent possible, route unpolluted flows around disturbed areas.

4. Install mitigation devices as early as possible.

5. Minimize the time disturbed areas are left un-stabilized.

6. Maintain siltation control devices in proper condition.

C. The Contractor shall include a detailed Oil and Hazardous Materials Management and Spill Control Program section as an integral part of the Storm Water Pollution Prevention Plan. The Oil and Hazardous Materials Management and Spill Control Program (hereinafter referred to as OHM Program) shall address inventory, storage, and on-site handling of oil and hazardous materials as defined by 310 CMR 40.1600, risk mitigation measures, and spill control and reporting procedures that will be implemented by the Contractor during construction at each work site. The OHM Program shall include complete descriptions of all methods, procedures, and Best Management Practices (BMP) proposed to ensure compliance with appropriate environmental requirements of the City, the Massachusetts Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency, and all other having authority. The OHM Program shall be logically organized, and at a minimum shall address the following subjects:

1. Introduction and Objectives. The Contractor shall present an overview of key issues addressed and shall identify the objectives of the OHM Program, e.g. to prevent the release of oil and hazardous materials to the environment through the normal use of

appropriately designed engineering controls, properly maintained equipment, operational procedures, inspections, and personnel training, and to minimize the potential environmental impacts resulting from an accidental release of oil and hazardous materials.

2. Oil and Hazardous Management Practices. The Contractor shall identify practices, procedures, controls, and the like that will be employed in his work to reduce the risks associated with oil and hazardous materials (OHM) storage and usage. Areas that shall be addressed include inventory of OHM, storage of OHM, usage of OHM, and OHM risk mitigation measures. Additional requirements in each of these four areas are presented below:

    a. Inventory of Oil and Hazardous Materials. The Contractor shall identify by means of an inventory list, all oil and hazardous material that will be used or stored at the site, together with approximate quantities and proposed usage application. The inventory list shall be specific in identifying the OHM product names, quantities, and application. The inventory list shall be updated monthly and maintained in an Appendix to the Storm Water Pollution Prevention Plan.

    b. Storage of Oil and Hazardous Materials. The Contractor shall address on-site storage of oil and hazardous materials and waste at the site. Descriptions of storage arrangements for each item (or class of items, where applicable) contained on the inventory list shall be presented. Descriptions shall identify whether materials will be stored inside a temporary shelter or outside in tanks or containers, design of temporary shelter (e.g. floor material, shelf storage, venting provisions, etc.), conditions of outside storage (e.g. pervious or impervious surface, protection from elements, etc.), design of outside containers (e.g. above-ground or on-ground, size, material of construction, etc.), secondary containment provisions, location and description of proposed structural and nonstructural control measures, etc. Storage of OHM shall conform to applicable industry standards and shall comply with applicable Federal, state, and local regulations.

    c. On-Site Handling of Oil and Hazardous Materials. The Contractor shall address on-site usage of oil and hazardous materials at the site. Description of handling arrangements for each item (or class of items, where applicable) contained on the inventory list shall be presented.

    d. OHM Risk Mitigation Measures. Due to the limited amount of OHM material to be stored on site, the risks associated with the OHM storage and usage under this Contract is reduced. However, the Contractor shall identify these various risks associated with OHM usage at the site and detail mitigation measures employed to minimize these risks. Mitigation measures that the Contractor intends to implement shall be described.

3. Waste Disposal Practices. The Contractor shall identify practices, procedures, controls, and the like that will be employed in his work to ensure proper collection, storage, removal, and disposal of all construction waste, hazardous waste, used oil, and other waste petroleum products at the site. The Contractor shall additionally identify the following for all hazardous waste that he anticipates will be associated with his operations: the nature of the waste generated at the site and its hazards; the

designated “generator;” the method of disposal (use of licensed transporter, manifest and final treatment or receiving facility); management at the job site; and method of transportation off site. All hazardous waste materials shall be disposed of in accordance with applicable state laws M.G.L. c. 21C and implementing regulations 310 CMR 30.000. All records, manifests, and the like associated with storage and off-site transport and disposal of Contractor-generated wastes (exclusive of those associated with transport and disposal of earthworks in accordance with Section 31 00 00) shall be maintained in an Appendix to the Storm Water Pollution Prevention Plan.

4. Spill Control Procedures. The Contractor shall develop contingency procedures for use in the event of a release of OHM at each work site to minimize adverse impacts to the environment; procedures shall at a minimum comply with applicable provisions of CERCLA, SARA, and the Massachusetts Contingency Plan. Contingency procedures shall identify regulated materials, reportable quantities, and notification requirements in accordance with 310 CMR 40.0000, Massachusetts Contingency Plan, specifically 310 CMR 40.0300 and 310 CMR 40.0345. Notification requirements shall be clearly defined.

D. The Contractor shall include a detailed Inventory of Materials On Site section as an integral part of the Storm Water Pollution Prevention Plan. The Inventory of Materials On Site shall identify materials that are expected to be stored on site during construction activities.

E. The Contractor shall provide certifications included as part of the attached Storm Water Pollution Prevention Plan along with any other certifications required to comply with federal, state, and local regulations for storm water management, erosion and sediment control, and oil and hazardous materials management.

F. The Contractor shall include Appendices as an integral part of the Storm Water Pollution Prevention Plan shall be logically organized, and at a minimum shall facilitate and be utilized for the compilation of the following information and records: plans and figures; completed inspection and maintenance reports; records of grading and stabilization; inventory of oil and hazardous materials; waste disposal records; spill and incidents; other relevant records and documents, including permits, notices, regulations, etc.

G. Penalties:

1. Failure to comply with provisions of the NPDES permitting program and the Storm Water Pollution Prevention Plan may result in penalties assessed by the U.S. Environmental Protection Agency, the costs of which would be borne by the Contractor.

1.8 IMPLEMENTATION OF THE STORM WATER POLLUTION PREVENTION PLAN

A. The Storm Water Pollution Prevention Plan, updated in accordance with Paragraphs 1.6 and 1.7 of this Section, shall be implemented and adhered to during all phases of construction. The Contractor shall retain an up-to-date copy of his Storm Water Pollution Prevention Plan and all Appendices at an on-site construction project office. Such Plan, including all Appendices, shall be available for inspection during normal working hours by the Engineer, the Owner, and all duly authorized Federal, State, and local officials from the date of initial Plan submittal until the final copy is submitted upon completion of the Work.

B. The Contractor shall develop appropriate plans, figures, related sketches, etc. as necessary y to illustrate the Storm Water Pollution Prevention Plan. Such items shall be maintained in an Appendix to the Storm Water Pollution Prevention Plan as the Contractor develops them. At a minimum such drawings shall address the following three elements for the site – (1) Existing Site Conditions; (2) Site Plans (illustrating slopes after grading, areas of disturbance, drainage pattern, etc.); and (3) Site Controls (illustrating erosion and sediment measures, project construction BMP's, OHM management, etc.) – with each element separately addressed on its own drawings of series of drawings.

C. The following inspection and maintenance practices shall be used to maintain erosion and sediment controls:

1. All control measures identified in the Storm Water Pollution Prevention Plan shall be inspected by a Contractor-designated individual at least once bi-weekly and following any storm event of 0.5 inches or greater.

2. All measures shall be maintained in good working order; if a repair is necessary, it shall be initiated within 48 hours of deficiency identification.

3. The individual who performed the inspection shall complete an Inspection and Maintenance Report for each inspection. Completed Inspection and Maintenance Reports shall be maintained in an Appendix to the SWPPP. The Contractor-developed report form to be completed by the Contractor's inspector shall be submitted to the Engineer for approval and shall address the control measures identified in the Storm Water Pollution Prevention Plan. A sample Inspection and Maintenance Report form is presented as an Attachment to this Section. Contractor shall further develop this form as necessary to list the specific control measures to be inspected and to provide additional detail based on his proposed work. Inspection activities performed by the Contractor shall in no way limit the Authority or Engineer from conducting their own inspections and identifying deficiencies to the Contractor for correction.

D. The Contractor shall always properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) to achieve compliance with the conditions of the NPDES General Permit and with the requirements of the Storm Water Pollution Prevention Plan.

E. The Contractor shall maintain records of dates when major grading activities occur, dates of temporary or permanent cessation of construction, and dates initiation of stabilization measures in an Appendix to the Storm Water Pollution Prevention Plan.

F. Oil and Hazardous Materials Management and Spill Control

1. For practices not more specifically addressed by federal, state, and local laws and implementing regulations or these Specifications, all oil and hazardous materials and all spills shall be managed in accordance with the Oil and Hazardous Materials Management and Spill Control Program presented in the Storm Water Pollution Prevention Plan.

2. Spills

a. The NPDES General Permit does not relieve the Contractor of the reporting requirements of the Massachusetts Contingency Plan, 40 CFR Part 117, or 40

CFR Part 302. Where a release containing a hazardous substance in an amount equal to or in excess of a reporting quantity established under the Massachusetts Contingency Plan, 40 CFR Part 117, or 40 CFR Part 302, the Contractor is required to comply with the requirements of the aforementioned regulations and to modify the Storm Water Pollution Prevention Plan if necessary within 15 calendar days of knowledge of the release. Spills of oil or hazardous material shall be reported to the Massachusetts Department of Environmental Protection and/or the National Response Center as appropriate, if the reportable quantity is exceeded. All spills of OHM, in any quantity shall be reported to the Owner.

b. The Contractor following each occurrence shall prepare a spill report. Spill report shall present a description of the release, including quantity and type of material, date of spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications, and corrective measures implemented to prevent reoccurrence. Such reports shall be maintained in an Appendix to the Storm Water Pollution Prevention Plan.

c. The Contractor shall identify an appropriately trained site employee(s) involved with day-to-day site operations to be the spill prevention and cleanup coordinator. The names(s) of responsible spill personnel shall be posted in the material storage area and in the office trailer on site. Each employee shall be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

G. The Contractor shall be required to amend the Plan, whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to waters, including the addition of or change in location of storm water discharge points, or if the Plan proves to be ineffective in eliminating or significantly minimizing pollutants in storm water discharges or in otherwise achieving the general objectives of the Plan. Also, where warranted based on the results of an inspection by the Contractor or others, the site description, procedures, or elements of the Plan shall be revised as appropriate; modifications called for by the inspection and resultant changes to the Plan shall be implemented within 7 calendar days following the inspection. In addition, the Plan shall be amended to identify any new subcontractor that will implement a measure of the Plan. Finally, the Plan shall be amended to incorporate specific revisions if so, directed by the Engineer, the Owner, or any duly authorized Federal, State, or local official at any time during the performance of the Work under this Contract.

PART 2 PRODUCTS

2.1 COMPOST

A. Compost quality: Sanitized, mature compost free of identifiable feedstock constituents and offensive odors. Biosolids compost shall comply with the Standards for Class A biosolids outlined in 40 Code of Federal Regulations (CFR) Part 503.

1. Biobased Content: Minimum [100] [xxxx] percent.

B. Compost Blanket: Provide blanket in accordance with AASHTO specification MP 10-03; Compost for Erosion/Sediment Control (Compost Blankets), American Association of State Highway Transportation Officials, Washington, D.C. and with product parameters as follows:

1. Particle size: 3/8-1/2 in. screen and 2-3 in. screen (ratio = 3:1)
2. Moisture content: 20-50%
3. Soluble salt: 3.0 - 6.0 mmhos/cm
4. Organic matter: 40 - 70%
5. pH: 6.0 - 8.0
6. Nitrogen content: 0.5 - 2.0%
7. Human made inerts: 0.0 - 1.0%
8. Application rate/size: 3/4 - 3 in. depth

C. Compost Filter Berm: Provide berm in accordance with AASHTO specification MP 9-06 Standard Specification for Compost for Erosion/Sediment Control (Filter Berms and Filter Socks), and with product parameters as follows:

1. Particle size: 3/8-1/2 in. screen and 2-3 in. screen (ratio = 1:1)
2. Moisture content: 20-50%
3. Soluble salt: 4.0 - 6.0 mmhos/cm
4. Organic matter: 40 - 70%
5. pH: 6.0 - 8.0
6. Nitrogen content: 0.5 - 2.0%
7. Human made inerts: 0.0 - 1.0%
8. Application rate/size: 1’ - 2' H x 2.5’ - 4' W

D. Compost Filter Sock: Provide [unvegetated] [vegetated] filter sock in accordance with AASHTO specification MP 9-06.

1. Size: [8] [12] [18] [24] [xxxx] inches in diameter.
2. Mesh Sock: Biodegradable.

PART 3 EXECUTION

3.1 INSTALLATION

A. Compost Blanket: Apply compost to the soil surface in a uniform thickness. Extend minimum 3 feet over the shoulder of the slope.

1. Slopes: Apply on slopes between 4:1 and 1:1, unless otherwise indicated.

B. Compost Filter Berm: Apply compost to the soil surface in a uniform thickness; compact and shape into a trapezoid. [Vegetate by hand.] [Vegetate by incorporating seed into the compost prior to installation.]

C. Compost Filter Sock: Do not trench. After placing filter sock, anchor to slope [with stakes driven through the center of the sock at regular intervals] [with stakes placed on the downstream side of the sock]. Direct ends of the filter sock upslope. [Vegetate by incorporating seed into the compost prior to installation.]

D. Compost for Soil Management: Amend soil [where indicated on drawings] [in disturbed areas] or import topsoil mix of sufficient organic content and depth to meet the specified requirements. Coordinate with work of Section 32 90 00 – Planting for topsoil analysis, recommended compost requirements for specified plants, and landscape commissioning.

1. Amendment Rate: [25%-30% compost by volume for planting areas; 15% compost by volume for turf areas.] [2"–4" of compost into upper 8"–12" of soil.] [xxxx] [Provide minimum 8-inch depth of soil with 10% Soil Organic Matter (SOM) content in planting areas, and 5% SOM content in turf areas. Unless otherwise indicated, use the following equation to calculate compost application rates necessary to achieve the specified SOM.

a. $$CR = D * \frac{SBD*(SOM\%-FOM\%)}{SBD*(SOM\%-FOM\%)-CBD*(COM\%-FOM\%)}$$

b. Where:

1) CR = Compost application rate (inches) calculated to achieve the target final organic matter (FOM)

2) D = Depth of finished incorporation (inches)

3) SBD = Soil bulk density (lb./cubic yard dry weight; to convert SBD from g/cm3 units to lb./cubic yard, multiply by 1697)

4) SOM % = Initial soil organic matter (%)

5) FOM% = Final target soil organic matter (%)

6) CBD = Compost bulk density (lb./cubic yard dry weight; to convert CBD from lb./cubic yard "as is" to lb./cubic yard dry weight, multiply by solids content)

7) COM% = Compost organic matter (%)]

2. Compacted subsoils: Scarify minimum 4 inches below the 8 inch deep amended layer (for a finished uncompacted depth of 12 inches).

3. Planting areas: Unless otherwise indicated, mulch with minimum 2 inches of organic material.

3.2 FIELD QUALITY CONTROL

A. Water: Coordinate with work specified in Section 02 24 00 – Environmental Assessment to provide water monitoring for surface and groundwater.

1. Assess potential effects of soil management practices on soil loss in accordance with ASTM D6629. Assess erodibility of soil with dominant soil structure less than 7 to 8 cm in accordance with ASTM D5852.

B. Soil Depth and Quality:

1. Document in scale site drawing:

a. Undisturbed areas: Areas of site remaining undisturbed with native vegetation and soil. Verify that these areas were protected from compaction during construction. Indicate total square footage.

b. Disturbed areas: Areas of site disturbed by construction operations. Indicate stormwater management procedures implemented; identify where compost blankets, compost filter berms, compost filter socks, and compost soil management practices were implemented. Indicate size and quantity of compost blankets, berms, and socks; indicate total square footage of compost soil management.

2. Compost Soil Management: For disturbed areas where stormwater management includes compost soil management, report results of the following:

a. Visually inspect soil for compaction, scarification, and amendment incorporation by digging at least one 12-inch-deep test hole per acre for turf and at least one per acre for planting areas. Excavate test holes using only a garden spade driven solely by inspector's weight.

b. Test 10 locations per landscaped acre (10 locations minimum) for compaction, using a simple rod penetrometer (a 4 foot long 3/8th inch diameter stainless steel rod, with and a 30-degree bevel cut into the side at that goes in 1/8 inch at the tip). Verify that rod penetrates to 12" depth driven solely by weight of [Landscape Architect] [Civil Engineer] [Owner's Representative] [xxxx] reviewing field quality inspection.

c. Verify placement and depth of organic mulch material on all planting beds is as specified.

d. Verify amendment rate for compost is as specified. [Verify calculations to meet SOM content requirements were prepared by a qualified professional. Qualified professionals include certified Agronomists, Soil Scientists or Crop Advisors; and licensed Landscape Architects, Civil Engineers, or Geologists.]

END OF SECTION 03 25 73

SECTION 32 11 00

Base Courses

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for the preparation and placement of granular pavement subbase and base materials. These subbase and base shall consist of approved granular materials placed on the subgrade and in close conformity with the lines and grades on the plans or established by the Engineer.

B. The work includes:

1. Fine grading and compaction of pavement subgrade.

2. Furnishing, placing, and compacting of subbase and base materials.

3. Producing a stabilized base course and/or sub-base through the recycling of the existing pavement structure and a specified depth of acceptable sub-base material. This combination of pavement and sub-base material is to be uniformly crushed, pulverized, and blended, then spread, graded, and compacted to the lines and grades shown on the plans or established by the Engineer.

1.2 RELATED SECTIONS

A. Other specification sections that directly relate to the work of this Section include:

1. Section 31 00 00 - Earthwork

2. Section 32 12 00 – Flexible Pavement

3. Section 03 30 00 - Site Cast-in-Place Concrete

PART 2 PRODUCTS

2.1 GRAVEL SUBBASE AND BASE

A. Gravel Borrow shall conform to the requirements for Gravel Fill of Section 31 00 00 – Earthwork. Largest stone size shall be 2-inches.

2.2 DENSE GRADED CRUSHED STONE SUBBASE AND BASE

A. Dense Graded Crushed Stone shall conform to the requirements for Dense Graded Crushed Stone of Section 31 00 00 – Earthwork.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. All subsurface utility construction shall be completed before fine grading is begun.

B. The pavement and curb subgrade shall be fine graded to the location, elevations and cross slope shown on the Drawings.

C. Subgrades in in-situ soils in excavation areas and in embankment areas shall be compacted in conformance with Section 31 00 00 - Earthwork.

3.2 SUBBASE MATERIAL PLACEMENT

A. Subbase material shall not be placed until the Engineer has approved the fine grading, compaction, and condition of the subgrade.

B. Subbase material shall be placed and spread on the approved subgrade in layers not exceeding four inches in thickness by approved self-spreading equipment. Any displacement of the compacted subgrade material by the equipment shall be restored to the required grade and recompacted before placement of the subbase material.

C. Subbase material shall be compacted conformance with Section 31 00 00 - Earthwork.

D. The surface of the subbase material shall be fine graded to the location, elevations and cross slope shown on the Drawings during final layer compaction operations.

3.3 BASE MATERIAL PLACEMENT

A. Base material shall not be placed until the Engineer has approved the fine grading, compaction, and condition of the subbase material.

B. Base material shall be spread on the approved subbase in layers not exceeding four inches in thickness by approved self-spreading equipment. Any displacement of the subbase material by equipment shall be restored to the required grade and recompacted before of the base material.

C. Base material shall be compacted in conformance with Section 31 00 00 - Earthwork.

D. The surface of the base material shall be fine graded to the proposed location, elevations and cross slope shown on the Drawings during final layer compaction operations.

END OF SECTION 32 11 00

SECTION 32 12 00

FLEXIBLE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Bituminous concrete wearing and binder course paving

B. Aggregate base course.

1.2 RELATED SECTIONS

A. Section 02 10 00- Site Preparation

B. Section 31 00 00 – Earthwork

C. Section 31 22 19 – Finish Grading

1.3 REFERENCES

A. ASTM D946 Penetration Graded Bituminous Cement for Use in Pavement Construction.

B. TBI (The Bituminous Institute) MS 2 Mix Design Methods for Bituminous Concrete and Other Hot Mix Types.

C. TBI (The Bituminous Institute) MS 3 Bituminous Plant Manual.

D. TBI (The Bituminous Institute) MS 8 Bituminous Paving Manual.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the Standard Specifications as specified herein.

B. Obtain materials from same source throughout.

1.5 ENVIRONMENTAL REQUIREMENT

A. Do not place Bituminous when ambient air or base surface temperature is less than 40 degrees F or surface is wet or frozen.

B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen suppliers bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.1 MATERIALS

A. Binder course shall be Class I Bituminous Concrete Binder Course in accordance with M3.11 of the Standard Specifications.

B. Wearing (top) course shall be Class I Bituminous Concrete Top Course in accordance with M3.11 of the Standard Specifications.

C. Aggregate base Course (Gravel base) shall be Gravel Borrow conforming to MHDSSHB Specification Section M1.03.0, Type b. Alternatively, The contractor may utilize pulverized asphalt pavement material for the aggregate base provided the material meets the gradation analysis specified below:

Sieve Designation	Percentage by Passing Weight
3”	100
1-1/2”	70-100
¾”	55-90
#4	40-75
#40	10-30
#200	0-10
Residual Asphalt Content	2-4

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of subgrade are correct.

3.2 GRAVEL BASE

A. See Section 32 11 00 –for placement of Aggregate Base for work of this section.

3.3 PLACING BITUMINOUS CONCRETE PAVEMENT

A. Pavement shall be laid in accordance with Section 460 of the Standard Specifications and shall be laid in two (2) courses with minimum depths, as shown in the drawings.

B. Binder Course shall be the first course laid with a depth as shown on the drawings.

C. Wearing Course shall be the second course laid with a depth as shown on the drawings.

D. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

3.4 TOLERANCES

A. Driveway area: 1/4" in 10'-0"

3.5 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for 2 days or until surface temperature is less than 140 degrees F (60 degrees C).

B. All street castings shall be protected during construction. Upon satisfactory placement of road base, the castings shall be reset and adjusted to the proper grade and alignment consistent with the finished roadway surface. A full bed of mortar shall be placed around the castings after the final setting. Mortar (shall not be) placed for this purpose within 3” of the proposed finished surface.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part of the Lump Sum contract.

END OF SECTION 32 12 00

SECTION 32 31 19

DECORATIVE METAL FENCES AND GATES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This specification covers materials and construction requirements for ornamental picket fence.

B. Ornamental picket fence gates shall be manufactured by an approved manufacturer that has been providing commercial and residential fence systems for no less than 5 years.

C. Ornamental picket fence gate shall be as shown on the drawings. The contractor shall verify dimension of the fence before fabrication.

1.2 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.

PART 2 MATERIALS

2.1 Pickets shall be made of hot rolled structural steel. The wall thickness shall be 16 gauge. Tube shall be manufactured per ASTM A513. Tube shall be hot dipped per ASTM A525-G90. Space between pickets shall be 3 31/32" face to face.

2.2 Size: 1" square; Wall Thickness: 16 gauge; Weight per ft.: 0.827 lbs.; Tensile Strength: 45,000 PSI

2.3 Rails shall be made of hot-rolled structural steel, rolled in "U" channel measuring 1 3/8" wide by 1 ½" deep by .120 wall thickness. Manufactured per ASTM A513 and hot-dipped galvanized per ASTM A525-G90.

2.4 Posts shall be hot rolled structural steel. Wall thickness and weights are presented below. Tube shall be manufactured per ASTM A513. Tube shall be hot dipped per ASTM A525.

Size	Wall Thickness	Weight per Ft.	Tensile Strength
2"	14 ga.	2164 lb.	45,000 PSI
2 ½"	14 ga	2733 lb.	45,000 PSI
3"	12 ga	4286 lb.	45,000 PSI
4"	12 ga	5770 lb.	45,000 PSI

2.5 Rail Attachment Brackets-die cast of zinc (ZAMAK #3) per ASTM B86-83Z 33521. Ball and socket design capable of 30 swivels (up/down left/right). Bracket to fully encapsulate rail end for complete security that is aesthetically pleasing.

2.6 Finials- grey cast iron with minimum 20,000 PSI. Hot dipped galvanized per ASTM A153.

2.7 Rings-Cast aluminum per ASTM A319

2.8 Coating-Fence shall have galvanized undercoat inside and outside all members to assure maximum corrosion resistance.

2.9 Color-Finished color of fence shall be Black.

PART 3 EXECUTION

3.1 SHOP DRAWINGS

A. Provide catalog cut or shop drawing to the engineer before fabrication.

3.2 LAYOUT

A. Contractor shall layout the fence.

3.3 INSTALLATION/PLACEMENT

A. Installation/placement of ornamental picket fence shall be in accordance with the manufacturers written instructions and recommendations.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Payment for this work will be made as part Lump Sum for the work item stated.

END OF SECTION 32 31 19

SECTION 32 90 00

PLANTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS: This Section is only a portion of the Contract Documents. All the Contract Documents, including Conditions of the Contract and Division 1 General Requirements, apply to this Section.

1.2 SECTION INCLUDES:

A. General: Provide trees, shrubs, vines, and groundcover complete in place including all related materials, and establishment procedures in accordance with the contract documents.

1.3 REFERENCES:

A. "American Standard for Nursery Stock", 1990 Edition, American Association of Nurserymen, Inc.

B. Hortus III 1976 Edition. Bailey Horatorium, Cornell University.

C. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103, USA as Published in “Compilation of ASTM Standards in Building Codes”.

1.4 EXAMINATION OF SITE AND DOCUMENTS:

A. The Contractor shall affirm that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

B. Plans, specifications, surveys, measurements, other documents, and dimensions under which the work is to be performed are believed to be correct; but the Contractor shall have examined them for himself during the Bidding period, as no additional compensation will be made for errors or inaccuracies that may be found therein.

1.5 SUBMITTALS TO LANDSCAPE ARCHITECT:

A. Tagging Schedule:

1. At least 30 days prior to planting, the Contractor shall submit a schedule for tagging material to the Landscape Architect. Once tagged, the Contractor shall provide written documentation to the Landscape Architect that trees have been paid for or a retainer has been placed on the plant material to ensure that the nursery will hold the plants until planting operations can begin. If, due to schedule delays, the planting will be delayed and the plant material needs to be released, the Contractor shall submit the request to release material in writing, for approval of the Landscape Architect. No plant material shall be released without approval in writing from the Landscape Architect.

B. Soil Test Reports:

1. See Section 32 92 00 - TURF AND GRASS for requirements.

2. Submit soil test report for on-site loam, loam borrow, and compost soil amendment/ mulch.

3. Written approval of loam borrow shall be obtained prior to delivery of any materials to the site.

4. Plant Material Availability Confirmation: At least 60 days prior to anticipated planting, the Contractor shall submit a confirmation of availability for all plants on the list, accompanied by nursery sources. No substitutions shall be made without the written consent of the Landscape Architect.

C. Manufacturers Product Data:

1. Specifications Instructions: Submit material specifications, manufacturer's literature, and installation instructions where applicable attesting that the following materials meet the requirements specified:

a. Soil conditioner (Polyacrilamide)

b. Soil inoculant (Endo-echo-mycorrhizae)

c. Soil Moisture Mat

d. Fertilizer

e. Anti-desiccant

f. Mulch

g. Stakes

h. Arbor tape

i. Soil Amendments as (recommended per soil test report)

1.6 PLANT MATERIAL FIELD REVIEW PROCEDURE:

A. Review: Submit a written request for review of plant materials and quantity at place of growth within (thirty (30) days after award of contract). Right is reserved to refuse review currently if, in the judgment of the landscape architect, an insufficient quantity of plants is available for review.

B. Transportation: Contractor shall accompany Landscape Architect to all review(s) of plant materials at the nursery. Landscape Architect will review and tag plants at place of growth and review them upon delivery for conformity to specifications. Except as otherwise agreed and approved by the owner.

C. Distant Material: Submit photographs with a person adjacent to each plant type for preliminary review. Such review shall not impair the right of a growing grounds review and rejection during progress of the work.

D. Unavailable Material: If proof is submitted that a specified plant is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Substantiate such proof in writing no later than 30 days after award of contract.

E. Special Conditions: The above provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made to supply specified materials.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Delivery: Do not deliver to the site disease infected plant materials.

B. Labeling: Furnish standard products in manufacturer's standard containers bearing original labels legibly showing quantity, analysis, genus/species, and name of manufacturer/grower.

C. Storage: Protect soil amendment containers from sun during summer months with temperatures above 80 degrees F. Keep plants that cannot be planted immediately upon delivery in the shade, well protected and well-watered Heel in and protect with burlap all B & B plant materials, which cannot immediately be planted upon deliver.

D. Handling: Do not lift or handle container and B & B plants by tops, stems, or trunks at any time. Do not bind or handle plants with wire or rope at any time.

E. Anti Desiccant: At Contractor's option, immediately before transporting, spay evergreen or deciduous plant materials in full leaf with anti-desiccant. Apply an adequate film over trunks, branches, twigs, and foliage.

F. Digging: Dig B & B plants with firm, natural balls of earth of diameter not less than that recommended by American Association of Nurserymen’s Standard for Nursery Stock, and of sufficient depth to include the fibrous and feeding roots.

1.8 PROJECT/SITE CONDITIONS:

A. Protection of Existing Plants to Remain:

1. Operations: Do not store materials of equipment, permit burning, or operate or park equipment under the branches of all existing plants to remain.

2. Barriers: Provide temporary fences at the drip line to protect existing plants to remain from damage during construction.

3. Notification: Give immediate written notification if other construction activities threaten to damage existing plants to remain.

B. Replacement of Damaged Plants:

1. Replace existing plants to remain which Contractor damages during construction with accepted plants of the same species; replacement size to be determined by Landscape Architect; cost of replacement shall be at no additional cost to Owner.

2. Landscape Architect will determine extent of damage and value of damage plants.

1.9 PLANTING SEASON:

A. Contractor to use discretion based on current weather conditions.

B. Deciduous Trees and Shrubs: In the fall (September 1 – November 15) after leaf drop occurs but before soil freezes, in the spring (April 1 – June 15) before growth begins.

C. Evergreen Trees, Shrubs and Vines: Early Fall (September 1 – November 1) or late spring (April 1 – June 1).

1.10 SEQUENCING AND SCHEDULING:

A. Acceptance: Do not install plant materials prior to acceptance of finish grades and/installation of irrigation system.

B. Coordination: Coordinate with work of other Sections to insure the following sequence of events:

1. Pruning: Do not prune materials prior to installation and acceptance. Request review by Landscape Architect prior to pruning.

1.11 WARRANTY:

A. The 90-day maintenance period begins the date of completed installation of all plant materials as approved in writing by the owner. The one-year warranty period begins after the final acceptance of the maintenance period. The final acceptance occurs upon satisfactory completion of all work, included in the 90-day maintenance period, but exclusive of replacement of materials under the Warranty Period.

B. Correct Species: Warrant that all plant materials are true to species and variety.

C. Vigor: Warrant that all trees, shrubs, vines, and groundcover planted under this Contract will be healthy and in flourishing condition of active growth one (1) year from date of Grand Opening.

D. Delays: Delays caused by the Contractor in completing planting into more than one planting season shall extend the Warranty Period correspondingly.

E. Conditions of Plants: At the conclusion of the maintenance period and at the conclusion of the warrantee period plants shall be reasonably free of dead or dying branches and branch tips, with foliage of normal density, size, and color comparable or superior to conditions at the time of approved installation.

F. Replacements: As soon as weather conditions permit, replace, without additional cost to Owner all dead plants and all plants not in a vigorous, thriving condition, as determined by Landscape Architect during Maintenance and Warranty Periods.

G. Exclusions: Contractor shall not be held responsible for failures due to neglect by Owner, vandalism, and acts of God, during Warranty Period. Report such conditions.

H. Dormancy Extension: Only the period of active growth shall be counted in measuring the duration of the Warranty Period. All plant materials installed just prior to or during their dormancy period shall have the Warranty Period extended accordingly. The date of dormancy

and date of resumption of active growth shall be as set by the Landscape Architect in accordance with regional and species-specific requirements.

1.12 REPLACEMENTS:

A. Failed Materials:

1. Plant materials exhibiting conditions, which are determined as unacceptable, shall be repaired supplemented and/or replaced at no additional cost to the Owner.

2. Replacements to be same species or approved equivalent. Apply requirements of this Specification to replacements.

3. Contractor shall be held responsible for a maximum of two (2) replacements for each failed tree, shrub and vine, and same area of groundcover planting after final acceptance during warranty period.

B. Incorrect Materials:

1. During Warranty Period. replace at no additional cost to Owner plants revealed as being untrue to name and species.

2. Provide replacements of a size and quality to match the planted materials at the time the mistake is discovered.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Plant Materials: Verify that all container stock has been grown in the containers in which delivered for at least one growing season, but not over two (2) years.

1. Growing Conditions: Plants shall be nursery grown, complying with ANSI Z60.1, in accordance with good horticultural practices under climatic conditions like those of the project unless otherwise specifically authorized.

2. Appearance: Trees shall be exceptionally heavy, symmetrical, tightly knit and so trained or favored in development and appearance as to be superior in form for their species, regarding number of branches, compactness, and symmetry.

3. Vigor: Plants shall be sound, healthy, and vigorous, well branched, and densely foliated when in leaf. They shall be free of disease, insect pests, eggs, or larvae. They shall have healthy, well developed root systems and shall be free from physical damage or adverse conditions, which would prevent thriving growth.

B. Condition of Root system: Samples must prove to be completely free of circling, kinked or girdling trunk surface and center roots and show no evidence of a pot bound condition.

C. Measurements:

1. General: Measure plants when branches are in their normal upright position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Take caliper measurement at a point on the trunk 6 in. above natural ground line for

trees up to 4 in caliper (and at a point 12 in. above the natural ground line for trees over 4 in. in caliper).

2. Size Range: If a range of size is given, do not use plant materials less than the minimum size. Not less than 40 percent of the plants shall be as large as the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.

3. Substitutions: Substituted plants shall be true to species and variety and shall conform to measurements specified except that plants larger may be used if accepted. Use of such plants shall not increase Contract price. If larger plants are accepted, increase the ball of earth in proportion to the size of the plant. Plants overgrown for their container size will be rejected.

D. Unacceptable Trees: Trees, which have damaged or crooked leaders, will be rejected. Trees having a main leader shall not have been headed back. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 3/4 in. which have not completely callused, will be rejected.

E. Pruning: Do not prune plants before delivery. Consult Landscape Architect for pruning after installation.

F. Field Dug Stock: Prior to digging of field grown plant materials, ensure that excess loose fill resulting from cultivation around stems and over roots be removed down to natural finish grade at crown of plant materials. During digging, verify that size of vernier shovel or other equipment is adequate to encompass the actively growing root zone of all plants. Plants, which, after digging, show mostly large fleshy roots and few fibrous rots, will be rejected.

2.2 FERTILIZERS:

A. Slow-Release Fertilizer:

1. Slow release Organic and/or stabilized nitrogen Fertilizer (N P K) and volume per plant as approved by the landscape architect based on findings of the soil test report.

2.3 SOIL CONDITIONING MATERIALS:

A. Apply conditioning materials in accordance with recommendations of testing laboratory.

B. Limestone for adjustment of soil pH shall be ground dolomitic limestone containing not less than 85 percent of total carbonated and shall be ground to such a fineness that 40 percent will pass through a 100-mesh sieve and 90 percent will pass through a 20-mesh sieve. Coarser material shall be acceptable provided specific rates of application are increased proportionately based on quantities passing the 100-mesh sieve. The lime shall be uniform in composition, dry and free flowing. It shall be delivered to the site in original unopened containers, each bearing manufacturer's guaranteed analysis.

C. Humus shall be natural humus, reed peat or sedge peat. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form and shall pass through a 1/2-inch mesh screen. According to the methods of testing of A.O.A.C., latest edition, the acidity range shall be approximately 5.5 pH to 7.0 pH and the organic content

shall be not less than 60% as determined by drying at 105 degrees C. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis. Ash content shall not exceed 10%.

D. Compost: Submit soil test report. Aged at least one (1) year, having a moisture content not exceeding 40 percent, free of any disease, insects, and shall pass a 1-inch square mesh and be retained on a 1/8-inch square mesh. Mulch shall not contain pieces more than 1/4 inch thick or an excess of fine particles. Compost Mulch shall be dark brown in color.

E. Manure shall be well-rotted, unbleached stable manure not less than eight months and not more than two years old, free from sawdust, shavings, or refuse of any kind and shall not contain over 25% straw. The Contractor shall furnish information as to kind of disinfectant or chemicals, if any, that may have been used in storage of the manure.

F. Bone meal shall be fine ground, commercial raw bone with a minimum analysis of 4% phosphoric acid and 1.0% of nitrogen. Mix uniformly with planting soil at the following rates: 1/4 pound per shrub.

G. Peat moss is not acceptable.

2.4 BACKFILL MIX:

A. Backfill Mix:

1. Backfill mix shall be amended loam topsoil per recommendation of soil test report.

2.5 ACCESSORIES:

A. Below Ground Tree Anchoring: Acceptable products include Arbor Guy, Duckbill anchors, tree staples or others as approved by Landscape Architect. Contractor responsible for maintaining trees in a plumb and upright position. Provide below-ground tree anchors for all trees unless noted otherwise approved by the owner's representative.

B. Soil Moisture Mat - If required provide burlap moisture matt. 36" diameter burlap fabric bag containing pre-saturated polyacrylamides. Water storage capacity of 15 gallons.

C. Mulch:

1. Type: 100% composted leaf mulch, food waste or biosolid compost). 100 percent organic, having a moisture content not exceeding 40 percent. Compost shall be derived from organic waste that meet all State Environmental Agency requirements. The product shall be free of viable weed seeds and contain material of a humus nature capable of sustaining growth of vegetation with no materials toxic to plant growth. Approved providers are Cavicchios (leaf mulch) and Agresource (food waste compost or biosolid compost)

2. Size: The mulch shall be well-composted material with no chips or pieces of mulch of a chunk type present. The particles shall pass a 1-inch square mesh and be retained on a 1/8-inch square mesh.

3. Documentation: Compost generator shall supply documentation showing state approval for intended use.

4. pH: Mulch pH shall be in the range of 5.5 to 8.0 or as requested by Landscape Architect.

D. Water:

1. Clean, fresh, and potable, furnished by the owner and paid delivered to the plants by Contractor including all necessary temporary equipment.

2. Transport as required.

E. Anti Desiccant:

1. Type: Sprayable, water soluble vinyl vinylidene complex, which will produce a moisture retarding barrier not removable by rain or snow.

2. Product: "Wilt Pruf NCF" by Nursery Specialty Products, Inc.

PART 3 Execution

3.1 EXAMINATION:

A. Verification of Conditions:

1. Soil Preparation: Do not commence planting work prior to completion and acceptance of soil preparation.

2. Finish Grades: Finish grades for planting areas shall have been established in another Section. Verify that all grades are within 1 in. plus or minus of required finish grade and that all soil amendments have been installed.

3.2 PREPARATION:

A. Layout and Staking: Lay out plants at locations shown on Drawings for Landscape Architect's review. Use wire flags, color coded for evergreen or deciduous and labeled for each species of plant material. Stake each tree, and major shrub. Outline shrub and groundcover beds with lime.

B. Review: Locations of plants will be checked in the field and will be adjusted to exact position before planting begins. Right is reserved to refuse review currently if, in the Landscape Architect's opinion, an insufficient quantity of plants is available.

C. If rock, utilities, tree roots or obstructions are encountered in the excavation of shrub beds and tree pits, the Landscape Architect may select alternate locations.

D. Equipment for Digging Plant Pits: Use backhoe to dig tree pits. Scarify all sides of the tree pit after excavation see below. Do not use an augur or vernier spade except when approved by the General contractor and Owners Representative.

E. Trunk Flare: Prior to excavation of tree pits and shrub beds, locate the trunk flare of the plant and excavate so that the trunk flare of the plant is located slightly above finish grade after installation.

3.3 DRAINAGE TEST OF PLANT FOR TREE AND SHRUB PITS/OBSTRUCTIONS:

A. Testing: Where requested by landscape architect perform a horticultural infiltration test: Immediately after completion of excavation, test drainage of all tree pits and 4 representative shrub pits plant pits by filling with water twice in succession. Give written notification of conditions permitting the retention of water in plant pits for more than twenty-four (24) hours.

B. Correction: Submit for acceptance a written proposal and cost estimate for the correction of poor drainage conditions before proceeding with planting.

C. Obstructions: If rock, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits, acceptable alternate locations may be used at direction of Landscape Architect.

D. For Trees and Shrub Plant Pit:

1. Location: At locations as determined by the Landscape Architect on site.

2. Restrictions: Do not perform test on a rainy day or during freezing weather. Repeat all tests interrupted by rain or cold.

3. Procedure:

a. Dig test pit of a size specified for the tree pits, a minimum of 4 ft. deep. Legibly calibrate a stake at 1 in. intervals and drive it firmly into the undisturbed soil at the bottom of the pit.

b. Fill test pit with water to within 1 ft. of the finish grade. Immediately record water level on the stake.

c. After 3 hours, record water level again. Repeat recording of water level once each hour for the succeeding five hours.

4. Documentation: Submit written documentation of all test pit results, dated, and signed by the tester.

5. Rates:

a. Acceptable Rate: 2 in./hr. or more

b. Marginal Rate: 1 in. to 2 in./hr.

c. Unacceptable Rate: 1 in./hr. or less

3.4 TREE, SHRUB AND VINE PLANTING:

A. Handling and De Potting of Plant Materials:

1. Damage: Avoid damage to containers and wrappings and root balls. If root ball is cracked or broken during handling and de potting, plant will be rejected.

2. Container Shrubs: Metal Containers: Cut can on two sides with accepted cutting tool. Do not use spade. Plastic Containers: Tip container to horizontal orientation and shake carefully to remove shrub. Support root ball during installation to prevent cracking or shredding of soil.

3. Balled and Burlapped Plants: Lift and carry bottom of ball only. Do not remove wrapping until plant is set in plant pit. Cut top wire and peel wire and burlap away from upper 1/3 of root ball prior to backfilling.

    a. Remove any plastic or fiberglass or other non-decomposable wrapping material completely.

B. Installation:

1. Plant Pit Side Scarification:

    a. Plant Root ball: After removing plant from container, scarify the sides of the root ball to a depth of 1 in. at four to six equally spaced locations around the perimeter of the ball or at 12 in. intervals on sides of boxed materials. Cut and remove circling roots over 3/8 in. diameter.

    b. Plant Pit: Scarify sides of all plant pits, thoroughly breaking up surfaces and eliminating "glazed" areas.

2. Positioning: Backfill plant pit with backfill mix as shown on the drawings to allow setting crown of tree 2 in. above new finish grade and crown of shrub 1 in. above finish grade. Thoroughly foot tamp all backfill. Position plant in planting pit, maintaining plumb condition. Maintain plants in a thriving healthy condition throughout all planting operations.

3. Backfilling:

    a. Use backfill mix to backfill on grade plant pits as shown on Drawings. Brace each plant plumb and rigidly in position until planting soil has been tamped solidly around the ball and roots.

    b. When plants pits have been backfilled approximately 2/3 full, water thoroughly and saturate root ball, before installing remainder of the backfill mix to top of pit, eliminating all air pockets.

    c. Slow-Release Fertilizer: Place evenly distributed in plant pits when backfilled 2/3 according to the following schedule: Rate per manufacturer’s instructions and as approved by the Owners representative based on soil test reports.

4. Tree Anchoring: Provide tree anchors for all trees as specified in paragraph 3.5.

5. Soil Moisture Mat: When required, install Soil Moisture mat per the manufacturer’s instructions. Pre-wet the moisture mat and cover with mulch as specified in paragraph 3.6.

6. Watering Saucer: Form saucer with 3 in. high berm of backfill mix or soil mix as shown on the drawings centered around edge of each tree and shrub ball.

7. Watering: Immediately water all plants after completion of planting operations. All plants shall be flooded with water twice within first 24 hours of planting.

8. Settlement: Correct all settlement of materials immediately.

3.5 TREE STAKING (BELOW GROUND ANCHORING):

A. General: Provide below-ground tree anchors for all trees unless noted otherwise approved by the owner's representative.

B. Contractor responsible for maintaining trees in a plumb and upright position.

3.6 MULCHING:

A. Install a 2-3 in. deep layer of mulch over all tree pits.

B. Install a 2-3 in. deep layer of mulch over all shrub areas including tree and shrub watering basins.

C. Install a 2-3 in. deep layer of mulch over groundcover areas prior to planting groundcover.

D. Keep mulch from direct contact with stems.

3.7 GROUNDCOVER ANNUAL OR PERENNIAL PLANTING:

A. Top dress Fertilizer: Prior to mulching groundcover areas apply fertilizer per manufacturer's instructions as approved by the owner's representative.

B. Mulch groundcover areas immediately after fertilizing.

C. Plant groundcover through the mulch.

D. Water groundcover area immediately after planting.

3.8 PRUNING:

A. Each tree and shrub shall be pruned in accordance with American Nurserymen Association standards to preserve the natural character and health of the plant.

B. Never cut a leader.

C. Pruning shall only be performed for health of plants and safety clearance at walkways. Shearing or hedging without approval from the owner's representative is not permitted.

D. Pruning shall include removal of all dead wood, suckers and broken or badly bruised branches.

E. Use only clean, sharp tools.

F. Apply anti-desiccant to foliage if conditions warrant.

3.9 MAINTENANCE:

A. Provide landscape maintenance from start of work until receipt of written approval and acceptance of completion of the 1-year maintenance period.

B. Maintenance includes watering of lawns, plants, trees, shrubs, and other plants.

C. Re-fertilization, weeding, mowing, cleaning up and edging, repairs of all washouts and gullies, repairs or protection, and other necessary work of maintenance. Maintain slopes against erosion.

D. Refer to the Landscape and Habitat Maintenance Guide for detailed maintenance methods. Maintenance practices for this project differ from standard plant bed maintenance. The most significant difference is the weeding and cleaning of beds which requires the retention of flower seed heads, stems, foliage, as well as retention of weed stems, foliage, and leaf litter. Remove only invasive weed seed and root stock as identified in the manual.

END OF SECTION 32 90 00

SECTION 32 91 13

SOIL PREPARATION

PART 1 GENERAL

1.1 DESCRIPTION

A. General: Provide soil preparation in accordance with the contract documents.

B. Related Work Specified Elsewhere:

1. Section 31 22 19 - Finish Grading

2. Section 32 92 00 – Turf and Grasses

3. Section 32 90 00 - Planting

1.2 PROJECT/SITE CONDITIONS

A. Review the Owner's existing soils analysis and soils boring data.

B. Existing conditions: For protection of existing plants to remain, refer to spec. Section 32 90 00 Planting

1.3 EXAMINATION OF SITE AND DOCUMENTS

A. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

B. Plans, specifications, surveys, measurements, other documents, and dimensions under which the work is to be performed are believed to be correct; but the Contractor shall have examined them for himself during the Bidding period, as no additional compensation will be made for errors or inaccuracies that may be found therein.

1.4 SEQUENCING AND SCHEDULING

A. Do not install on structure drainage materials or soil mix prior to acceptance of waterproofing and sprinkler irrigation in other sections.

1.5 SUBMITTALS TO CIVIL ENGINEER

A. Product Data: Manufacturer's current catalog cuts and specifications of the following:

1. Fertilizer.

2. Approved organic amendment.

3. Peat moss.

4. Potting soil.

B. Quality Control Submittals:

1. Soils Test Lab:

    a. Soils Testing Laboratories:

        1) To be approved by the Owner.

        2) Lab must be capable of providing field observation and testing services as well as experience in landscape soils.

2. Test Reports:

    a. Organic Amendments: Test for physical and chemical properties.

    b. Imported Topsoil: Agricultural suitability tests.

    c. Stockpiled on Site Natural Topsoil.

        1) Agricultural suitability tests.

    d. Off Site Imported Topsoil.

        1) Agricultural suitability tests.

    e. On Site Earth Subsoil in Planted Areas:

        1) Agricultural suitability tests.

        2) Certificates: Contractor certifying strict compliance with accepted soil mixes and amendments, including rate of application.

1.6 FIELD QUALITY CONTROL

A. Tests: Right is reserved to take soil mixes and prepared soil for testing for conformity to Specifications.

B. Rejected Materials: The contractor shall pay cost of testing of materials not meeting specifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Stockpiled On Site Native Topsoil:

1. Quantity: The approximate quantity of on-site stockpiled native soil will not be known until demolition and excavation for parking lots and building pads have been completed.

2. Topsoil shall have been stockpiled on the site under Site Earthwork section. Provide agricultural suitability test.

3. Amend topsoil per recommendation of soil test for the trees, shrubs, groundcover, and perennials as noted on the drawings and for the lawns.

B. Off Site Imported Topsoil:

1. Composition: Fertile, friable, well-drained soil, of uniform quality, free of stones over 1/2 in. diameter, sticks, oils, chemicals, plaster, concrete and other deleterious materials.

2. Analysis: Obtain an agricultural suitability analysis of the proposed topsoil from an approved Soils Testing Laboratory.

3. Test Results: Request soils laboratory to send one (1) copy of test results direct to the Landscape Architect.

   a. Imported topsoil shall be amended per soils test report for the trees, shrubs, groundcovers, and perennials, as noted on the drawings and for the lawns.

4. Samples: The Landscape Architect reserves the right to take samples of the imported topsoil delivered to the site for conformance to the Specifications.

5. Rejected Topsoil: Immediately remove rejected topsoil off the site at Contractor's expense.

C. Topsoil shall comply with these Specifications herein for screened loam.

1. Screened Loam shall be “fine sandy loam”, or “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
Sand (0.05 – 2.0mm dia. range)	45-75	60
Silt (0.002 – 0.05mm dia. range)	15-35	25
Clay (Less than 0.002mm dia. range)	5-20	15

2. 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 Landscape Architect. Screened Loam shall not contain less than 5 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.

3. 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 Landscape Architect. Screened Loam shall fall within the pH range of 6.0 to 6.5 except as were 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.

4. 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.

2.2 AMENDED TOPSOIL

A. Soil Amendments: incorporate thoroughly with top six (6) in. of lawn and planting areas per 1,000 square feet:

1. 6 cu. yd. Approved Organic Amendment

2. 30 lbs. 6 20 20 Commercial Fertilizer

3. 50 lbs. Dolomite Lime

4. 10 lbs. Iron Sulfate

5. Intent: The above amendments and quantities are approximate and are for bidding purposes only following an on-site topsoil analysis by Soils and Plant Laboratory, composition of amendments may change. Contract price will be adjusted accordingly.

B. Organic Amendments:

1. Type: As recommended by the soil's laboratory.

2.3 BACKFILL MIX

A. Backfill mix shall be composed of approved topsoil's amended and fertilized per the recommendations of the soil's laboratory.

2.4 COMMERCIAL FERTILIZERS

A. Controlled Release Fertilizer:

1. Type: Osmocote 17 6 12 plus minors.

2.5 SUPPLEMENTAL CHEMICAL COMPONENTS:

A. The following but not limited to chemical components may or may not be used depending on the outcome of the solid's agricultural suitability test.

B. Dolomite Lime: Agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum calcium carbonate, 100% passing #65 sieve. "Kaiser Dolomite 65 AG" as manufactured by Kaiser, Inc. Mineral Products Department, or equal.

C. Iron Sulfate (Ferric or Ferrous): Supplied by a commercial fertilizer supplier, containing 20% Fe as ferrous sulfate.

D. Single Superphosphate: Commercial product containing 20% to 25% available phosphoric acid.

E. Potassium Nitrate: Commercial product: 13 0 44.

F. Calcium Nitrate: Agricultural grade containing 15 1/2% nitrogen.

2.6 WATER

A. Water: Clean, fresh, and potable. Furnished and paid for by Contractor. Transport as required.

PART 3 EXECUTION

3.1 PREPARATION

A. Soil Moisture Content: Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air or that clods will not break readily. Apply water, if necessary, to bring soil to optimum moisture content for tilling and planting. Maintain within 2 percent above or below optimum moisture content at all times during the work.

B. Clearing of Debris: Clear all planting areas of stones 2 in. diameter and larger, weeds, debris, and other extraneous materials prior to amending existing soil and prior to spreading topsoil.

C. Preparation of Areas to Receive Topsoil:

1. Verifications: The subgrades shall be reviewed and approved by Landscape Architect prior to installation of topsoil.

2. Depth: Verify that subgrades are 6 in. minimum below finished grades, +/ 1 in., allowing for topsoil and soil amendments.

3. Cultivation: Cross rip to 8" depth subgrade in planting areas prior to spreading topsoil.

3.2 INSTALLATION OF AMENDED TOPSOIL

A. Installation of Amended Topsoil:

1. Spreading of Topsoil:

a. Preparation: Do not commence spreading of topsoil prior to acceptance of soil preparation. Do not place topsoil under muddy or frozen conditions.

b. Topsoil Depth: Minimum depth of 6 in. after natural settlement and light rolling conforming to finished grades shown on Drawings.

c. Installation of Topsoil:

1) Install where shown on the Drawings.

2) Place in 2 lifts of 3" per lift.

3) First lift to be thoroughly mixed with subsoil by rototill, disc, or cross ripping.

4) Second lift to be placed on first and rototilled with amendments required by soils lab.

3.3 PREPARATION OF BACKFILL MIX

A. Backfill mix shall be composed of approved topsoils amended and fertilized per the recommendations of the soil's reports.

3.4 PREPARATION OF AMENDED TOPSOIL

A. Amend the topsoil as specified Part 2.02A materials amended topsoil preparation.

3.5 APPLICATION OF PRE-EMERGENT HERBICIDE

A. Apply pre-emergent weed control to all areas to receive woody, non-lawn ornamental planting after incorporating soil amendments.

B. Apply strictly according to manufacturer's current printed specifications.

3.6 INSTALLATION OF BACKFILL MIX

A. Install where shown on the drawings and details and as specified under the Trees, Shrubs, Vines, and Groundcover Section.

END OF SECTION 32 91 13

SECTION 32 92 00

TURF AND GRASSES

PART 1 GENERAL

1.1 RELATED DOCUMENTS: This section is only a portion of the Contract Documents. All the Contract Documents, including Conditions of the Contract and Division 1 General Requirements, apply to this section.

1.2 SECTION INCLUDES:

A. This Section specifies requirements for topsoil, seed, and sod for site landscape areas.

B. The work includes:

1. Furnishing, spreading, and fine grading of loam-topsoil and loam borrow

2. Application of lime, fertilizer, and amendments

3. Seeding, sodding, and mulching

4. Maintenance of seeded and sodded areas.

1.3 SUBMITTALS:

A. Manufacturers Product Data:

1. Submit material specifications and installation instructions where applicable attesting that the following materials meet the requirements specified:

a. Fertilizer

b. Seed (Lawn, Meadow, Erosion control, Temp cover)

c. Lime

d. Inoculants

B. Soil Test Reports:

1. Provide soil test report for stockpiled loam-topsoil.

2. Prior to ordering the topsoil, submit soil test reports to the Engineer for review and approval. Do not order materials until approval has been obtained. Delivered materials shall closely match the approved samples.

C. Certificates:

1. A manufacturer's Certificate of Compliance to the specifications shall be submitted by the manufacturers with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the

seed, and the net weight and date of shipment. No seed shall be sown until the Contractor has submitted the certificates.

D. Submittal Schedule:

1. Before installation:

a. Manufacturer's Product data

b. Soil Test Reports

c. Seed Certification

d. Hydroseed mix

1.4 QUALITY ASSURANCE:

A. All work shall be performed by personnel experienced in lawn installation under the full-time supervision of a qualified supervisor.

B. Work shall be coordinated with all other trades on site.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver material to the site in original unopened packages, showing weight, manufacturer's name, and guaranteed analysis.

B. Store materials in a manner that their effectiveness and usability will not be diminished or destroyed. Materials shall be uniform in composition, dry, unfrozen, and free flowing. Any material which has become caked or otherwise damaged or does not meet specified requirements will be rejected.

1.6 INSPECTION FOR ACCEPTANCE:

A. Conditions of Acceptance:

1. Acceptance shall be given for the entire portion of the lawn areas. No partial acceptance will be given.

2. Lawns shall exhibit a uniform, thick, well-developed stand of grass. Lawn areas shall have not bare spots more than four inches in diameter and bare spots shall comprise no more than two percent of the total area of that lawn.

3. Lawn areas shall not exhibit signs of damage from erosion, washouts, gullies, or other causes.

4. Pavement surfaces and site improvements adjacent to lawn areas shall be clean and free of spills or overspray from placing or managing of topsoil and seeding operations.

B. Inspection and Acceptance:

1. Upon written request of the Contractor, the Engineer will inspect all lawn areas to determine completion of work. This request must be submitted at least five days prior to the anticipated inspection date.

2. If the lawn areas are not acceptable, the Engineer will indicate corrective measures to be taken, and shall extend the maintenance period as necessary for the completion of the work. The Contractor shall request a second inspection of the lawns after corrective measures have been accomplished. This process shall be repeated until the total area of the lawn being inspected is acceptable.

3. When the lawn areas are acceptable, a meeting of the Contractor and Owner's representative will be arranged to accept the lawn work. A final inspection will be a part of this meeting. At this meeting, the Contractor shall be furnished with a written acceptance of the lawn section being approved. The Contractor shall turn over maintenance of the lawn to the Owner at this meeting.

4. Following the acceptance of lawns, the Contractor shall provide the Owner with access to all lawn areas as required for the Owner's maintenance work.

C. Site Cleanup:

1. The Contractor shall leave the site in a clean and neat condition. Final acceptance will not be granted until this condition is met.

PART 2 Products

2.1 SOILS:

A. Loam-Topsoil shall conform to the requirements of Section 32 91 13 and shall be amended as directed by the Landscape Architect based upon the findings of the soil test report.

B. Testing shall confirm that the topsoil, obtained from the site or loam from off-site, contains not less than 5 percent nor more than 10 percent organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F (+5) and certified test results shall be sent to the Engineer by the laboratory for approval.

2.2 SOIL CONDITIONING MATERIALS:

A. Lime:

1. Granular calcite Lime shall be an approved agricultural limestone with a neutralizing value of at least 100 percent. The material shall be ground to such a fineness that 40 percent will pass through a No. 100 U.S. Standard Sieve, and 98 percent will pass through a No. 20 U.S. Standard Sieve. The lime shall be uniform in composition,

2. Pelletized dolomitic limestone shall be containing no less than 50 percent total carbonates, and 25 percent total magnesium.

3. Lime shall be dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime that becomes caked or otherwise damaged (making it unsuitable for use) will be rejected.

B. Inoculant: Inoculate seeds with endo-mycorrhizae prior to spreading or hydroseeding at a rate of 1lb inoculant per 50lb. seed. Mycorrhizae shall include a minimum of 25,000 propagules per lb.

C. Fertilizer: Fertilizer shall be a complete, standard product complying with State and Federal Fertilizer Laws. The fertilizer shall be uniform in composition, dry and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis, and submitted to the Engineer for approval. Seventy-five percent of the nitrogenous elements shall be derived from organic sources or Urea-form. Exact percentages of fertilizer may vary in accordance with the soil test report. Any fertilizer that becomes caked or otherwise damaged (making it unsuitable for use) will be rejected.

D. Soil Conditioner: If soil organic matter of topsoil falls below 10% then sub grade shall be dressed in pre-saturated polyacrylamide at a rate of 300 gallons per 1,000 sf. or 15lb. dry granules/1,000sf. before placement of soil or dry granules uniformly blended with soil at a rate of one gallon per 4 cubic yards of soil.

2.3 WATER:

A. Water shall be furnished by select Owner or Contractor and distributed by the Contractor, it shall be suitable for irrigation, and free from ingredients harmful to plant life. Hoses and other watering equipment required for the work shall be furnished by the Contractor.

2.4 SEED:

A. Seed: Seed shall be fresh, clean, and selected from the previous year's crop; weed seed content not to exceed 1 percent; complying with applicable Federal and State seed laws; furnished and delivered premixed in unopened containers. The following seed blends are acceptable.

B. Select one or more of the following per site conditions:

1. Owners pre-approved blend to match existing.

2. Standard low water use turfs The following is an example of an acceptable product LESCO Tall Fescue Select Blend

3. Rough Turf, The following is an example of an acceptable product LESCO All Pro Transition Tall Fescue Blend

4. High traffic/ Sport turf The following is an example of an acceptable product LESCO All Pro Team Mates Plus

5. Shade turfs The following is an example of an acceptable product LESCO Shade Seed Mixture

6. Temporary turf The following is an example of an acceptable product LESCO Quick Cover Seed Mixture

C. No-mow conditions ‘Rough maintained at 6” ht.

1. No Mow Lawn Seed Mix by Prairie Nursery (www.prairienursery.com)

2. Pearls premium

3. Other hard fescue blend as approved by the Landscape Architect

D. Erosion control seed: Erosion control seed shall be New England Erosion Control/Restoration Mix for Dry Sites, from New England Wetland Plants Inc. applied at the manufacturers specified rates.

E. Meadow Wildflower Pollinator Seed:

1. Acceptable wildflower seed mixes:

a. Northeast Pollinator Wildflower Seed Mix from American Meadows

b. Native Northeast Wildflower Mix from American Meadows

c. Showy Northeast Native Wildflower Mix by Ernst Seed

d. New England Showy Wildflower mix by New England Wetland Plants or approved equivalent.

2. Annual meadow seeds for over-seeding select drifts as directed by Landscape Architect.

a. Daisy + Lupine combination

b. Red Poppy (Papaver rhoeas)

c. Pale purple coneflower (Echinacea pallida)

d. Cosmos bipinnatus

e. Shasta daisy (Chrysanthemum maximum)

F. Wildflower Shade Seed Mixes (Note location/s)

1. Flowering Seed Mix #1 – a blend of:

a. 50% Nodding Onion (Allium Cernuum)

b. 50% Common Violet (Viola Sororial)

2. Flowering Seed Mix #2

a. 25% Tall Thimbleweed (Anemone virginiana)

b. 25% Shorts Aster (Symphyotrichum shortii)

c. 25% Wild Blue Phlox (Phlox divaricata)

d. 25% Jacobs Ladder (Polemonium reptans)

3. Flowering Seed Mix #3

a. Vermont Wildflower Partial Shade Roadside Wildflower + Grass Mix

G. Temp-Cover seed Mix (Un-landscaped exposed soil areas)

1. Ernst-seed Custom blend: (See attached)

a. 25.00% Lolium perenne, 'Confetti III' Perennial Ryegrass, ‘Confetti III’ (turf type)

b. 15.00% Trifolium michelianum, Fixation (Balansa Clover, ‘Fixation’)

c. 10.00% Onobrychis viciifolia Sainfoin, Shoshone

d. 20.00% Pisum arvense Austrian Winter Pea

e. 10.00% Camelina sativa, Camelina Suneson

f. 5.00% Medicago sativa, Vernal Vetch

g. 5.00% Chamaecrista fasciculata, FL Ecotype Partridge Pea, FL Ecotype

h. 5.00% Cichorium spp. Chicory, Six Point

i. 5.00% Melilotus officinalis Yellow Blossom Sweetclover

H. Seed Suppliers: Submit a certificate from the supplier outlining the type and percentage of wildflower plants in the mix. Acceptable wildflower and micro clover seed suppliers are:

1. American Meadows – www.americanmeadows.com

2. Ernst Seed – www.ernstseed.com

3. New England Wetland Plants – www.newp.com

4. Vermont Wildflower Farm – www.vermontwildflower.com

5. Prairie Nursery – www.prairienursery.com

6. Prairie Moon Nursery – www.prairiemoon.com

7. Microclover – Albert Lea Seed – www.alseed.com

8. Microclover – Good Nature Organic Land Care – www.whygoodnature.com

2.5 MULCH: (HYDROSEED MULCH)

A. Wood Cellulose Fiber Mulch:

1. Mulch to cover hydroseeded areas shall be fiber-processed from whole wood chips manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material such as sawdust, paper, or cardboard.

2. Moisture content shall not exceed 10 percent, plus or minus 3 percent, as defined by the pulp and paper industry standards. Fiber shall have a water-holding capacity of not less than 900 grams of water per 100 grams fiber.

3. The mulch shall disperse into a uniform slurry when mixed with water. It shall be nontoxic to plant life or animal life.

4. The mulch shall contain a non-petroleum based tackifier and a green dye for visual monitoring during application, but non-injurious to plant growth.

2.6 EROSION CONTROL MATTING FOR SLOPED AREAS:

A. Matting for erosion control shall be provided on all slopes of 1 foot rise to 2 feet and steeper and shall consist of undyed and unbleached smolder resistant jute yarn woven into a uniform, open, plain weave mesh. Jute matting shall be furnished in rolled strips and shall conform to the following:

1. Width:

a. 48 inches, plus or minus one inch

b. 78 warp ends per width of cloth.

c. 41 weft ends per yard.

2. Weight:

a. To average between 1.22 pound and 1.80 pounds per linear yard.

3. Tolerance:

a. plus, or minus 5%

B. Stakes for pegging erosion control matting shall be sound hardwood approximately 1 inch by 3 inches. Stakes shall be free from insects and fungi and capable of remaining intact in the ground for at least two years.

2.7 HYDROSEED MIX:

A. The Contractor shall submit a certified statement as to number of pounds of fertilizer, amounts and types of grass seed, and processed fiber, per 100 gallons of water.

2.8 SOD/ SODS:

A. Select the following sections as applicable.

1. Standard turf shall be a rhizoming turf type tall fescue blend with microclover. Blackbeauty sod

2. Shade turf shall be a fine fescue blend with a maximum of 20% bluegrass.

3. High Traffic/ Sport turf shall be a bluegrass blend including advanced endophytic varieties.

4. SodCo. Provides examples of acceptable sod species mixes, submit manufacturers product data for review and approval by the Landscape Architect.

B. Characteristics: Sod shall be well-rooted turf, free from weeds, insect pests, and disease. It shall be machine-cut to a uniform soil thickness of 3/4-inch plus or minus, and to industry standard length and widths. Sod shall be harvested and replanted within 36 hours. Soil on sod pads shall be always kept moist.

C. Submit blend percentages and names to Engineer for approval. The sod shall be grown by a recognized turf farm which meets the approval of the Engineer. The approved farm must, in turn, certify in writing that they are the Contractor's selected supplier.

D. Sod shall be furnished in either of the following dimensions:

1. Required for large areas of Ballfields: In rectangular sod strips termed "Big Rolls," consisting of three (3) sixteen (1 6) inch wide sod strips, maximum fifty (50) feet long, rolled and stored on specially fabricated heavy-duty tubes furnished by the sod supplier. The overall dimensions of the "Big Roll" are forty-eight (48) inches wide by a maximum of fifty (50) feet long.

2. In rectangular sod strips measuring twelve (1 2) inches or sixteen (1 6) inches in width and from four (4) feet or six (6) feet in length, stored in rolls with the grass top side inverted so that the topsoil side is to the exterior. Note: These smaller strips will only be acceptable for filling in smaller areas if needed.

E. All sod furnished shall be living sod containing at least seventy percent (70%) of thickly matted grasses as specified, and free from noxious weeds.

F. Any sod with growth of more than two (2) inches in height shall be mowed to a height of from one and one-half (1 %) to two (2) inches not more than five (5) days prior to harvesting. The sod shall be machine cut at a uniform soil thickness of from one-half ('1/2) to three-quarter (314) inches, excluding top growth and thatch at time of cutting. The maximum allowable deviation from the widths and lengths specified shall be five percent (5%). No broken pads or torn and uneven ends shall be accepted.

G. Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically with a firm grasp on the upper eighteen percent (18%) of the section. Sod shall not be harvested when its moisture content (excessively wet or dry) may adversely affect its survival.

H. Sod shall be harvested, delivered, and installed within a period of thirty-six (36) hours. Sod not installed within this time shall be inspected by the Engineer and shall not be installed prior to his approval. Any sod not approved by the Engineer shall be removed from the site by the Contractor and a fresh sod supply shall be furnished at no extra cost to the Owner.

PART 3 Execution

3.1 SOIL PREPARATION FOR SEEDING:

A. After placement of conditioner, soil, and amendments grade seeded walking access surfaces to finish grades as indicated on the Drawings. When no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls and elevations shown on Drawings.

1. Walking surface low mow grass: Roll, scarify, and rake, as required, to obtain uniform, even walking surfaces. Walking surfaces shall slope to drain. The Engineer shall approve finish grades.

2. Meadows and Erosion control grass: Scarify soils parallel to slopes to create shadowed surfaces 1-3” deep.

B. If no new topsoil is to be placed, thoroughly loosen existing soil in areas to be seeded or sodded to a minimum depth of 6 inches incorporating soil conditioners or organic amendments with approved power or hand equipment. Remove rocks, debris, clods, and other undesirable substances, and maintain grading and drainage patterns.

C. When topsoil is required, place topsoil on previously scarified subsoil to a minimum depth of 6 inches. Subsoil shall be cleaned of debris and stones larger than 2 inches and conditioned prior to topsoil spreading.

D. Apply soil supplements and inoculants at rates recommended by the testing agency and approved by the Engineer. Thoroughly and evenly incorporate fertilizer and lime into the soil to a depth of 3 inches, by discing or other approved methods. In areas inaccessible to power equipment, fertilizer and lime shall be incorporated into the soil by manual methods. At existing trees, the depth shall be adjusted to avoid disturbance of the roots.

E. Seeding and sodding shall be done immediately after final grading, provided the bed has remained in a good, friable condition, and has not become muddy or compacted. Any undulations or irregularities in the surface resulting from fertilizing, liming, tilling, or other causes, shall be regraded prior to seeding and sodding. The surface shall be free of stones, cleared of all trash, debris, roots, brush, wire, grade stakes and other objects that would interfere with establishment of grass and grass maintenance operations.

3.2 HYDROSEED BED PREPARATION:

A. Hydroseeding shall be applied with a spray machine designed for this purpose and approved by the Engineer.

B. Soil amendments may be incorporated into hydroseed slurry.

3.3 SEEDING:

A. Seeding shall be done between April 1 to June 1, or August 15 to October 15, except as otherwise authorized in writing by the Engineer.

B. All disturbed areas not covered by buildings, paving, or otherwise developed, shall be seeded.

C. Seeding shall not be done during windy or inclement weather.

3.4 MANUAL SEEDING:

A. Sow lawn seed uniformly with an approved mechanical seeder at the rate of five pounds per 1,000 square feet. Culti-packer or approved similar equipment may be used to cover the seed and to form the seed bed in one operation. In areas inaccessible to the Culti-packer, the seeded ground shall be lightly raked with flexible rakes and rolled with a water ballast roller. Seeding shall be done in two directions at right angles to each other.

B. In areas having slopes 3:1 or steeper, and in drainage swales, the Contractor shall conduct a separate overseeding operation immediately after sowing the specified seed mix. The overseeding shall be sown at the rate of 3 pounds per 1,000 square feet. Seeded areas requiring additional erosion control, shall be covered with an approved, biodegradable erosion control fabric and the fabric firmly anchored.

C. The wildflower seed mix shall be applied by hand as directed by the landscape architect over the designated area at a rate of 30 pounds per acre. The seed shall be lightly raked to ensure proper soil-seed contact and kept damp until the plants have become established.

3.5 HYDROSEEDING:

A. Designated areas shall be hydroseeded only after written approval of the finished grading by the Engineer.

B. Fertilizer shall be added to the hydroseeding slurry at the rate of five pounds per 1,000 square feet.

C. Seed shall be added to the hydroseeding slurry at the rate of seventy-five pounds per acre.

D. Wood cellulose fiber mulch shall be added to the hydroseeding slurry at the rate of two tons per acre.

E. A mobile tank with a capacity of at least 500 gallons shall be filled with water, and the required amounts of seed, wood cellulose mulch and fertilizer. The slurry shall be thoroughly mixed by means of positive agitation in the tank. The slurry shall be applied by means of a centrifugal pump using the turret or hose application technique from the mobile tank. The hose or turret shall be equipped with a seeding nozzle of a proper design to ensure even distribution of the solution over the area to be seeded and shall be operated by a person thoroughly familiar with this type of seeding operation.

3.6 SODDING:

A. Note: Sod is not intended for this project but may become necessary where slope repair or schedule are a limiting factor for seed.

B. Before sod is laid, and after all grading is complete, the loam bed shall be lightly raked with a fine-toothed harrow or hand rake. The loam bed shall be moist, but not wet, prior to laying the sod. Sod shall not be laid on soil that is dry and powdery.

C. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to, and tightly against, each other. Lateral joints shall be staggered to promote more uniform growth and strength. Care shall be exercised to ensure that the sod is not stretched or overlapped, and that all joints are butted tight to prevent voids. The Contractor shall rake sufficient screened loam into the sod to fill all small voids. all large voids shall be filled with sod plugs.

D. Sod shall be laid with staggered joints and secured by pegging on slopes greater than 25%.

E. Sod shall be placed from April 1 to June 1 and August 15 to October 15, provided that the ground is not frozen.

F. Sod shall be harvested, delivered, and transplanted onto the site within a period of 36 hours.

G. Sod shall be watered immediately, during and after installation, to a sufficient depth to thoroughly wet the underside of the new sod and the soil immediately below. The Contractor shall have adequate water available on the site prior to, and during, installation of the sod.

3.7 MAINTENANCE AND PROTECTION:

A. Maintenance of seeded and sodded areas shall begin immediately after installation. Maintenance includes watering, weeding, mowing, and edging, reseeding, replacement of dead sod, disease and insect pest control, repair of all erosion damage, and any other procedures consistent with good horticultural practice, required to ensure normal, vigorous, and healthy growth. Maintenance shall continue until final acceptance of the work.

B. Watering Schedule:

1. Water regularly for first two months for best germination and growth.

2. Weeks 1-2: Water every morning for about 15-20 minutes. Regular watering is required to maintain soil moisture at the soil surface where the seed is germinating.

3. Weeks 2-4: When seedlings begin to appear (+/- 2 weeks), reduce watering to every other day for a 2-week period.

4. After 4 weeks: Watering may be reduced to every 3 days unless the weather is hot and dry and necessitates more frequent watering.

C. Maintenance shall also include all temporary protection fences, barriers, signs, and all other work incidental to proper maintenance.

D. Scattered bare spots will be allowed up to a maximum of 2 percent of any lawn area, provided none are larger than 72 square inches. After the grass has sprouted, all bare areas shall be re-seeded or re-sodded repeatedly until all areas are covered with a satisfactory growth of grass. At the time of the first cutting, lawn should be mowed not less than 2-1/2 inches high. Sod shall be maintained between 1-3/4 and 2-1/2 inches high. Do not remove more than one-third of the grass blade. All lawns shall receive at least three mowing's before acceptance.

E. The seeded and sodded areas shall be maintained in a continuous moist condition, satisfactory for good germination and growth of grass until acceptance.

F. Six weeks after the seeded areas have become established, fertilizer shall be applied over the entire area. Sod shall be fertilized at the time of the second mowing.

END OF SECTION 32 92 00

SECTION 33 05 33

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to install and test High Density Polyethylene (HDPE) pipe and fittings complete as shown on the Drawings and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. EXCAVATING AND FILL- Section 31 23 00.

B. STORM DRAINAGE UTILITIES – Section 33 40 00

1.3 SUBMITTALS

A. Submit catalog cuts of the pipe and fitting material.

1.4 QUALITY ASSURANCE

A. All HDPE pipe and fittings shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in AASHTO M294 and shall produce written documentation thereto. The pipe shall be subject to rejection at any time for failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job site at once.

PART 2 PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE (HDPE) DRAINAGE PIPE AND FITTINGS

A. Pipe and fittings shall have full diameter dimensions and shall meet the provisions and all test requirements as specified in ASTM F 405 or ASTM F 667.

B. HDPE pipe and fittings shall have bell and spigot push on joints. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket securely locked in place to prevent displacement during assembly.

C. All fittings and accessories shall have bell and/or spigot configurations compatible with the pipe.

PART 3 EXECUTION

3.1 HANDLING AND CUTTING PIPE

A. Pipe and fittings are slightly brittle. Care shall be taken in shipping, handling, and laying to avoid damage to the pipe and fittings. Extra care will be necessary during cold weather construction.

B. Any pipe or fitting showing a crack, or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the site.

C. All pipe ends shall be square after cutting.

D. While stored, pipe shall be adequately supported from below at not more than 3 ft intervals to prevent deformation. Pipe shall not be stacked higher than 6 ft. Pipe and fittings shall be stored in a manner that will keep them at ambient outdoor temperatures. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature build up when exposed to direct sunlight will not be permitted.

3.2 JOINTING HDPE PIPE AND FITTINGS

A. HDPE pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM D2321 Standard and detailed instructions of the manufacturer.

B. All manhole connections shall be as shown on the Drawings except that concrete and mortared connections shall have a positive watertight seal.

3.3 INSTALLATION OF HDPE PIPE AND FITTINGS

A. No single piece of pipe shall be laid unless it is straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length.

1. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the job site. Laying instructions of the manufacturer shall be explicitly followed.

B. Any pipe or fitting discovered to be defective after laying shall be removed and replaced with a sound piece.

C. The Engineer shall examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and immediately removed from the site.

D. All pipes shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good and proper alignment shall be preserved in laying the pipe.

E. Pipe and fittings shall be installed in accordance with instructions of the manufacturer, ASTM D2321 and as specified herein. As soon as the excavation is complete to normal grade of the bottom of the trench, the 6-inch-deep drainage aggregate bedding shall be placed, compacted, and graded to provide firm, uniform, and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Drawings, making certain that in locations where perforated pipe is specified, the pipe shall be laid with the perforations facing down. Blocking under the pipe will not be permitted. Drainage aggregate shall be placed evenly on each side of the pipe to mid diameter and hand tools shall be used to force the aggregate under the haunches of the pipe and into the bell holes to

give firm continuous support for the pipe. Drainage aggregate shall be placed to six inches above the top of the pipe. The initial three feet of backfill above the sand backfill shall be placed in one-foot layers and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. Equipment used in compacting the initial three feet of backfill shall be approved by the Engineer prior to use.

F. Each length of the pipe shall be positioned against the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be "pulled" or "cramped".

G. Before any joint is completed, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.

H. Precautions shall be taken to prevent flotation of the pipe in the trench.

I. When moveable trench bracing such as trench boxes, moveable sheeting, shoring, or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid diameter of the pipe. As trench boxes, moveable sheeting, shoring, or plates are moved, sand shall be placed to fill any voids created and the sand and backfill shall be recompacted to provide uniform side support for the pipe.

END OF SECTION 33 05 33

SECTION 33 19 00

WATER SUPPLY SYSTEM - IN CEMETERY

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of work includes installing High Density Polyethylene (HDPE) water piping, faucets and appurtenances and as specified herein.

B. Related Work

1.2 SUBMITTALS

A. Submit the name of the pipe and fitting suppliers and a list of materials to be furnished, valves, tapping sleeves, curb stops, and valve boxes.

B. Submit product data and schedules of HDPE pipe, faucets, hose bib and fittings required.

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1.3 QUALITY ASSURANCE

A. All HDPE and fittings shall be from a single manufacturer. In addition, HDPE to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections.

B. Inspections of the pipe may also be made by the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Remove pipe rejected after delivery and remove from the job site immediately.

PART 2 - PRODUCTS

2.1 MATERIALS

A. High Density Polyethylene (HDPE) Water Supply Piping

1. Pipe and fittings shall be Class 160 HPDE and shall meet the provisions and test requirements as specified in ASTM D2241.

B. Fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and/or spigot configurations compatible with that of the pipe.

C. Faucets be steel self-draining yard #1. Faucets shall be T&S B-0707 Self-Closing Single Sink Faucet, 3/4"Hose Thread Outlet (or approved equal). Total Eclipse yard hydrants by Kupferle (or approved equal).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Handling and Cutting Pipe

1. Pipe and fittings are slightly brittle. Care shall be taken in shipping, handling and laying to avoid damaging the pipe and fittings. Extra care will be necessary during cold weather construction.

2. Remove immediately from the site any pipe or fitting showing a crack or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen.

3. All pipe ends shall be square after cutting.

4. While stored, pipe shall be adequately supported from below to prevent deformation. Pipe shall not be stacked higher than 6 ft. Pipe and fittings shall be stored in a manner that will keep it at ambient outdoor temperatures. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature build-up when exposed to direct

sunlight will not be permitted.

B. Jointing Pipe and Fittings

1. HDPE pipe, and fittings shall be jointed in accordance with the recommendations of the latest ASTM Standards and detailed instructions of the manufacturer. The pipe manufacturer shall furnish information and supervise the installation of at least the first five joints installed by the Contractor.

C. Pipe and Fitting Installation, General

1. All pipe shall be installed pitching downward from the highest point to the location of the drainage pit to facilitate fall de-watering of the system. It shall be in clean sand 6" all around pipe

2. Any pipe or fitting discovered to be defective after laying shall be removed and replaced with a sound piece.

3. Pipe shall be sound and clean before laying. When laying is not in progress, including lunch time, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements for the site storm drainage improvements.

B. The work includes:

1. Site storm drainage system (basin drainage structures & recharge systems).

1.2 RELATED SECTIONS

A. Sections which relate to the work of this Section include:

1. Section 31 23 19—Dewatering

2. Section 31 00 00—Earthwork

3. Section 33 05 33—HDPE Pipe

1.3 SUBMITTALS

A. Shop Drawings

1. Materials list of items proposed for the work.

2. Shop drawings or descriptive literature, or both, showing dimensions, joint and other details of all materials proposed for the work. Shop drawings shall be submitted to the Engineer for approval prior to ordering material.

PART 2 PRODUCTS

2.1 GENERAL

A. All materials for storm drainage system shall be new and unused.

2.2 PIPE

A. HDPE as per Section 33 05 33

2.3 CATCH BASINS AND MANHOLES

A. Precast catch basins, Manholes and leach pits shall be manufactured in accordance with ASTM Designation C478 (4,000 psi minimum compressive strength) to the diameters and depths shown on the Drawings. All structures shall be designed for HS-20 / H-20 loading. Precast unit joints shall be sealed with butyl rubber in accordance with ASTM 990.

B. Where required for hood, a slot and opening shall be cast in the catch basin wall for mounting the cast iron hood over the outlet pipe.

C. When approved by the Engineer, catch basins, and drop inlets may be constructed with brick or concrete block walls and poured reinforced concrete bases as an alternative to precast concrete units.

D. Brick and concrete block and other materials shall conform to Article 2.03B.

E. Cast iron frames and grate shall conform to ASTM A48, Class 30.

F. Single catch basin frame and grate shall be LeBaron L15 (Cascade type) or approved equivalent with four flanges.

G. Catch basin traps shall be LeBaron Oil and Grease Trap Model No. L 219 or approved equivalent.

2.4 STORMWATER CHAMBERS

A. Chambers shall be Stormtech, Cultec or Infiltrator.

B. Chambers shall conform to the requirements of ASTM F2418-05, "Standard Specification for Polypropylene Pipe (PP) Corrugated Wall Stormwater Collection Chambers".

C. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels.

D. The structural design of the chambers, the structural backfill and the installation requirements shall insure that the load factors specified in the ASSHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on ASSHTO design truck with consideration for impact and multiple vehicle presence.

E. Only chambers that are approved by the engineer will be allowed. The contractor shall submit three (3) sets of the following to the engineer for approval before delivering chambers to the project site:

1. A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F2418-05 must be used as part of the AASHTO structural evaluation to verify long-term performance.

2. A certification by the manufacturer that the chambers are in accordance with ATSM F2418-05.

F. Chambers shall be produced at an ISO 9001 certified manufacturing facility.

G. All design specifications for chambers shall be in accordance with the manufacturer's latest installation instructions.

PART 3 EXECUTION

3.1 CATCH BASINS

A. Catch Basins shall be constructed at the locations and to the lines, grades, dimensions, and design shown on the Drawings or as required by the Engineer.

B. Precast Concrete Units shall be installed in a manner that ensures watertight construction and all leaks in precast concrete structures shall be sealed. If required, precast concrete structures shall be repaired or replaced to obtain watertight construction.

C. Stubs shall be short pieces of pipe cut from the bell ends of the pipe. Stubs shall be plugged with brick masonry unless otherwise directed by the Engineer.

D. Manhole Inverts shall conform accurately to the size of the adjoining pipes.

1. Utility access hole inverts shall be constructed of 3,500 psi concrete as shown the Drawings.

2. Inverts shall be laid out in smooth diameter curves of the longest possible radius to provide uniform flow channels.

3. Invert shelves shall be graded with a 1-inch drop per 1-foot length sloped from the utility access hole walls.

E. Utility access hole steps shall be accurately positioned and embedded in the concrete when the section is cast. Precast-reinforced concrete utility access hole sections shall be set vertical and with sections and steps in true alignment.

F. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch, hammered into the holes until it is dense, and an excess of paste appears on the surface, and finished smooth and flush with the adjoining surfaces.

G. Precast sections shall be level and plumb with approved joint seals. Water shall not be permitted to rise over newly made joints until after inspection and acceptance. All joints shall be watertight.

H. Openings which must be cut in the sections in the field shall be carefully made to prevent damage to the riser. Damaged risers will be rejected and shall be replaced at no additional cost to the Owner.

3.2 BRICK MASONRY

A. Brick masonry structures shall be watertight. All leaks in brick masonry structures shall be sealed. Skilled workers shall lay all brick masonry.

B. All beds on which masonry is to be laid shall be cleaned and wetted properly. Brick shall be wetted as required to be damp, but free of any surface water when placed in the work. Bed joints shall be formed of a thick layer of mortar which shall be smoothed or furrowed slightly. Head joints shall be formed by applying a full coat of mortar on the entire brick end, or on the entire side, and then shoving the mortar covered end or side of the brick tightly against the bricks laid previously. The practice of buttering at the corners of the brick and then throwing the mortar or crappings in the empty joints will not be permitted. Dry or butt joints will not be permitted. Joints shall be uniform in thickness and approximately 1/4 inch thick.

C. Brickwork shall be constructed accurately to the required structure dimensions and tapered at the top to the dimensions of the flanges of the cast-iron frames, as shown on the Drawings.

D. Joints on the inside face of walls shall be tooled slightly concave with an approved jointer when the mortar is thumbprint hard. The mortar shall be compressed with complete contact along the edges to seal the surface of the joints.

E. All castings to be embedded in the brickwork shall be accurately set and built-in as the work progresses.

F. Water shall not be allowed to flow against brickwork or to rise on the masonry for 60 hours after it has been laid, and any brick masonry damaged in this manner shall be replaced as directed at no additional cost to the Owner. Adequate precautions shall be taken in freezing weather to protect the masonry from damage by frost.

3.3 CONCRETE MASONRY UNITS

A. Concrete masonry units shall be soaked in water before laying. As circular concrete block walls are laid-up, the horizontal joints and keyways shall be flushed full of mortar. As rectangular blocks are laid-up, all horizontal and vertical joints shall be flushed full of mortar. Plastering of the outside of block structures will not be required. No structure shall be backfilled until all mortar has completely set.

3.4 MANHOLE STEPS

A. Steps shall be cast into the precast walls during manufacture.

B. Steps in brick masonry and concrete units shall be installed as the masonry courses are laid.

3.5 CASTINGS

A. Cast-iron frames for grates and covers shall be well bedded in cement mortar and accurately set to the proposed grades.

B. All voids between the bottom flange and the structure shall be filled to make a watertight fit. A ring of mortar, at least one-inch thick and pitched to shed water away from the frame shall be placed over and around the outside of the bottom flange. The mortar shall extend to the outer edge of the masonry all around its circumference and shall be finished smooth. No visible leakage will be permitted.

C. Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course. After the binder course has been compacted, the structures shall be set at their final grade. Backfill necessary around such structures after the binder course has been completed shall be made with 3,500 psi concrete.

3.6 STORMWATER CHAMBERS

A. Stormwater chambers shall be installed in accordance with the manufacturer’s latest written installation instructions and the drawings.

END OF SECTION 33 40 00