SECTION 02100 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02300
C. Landscape Materials: 02900
D. Contract Drawings

1.03 DESCRIPTION OF WORK:

A. The Contractor shall provide all materials, equipment, and labor necessary for the diversion of surface water from the construction area and provision of temporary and permanent erosion and sedimentation control structures and measures as shown on the plans and/or as required by the state and local permit requirements.

B. Erosion and sedimentation controls shall be provided in accordance with these Specifications for all areas within the limits of this Contract where existing earth and vegetation will be disturbed by construction.

1.04 EROSION AND SEDIMENTATION CONTROL GUIDELINES:

A. Erosion and sedimentation control measures shall be installed in accordance with "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices", Cumberland County Soil & Water Conservation District, Department of Environmental Protection publication dated March 1991, or latest edition.

1.05 CONFORMANCE WITH ENVIRONMENTAL LICENSING REQUIREMENTS:

All construction under this project shall be subject to review and/or inspection by local, State, and Federal agencies for the adequacy of erosion and sedimentation control measures. The Contractor shall conform to the conditions of environmental permits or licenses which are applicable to the project.

1.06 SUBMITTALS:

A. For information only, the Contractor shall submit two copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including silt fencing, erosion control mesh, and others as requested by the Engineer.

PART 2 - MATERIALS

2.01 GENERAL: Seed, fertilizer and lime shall be as specified under Erosion Control Notes provided on Contract Drawings.

2.02 MULCH: Mulch shall meet the requirements of Maine Department of Transportation (MDOT) Standard Specification, Section 619.

2.03 EROSION CONTROL MESH: Erosion control mesh shall be jute or excelsior blanket conforming to MDOT Standard Specifications, Section 617.

2.04 SILTATION FENCE:

A. Siltation Fence: Fencing shall be "Propex Silt Stop" as manufactured by Amoco Fabrics Company or approved equal.

B. Support Fence: Siltation fabric shall be attached to metal or wooden posts. Fence with an integral support mesh and posts may be used.

2.05 CRUSHED STONE: Durable, clean, angular rock fragments obtained by breaking and crushing rock material. 2"-3" stone.

2.06 CATCH BASIN INSERTS: Catch basin inserts shall be "Silt Sack" as manufactured by ACF Environmental, Inc., Richmond, VA (800) 445-3636, or approved equal.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

A. Prior to construction, the contractor shall prepare a detailed schedule and marked up plans indicating areas and components of the work, key dates of disturbance and completion and the location and details of proposed erosion control measures to be employed to address the phased construction of the project. The contractor shall schedule a pre-construction meeting with the City of Portland building inspection authority. Three copies of the schedule and marked up plans shall be submitted to the municipal authority three days prior to the scheduled pre-construction meeting. All erosion control plans are subject to review, modification and approval by the municipal authority.

B. Prior to grubbing, stripping, excavation, placement of fill, temporary or permanent placement of excavated materials, or other earthwork within the limits of this Contract, the Contractor shall implement erosion and sedimentation control measures as specified and/or as shown on the drawings and meeting state and local permit requirements.

C. Temporary measures for controlling erosion and sedimentation may include, but are not limited to, the following:

1. Siltation fencing around the downslope periphery of areas to be disturbed by construction.

2. Temporary seeding and mulching of soil stockpiles or disturbed areas.

3. Installation of inlet protection at new and proposed catch basins.

4. Protection of new and existing foundation drainage systems from soil intrusion during construction.

5. Other temporary practices as approved by the Engineer.

D. Permanent measures for controlling erosion and sedimentation shall be provided as shown on the plans or required by these Specifications.

E. Where disturbed areas cannot be permanently stabilized within 14 days of exposure of the soil, the areas shall be temporarily seeded and mulched as specified under Section 02900, or otherwise stabilized as approved by the Engineer.

F. Permanent soil stabilization measures for all slopes, channels, ditches, or any disturbed land area shall be completed within 7 calendar days after final grading has been completed. Where such permanent erosion control measures are not possible or practical to implement, and upon approval by the Engineer, temporary stabilization practices shall be applied as in 3.01.D above.

G. All temporary and permanent control measures shall be periodically inspected and maintained by the Contractor for the duration of the construction and warranty period of this Contract. Sediment collection devices shall be cleaned periodically as required, and the removed material reused or disposed of at an approved disposal area.

3.02 DIVERTING SURFACE WATER:

A. Build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protection works needed to divert surface water through or around the construction site and away from the construction work while construction is in progress.

B. Outlet diverted stormwater to sedimentation trap or basin or other approved sedimentation control measure.

3.03 SILTATION FENCE:

A. Construct siltation fences at the locations and to the dimensions shown on the Drawings, and as required to meet specified criteria.

B. Prior to removal of the silt fence, all retained soil or other material shall be removed and disposed of at an approved disposal area.

3.04 STRAW BALES AND CATCH BASIN INSERTS AT CATCH BASINS:

A. Construct straw bales at catch basins to the dimensions shown on the drawings and as required to meet specified criteria.

B. Bales (straw or hay) shall be placed in a row with ends tightly abutting the adjacent bales.

C. Each bale shall be embedded in the soil a minimum of 4 inches.

D. Bales shall be securely anchored in place by stakes or rebars driven through the bales. The first stake in each bale shall be angled toward the previously laid bale to force bales together.

E. Bales shall be removed and/or replaced when they have served their usefulness so as not to obstruct storm flow or drainage.

F. Catch basin inserts shall be installed in accordance with manufacturer's recommendations.

3.05 STONE CHECK DAMS

A. Construct stone check dams as shown on drawings.

3.07 REMOVAL OF TEMPORARY WORKS:

A. Remove to level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

END OF SECTION

SECTION 02101 - SITE PREPARATION AND LAYOUT

PART 1 - GENERAL

1.1 SCOPE

1. Under this item, the Contractor shall provide all labor, material, equipment and transportation for preparing the site for construction in accordance with the Contract Plans and these Specifications.

PART 2 - PRODUCTS

1. (NONE REQUIRED)

PART 3 - EXECUTION

3.1 CONSTRUCTION LAYOUT AND STAKING:

1. The Contractor will provide the initial construction layout and staking, which will include; bench marks, offsets and grade stakes. The Contractor shall be held responsible for maintaining all surveying data, including but not limited to stakes, offsets, control points, bench marks, etc. Any additional offsets or control points that the Contractor requires shall be deemed for his convenience. The cost for any additional surveying information shall be borne by the Contractor.
2. Locations Shown on Contract Plans not Guaranteed:

    a. The structures, obstructions, hydrants, utilities, trees, shrubs and stone walls shown on the Contract Plans are those known to exist, but their location is not guaranteed to be exact, nor is it guaranteed that all structures, obstructions, utilities, trees, shrubs and stone walls are shown. The Contractor shall, however, be responsible for the protection of all structures, obstructions, utilities, trees, shrubs, and stone walls whether shown or not on the Contract Plans.

3.2 SAFEGUARDS AND PROTECTION

1. The Contractor shall provide all necessary safeguards including the installation of shoring, signing, structural supports, protective fencing and barriers, etc., as may be required to prevent damage to adjacent property or injury to persons. All work shall be performed in accordance with the requirements of the local building codes and the rules, regulations and ordinances of all governing bodies having jurisdiction. The Contractor shall be responsible for any claims arising from his failure to provide proper safeguards or for his failure to conduct his operation in a manner consistent with the rules, regulations and ordinances of the governing agencies having jurisdiction.

3.3 NOTIFICATION OF UTILITY OWNERS

1. CALL BEFORE YOU DIG: The Contractor shall notify Dig Safe and/or other applicable utility owners at least seventy-two (72) hours prior to the start of any excavation operation. The Contractor will be held responsible for any claims arising from his failure to make such notification, or for his failure to do the work in accordance with the rules and regulations of the governing authorities.

3.4 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

1. The Contractor shall be responsible throughout the course of the work for protection from injury or damage of all existing structures and utilities that are to remain.
2. All existing gas and water lines, telephone and electric poles, wires, conduits, sewers, drains, culverts, fire hydrants and other utilities which are to remain shall be carefully supported, maintained in operation and protected from injury or damage by the Contractor.

3.5 DEMOLITION FOR SITE WORK

1. The Contractor shall remove all existing plants, pavements, buildings or other structures as indicated on the Contract Drawings. All material obtained from demolition operations shall be removed from the site and disposed of in a timely manner, in accordance with applicable laws and codes, or, as directed by the project engineer. Items of value (as determined by the owner's representative) encountered during demolition operations will remain the property of the owner, until determined to be disposable by the owner's representative.

3.6 CLEARING AND GRUBBING

1. Prior to commencing Demolition, the Owner will be responsible to remove and salvage any vegetation desired for reuse. The Owner's Representative shall have the final authority on the removal of all trees. The Contractor, at the Contractor's expense shall replace any trees removed contrary to the orders of the Owner's Representative. Any trees or vegetation damaged during construction shall be repaired immediately by an approved tree surgeon at the Contractor's expense.
2. Prior to commencing clearing operations, the Contractor shall provide all sediment and erosion control improvements required related to the area to be disturbed. Sediment and erosion controls shall be installed and maintained throughout the construction period as specified on the drawings.

3.7 DISPOSAL OF MATERIAL

1. All material obtained from the removal of structures, stones and boulders and obstructions, including, but not limited to, metal, concrete pavements, asphaltic pavements and all other miscellaneous debris, shall be removed from the site, or dealt with as directed by the Owner's Representative.
2. In addition to the above-mentioned items the Contractor shall also be responsible for the off-site removal of construction related debris. This disposal shall be in accordance with

all applicable codes, rules and regulations. This material shall be defined as anything used by the Contractor to complete his work and shall include such items as leftover pipe, pallets and garbage. Under no circumstances shall on-site burning of the material be permitted.

3.8 PROTECTION OF EXISTING VEGETATION AND NATURAL FEATURES

1. The Contractor shall protect, throughout the course of construction, all such trees, brush, vegetation and existing improvements as are shown on the Drawings which are not marked by the Owner's Representative or indicated on the Drainage Plans to be removed. Tree protection shall be installed as shown on the Drawings.
2. The Contractor shall also protect throughout the course of construction all landscaping, vegetation and natural features on public and private property. The Contractor shall use every precaution to prevent injury, damage, pollution, erosion or destruction of existing landscaping, water courses, vegetation and other surrounding natural features.
3. The Contractor shall construct and maintain a proper and substantial protective fence around trees that are to be saved adjacent to or within the construction area. The fence shall be constructed as specified on the Drawings. All protective fencing shall be subject to the approval of the Owner's Representative.
4. Grading and/or filling operations adjacent to trees shall be carried out with extreme care. If the soil over the root area of the trees has been compacted, it shall be restored by proper cultivation to permit entrance of water and proper aeration of roots.
5. Roots and limbs of trees are not to be cut unless authorized by the Owner's Representative. Should it become necessary to do so, the Contractor shall treat the remaining exposed portion of roots and/or limbs to prevent damage, loss or injury to the tree and perform the necessary pruning of the tree. This treatment shall be performed in accordance with accepted horticulture practice and by personnel experienced in that field of work.

END OF SECTION

SECTION 02205 - GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Provide geotextile fabrics as shown on the drawings.

B. Earthwork: Section 02300.

1.02 SUBMITTALS:

A. Product Data: Manufacturer's product data and installation instructions for geotextile fabrics, as specified and shown on the drawings.

PART 2 - MATERIALS

2.01 FILTER FABRIC GENERAL PURPOSE:

Equal to Mirafi 140N, by Mirafi Inc., P.O. Box 240697, Charlotte, North Carolina 28224, or Amoco 4545 by Amoco Fabrics Co. 550 Interstate Parkway, Suite 150, Atlanta, GA 30099.

2.02 FILTER FABRIC BELOW RIPRAP:

Equal to Mirafi 600X.

2.03 FILTER FABRIC BELOW SLABS ON GRADE:

Equal to Mirafi 500X

PART 3 - INSTALLATION

3.01 INSTALL FILTER FABRIC:

As shown on the plans and in accordance with the manufacturer's installation instructions.

END OF SECTION

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

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

2.0 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, groundcovers, plants and grass to remain.
2. Removing existing trees, shrubs, groundcovers, plants and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.

2. Division 1 Section "Execution Requirements" for verifying utility locations and for recording field measurements.

3. Division 2 Section "Building Demolition" for demolition of buildings, structures, and site improvements.

4. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.03 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

1.04 MATERIAL OWNERSHIP

A. Except for stripped topsoil, granite curbing, and or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1. Granite Curbing on Maine Historical Society property: Granite curbing located on Maine Historical Society shall be salvaged for re-installation.

2. Granite Curbing and within in Public Right-of-Way: Granite curbing and Brick Pavers removed from the public right-of-way remain the property of the City of Portland.

   The Contractor shall be responsible for the removal without damage, cleaning and stacking in a City designated location, all straight and curved curbing, terminal sections and curb corners which are to be removed.

   Each section of straight curbing shall have its overall length painted legibly and plainly on one end. Each section of circular curbing shall have its overall arc length and radius painted on one end.

   Removing and stacking curb or edging shall include all labor, equipment, tools and materials for excavating, removing, cleaning, backfilling, handling, stacking and any incidental work necessary.

1.05 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings, according to Division 1 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.06 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

   1. Do not proceed with work on adjoining property until directed by Architect.

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

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 -EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities. Coordinate timing of shutoff with Owner. Provide a minimum of 72 hours notification prior to shutoff. Refer to Section 02221 BUILDING DEMOLITION for additional requirements.

3.04 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.

4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.05 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil within limits designated on the drawings to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil, waste materials or other objectionable materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 96 inches.
2. Dispose of excess topsoil as specified for waste material disposal.

3.06 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

C. Salvage of Granite Curbing

1. The Contractor shall be responsible for the removal without damage, cleaning and stacking, all straight and curved curbing, terminal sections and curb corners which are to be removed. All curbing on Maine Historical Society Property shall be stacked at a location determined by the contractor and approved by the Owner. Curbing removed from areas within public right-of-way shall be staked at a location designated by the City of Portland.

2. The Contractor shall carefully remove and store curb for resetting. Curb damaged or destroyed, because of the contractor's operations or because of their failure to store and protect in a manner that would prevent it's loss shall be replaced with curbing of equal quality at the contractor's expense.

3. Each section of straight curbing shall have its overall length painted legibly and plainly on one end. Each section of circular curbing shall have its overall arc length and radius painted on one end.

4. Removing and stacking curb or edging shall include all labor, equipment, tools and materials for excavating, removing, cleaning, backfilling, handling, stacking and any incidental work necessary.

3.07 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property in accordance with Maine Solid Waste Management Regulations.

1. Stumps may be chipped and used as erosion control mix or landscape mulch or may be transported off site.

END OF SECTION 02230

SECTION 02240 - DEWATERING

PART I – GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK

A. Work included: This Section includes construction dewatering to lower and control water levels below excavation subgrade.

B. Related Work in Other Sections:

1. Site Clearing: Section 02230
2. Shoring and Bracing: Section 02260
3. Erosion and Sedimentation Control: Section 02150
4. Earthwork: Section 02300

1.03 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: The Contractor shall engage a geotechnical engineer, registered as a professional engineer in the State of Maine, to design the dewatering systems. The Contractor shall furnish, install, test, operate, monitor, and maintain dewatering systems of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.

1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.

2. Prevent surface water from entering excavations by grading, dikes, or other means.

3. Accomplish dewatering without damaging existing buildings adjacent to excavation.

4. Remove dewatering system if no longer needed.

1.04 SUBMITTALS

A. The Contractor shall submit the following information at least two weeks before beginning of excavation.

1. Shop drawings showing arrangement, locations, and details of the dewatering system, observation wells, berms, ditches, sumps, locations of headers and discharge lines; and means of discharge and disposal of water.

2. Capacities of pumps and standby equipment.

3. Design calculations for the dewatering system.

4. Detailed description of equipment, materials, sequence and procedures for installation, operation and maintenance, in relation to proposed sequence of excavation, lateral support system and backfilling.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all rules, regulations, laws and ordinances of the State of Maine, the City of Portland and all other authorities having jurisdiction over the work.

B. Provide monitoring of the dewatering systems.

C. The Contractor shall have a minimum of five years experience within the last 10 years in construction dewatering installations of similar type and complexity as is required for the project.

D. The Contractor shall perform any and all preparatory work at no additional cost to the Owner to discover, protect, maintain, relocate, and restore existing and new site improvements (i.e., utilities). The Contractor shall include and incorporate the findings of this preparatory work on the submittals.

1.06 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Prior to submitting a bid, the Contractor shall review and understand the information contained in the geotechnical report "Report on Subsurface and Foundation Investigation, Proposed Addition Maine Historical Society" prepared by Sebago Technics, Inc. dated March August 4, 2006. This report is made available to the Contractor for information only and shall not be interpreted as a warranty of subsurface conditions.

C. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. The Contractor shall make additional test borings and conduct other exploratory operations necessary for dewatering.

D. Available soil samples recovered from borings may be examined at the office of Sebago Technics, Inc. 1 Chabot Street, Westbrook Maine 04098. The boring information is considered to represent the conditions at the locations of test borings at the time the test borings were made. The Contractor should anticipate variations from the conditions disclosed by the borings in planning and estimating the work. Water levels can be expected to vary with season, precipitation, temperature and other construction activity in the area. Therefore, water levels encountered during construction may differ from those shown.

E. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

F. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 – MATERIALS

All materials shall be of good quality and suitable for their intended use.

PART 3 – EXECUTION

3.01 GENERAL

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

3.02 WATER LEVEL CRITERIA

A. The Contractor shall be required to control groundwater levels to at least 2 feet below the lowest excavation level. Prior to the start of excavation and to maintain these levels until dewatering is no longer needed.

B. Water levels shall subsequently be maintained so as to prohibit floatation of completed portions of each structure.

C. Water level criteria are applicable to all saturated soils below the final excavation level, within the plan limits of the excavation.

D. The Contractor shall maintain water levels below the maximum levels specified until completion and backfilling of the excavation.

3.03 DESIGN AND INSTALLATION OF DEWATERING SYSTEM

A. Design and installation of the dewatering systems shall be compatible with the Contractor's design for excavation support and protection systems and utility construction.

B. The dewatering systems shall be installed in accordance with shop drawings submitted for review and comment.

C. The dewatering systems shall be designed and installed to provide water level control as specified. The systems shall be modified, at no additional cost to the Owner, in the event that water level criteria cannot be achieved. Proposed modifications shall be submitted for review and comment.

D. Wells, well points, sumps and pumps shall be installed with suitable filters and other provisions necessary to prevent migration or piping of soil fines.

E. The Contractor shall locate the dewatering systems components to minimize interference with other construction operations.

F. The Contractor shall install the systems in a manner which does not cause loss of ground or affect stability of existing or future construction.

G. The Contractor shall provide adequate protection from erosion from any of the dewatering operations utilized during the course of construction. Any damage, disruption or interference to newly constructed work or existing properties, buildings, structures, utilities and/or work resulting directly or indirectly from dewatering operations conducted under this Contract shall be remedied by the Contractor to the satisfaction of the Architect, at no cost to the Owner.

H. The Contractor shall provide such additional treatment of dewatering discharge as may be required to meet the provisions of the Contract. This may include the construction of sumps and/or settling basins, stone rip-rap, silt fences or other requirements. They shall be provided and later removed and/or filled in with acceptable backfill material, and restored to original conditions once they are no longer needed, at no additional cost to the Owner.

3.04 STANDBY EQUIPMENT: The Contractor shall be equipped with standby pumps, wells and power generating equipment in order to maintain continuous operation of the dewatering systems in the event of a disruptive occurrence such as equipment breakdown, power outage, or vandalism.

3.05 PERFORMANCE MONITORING

A. The Contractor shall install groundwater observation wells or other devices, as necessary, to monitor water levels in the soils within the plan limits of the excavations.

B. The Contractor shall read each well daily until excavation to final grade is complete and weekly thereafter until the well is dismantled or the excavation backfilled.

C. The Contractor shall maintain and replace observation wells, which are damaged or do not function.

D. The Contractor shall use the observation well readings and other available information to evaluate the effectiveness of the dewatering systems.

E. Observation wells shall be dismantled with the Architect's approval. Riser pipes shall be cutoff at excavation level and filled with sand.

END OF SECTION

SECTION 02260 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK

A. Work included: Shoring and bracing necessary to protect existing buildings, streets, utilities, and other improvements and excavation against caving; and to meet OSHA safety requirements of excavation support and protection. It will be the Contractor's responsibility to determine the locations where excavation support and protection are required to meet the criteria noted below.

B. Excavation Support and Protection: Excavation support and protection shall mean the use of any of the following:

1. Square edge or tongue and groove sheeting braced as required.

2. Interlocking steel members braced as required, used alone or in combination with a steel box template.

3. Steel soldier beams with wood lagging braced as required.

4. Wood shoring braced as required.

5. A steel trench box from bottom of excavation to ground surface.

C. Related Sections include the following:

1. Site Clearing: Section 02230
2. Dewatering: Section 02240
3. Erosion and Sedimentation Control: Section 02150
4. Earthwork: Section 02300

1.03 PERFORMANCE REQUIREMENTS

A. Excavation Support and Protection Performance: The Contractor shall engage a geotechnical engineer, registered as a professional engineer in the State of Maine, to design the excavation support and protection systems. The Contractor shall furnish, install, monitor, and maintain excavation support and protection systems capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.

2. Prevent surface water from entering excavations by grading, dikes, or other means.

3. Install excavation support and protection systems without damaging existing structures, buildings, utilities, streets, pavements, and other improvements adjacent to excavation.

1.04 SUBMITTALS

A. Shop Drawings for Information: The Contractor's proposed method for making the excavation shall be designed by a geotechnical engineer registered as a professional engineer in the State of Maine and shall be submitted for review and comment. The Contractor shall submit the following information at least three (3) weeks prior to the start of excavation:

1. Shop Drawings signed and sealed by the geotechnical engineer responsible for their preparation showing the location, layout and sizes of all members, details of connection, sequence of installation and removal.

B. Written data and calculations and design assumptions for determination of loads and stresses acting on the temporary excavation support and protection systems.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all rules, regulations, laws and ordinances of the State of Maine, the City of Portland and all other authorities having jurisdiction over the work.

B. Provide monitoring of the excavation support and protection systems.

C. The Contractor shall have a minimum of five years experience within the last 10 years in excavation support and protection systems of similar type and complexity as is required for the project.

D. The Contractor shall perform any and all preparatory work at no additional cost to the Owner to discover, protect, maintain, relocate, and restore existing and new site improvements (i.e. utilities). The Contractor shall include and incorporate the findings of this preparatory work on the submittals.

1.06 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Prior to submitting a bid, the Contractor shall review and understand the information contained in the geotechnical report . This report is made available to the Contractor for information only and shall not be interpreted as a warranty of subsurface conditions. If office practice differs from first paragraph and subparagraphs below, revise to suit Project or delete. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. The Contractor shall make additional test borings and conduct other exploratory operations necessary for dewatering.

C. Available soil samples recovered from borings may be examined at the office of Sebago Technics, Inc. 1 Chabot Street, Westbrook Maine 04098. The boring information is considered to represent the conditions at the locations of test borings at the time the test borings were made. The Contractor should anticipate variations from the conditions disclosed by the borings in planning and estimating the work. Water levels can be expected to vary with season, precipitation, temperature and other construction activity in the area. Therefore, water levels encountered during construction may differ from those shown.

D. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

E. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - MATERIALS

2.01 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Tieback tendons shall consist of either high strength steel bars or groups of wire strand cables; the sizes and capacities to be proposed by the Contractor.

E. Cement grout materials and admixtures for tieback anchorages shall be proposed by the Contractor.

F. Wood Lagging: Lumber, mixed hardwood, having a minimum allowable working stress of 1100 psi in bending.

G. Shotcrete: Comply with Division 3 Section "Shotcrete" for shotcrete materials and mixes, reinforcing, and shotcrete application.

PART 3 -EXECUTION

3.01 GENERAL REQUIREMENTS

A. Provide fully equipped rig(s) and appropriate tools in full-time operation at the site to complete the Work under this Section on schedule. Mobilize additional equipment to the site at no additional cost to the Owner to complete the Work of this Section on schedule.

B. Perform preparatory work to discover, protect, maintain, and restore utilities, foundations or other facilities within the zone of influence of the temporary support systems.

C. Protect structures, buildings, utilities, streets, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection systems operations.

D. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

E. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

F. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

G. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

H. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.01 SOLDIER BEAMS AND LAGGING

A. Install steel soldier beams before starting excavation. Space soldier beams at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier beams as excavation proceeds. Install lagging with louvered openings (gaps) between boards in accordance with the ground conditions encountered in excavations. In no case will the louvered openings be allowed to exceed one (1) inch. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Pack louvered openings between lagging with porous material to allow free drainage of groundwater without loss of retained soil.

D. If unstable ground is encountered, take suitable measures to retain the material in place and prevent loss of ground and/or movement, which may cause damage to adjacent buildings, structures, streets, utilities or other site improvements.

E. The installation and removal of soldier beams shall be done with minimum vibrations to the ground. The work shall be controlled so that peak particle velocities, measured at adjacent structures, shall not exceed the "safe" limits recommended by the U.S. Bureau of Mines in Appendix B of BUMINES RI 8507. Vibration monitoring shall be performed by the Contractor and will be reviewed by the Architect.

F. Install lateral bracing in accordance with the reviewed submittals.

3.02 SHEET PILING

A. Drive sheet piling in plumb position such that each pile is continuously interlocked with adjacent piles over its entire length. Sheeting, after driving, shall be in direct contact with material to be retained.

B. Drive sheeting to the depths indicated on reviewed shop drawings. Do not overdrive sheeting so as to cause damage to sheet piling tips or interlocks. Drive sheeting with care such that it can be removed without damage to adjacent backfill.

C. Methods and equipment used in driving, cutting and splicing shall conform to reviewed shop drawings.

D. The installation and removal of sheeting shall be done with minimum vibrations to the ground. The work shall be controlled so that peak particle velocities, measured at adjacent structures, shall not exceed the "safe" limits recommended by the U.S. Bureau of Mines in Appendix B of BUMINES RI 8507. Vibration monitoring shall be performed by the Contractor and will be reviewed by the Architect.

3.03 TIEBACKS

A. The type, overall length, location and capacity of each tieback proposed shall be verified by proof tests. Tiebacks shall consist of a grouted anchor zone, a free-length (tendons prevented from bonding with grout and/or soil) and an anchor head assembly. Details of proposed system shall be consistent with reviewed shop drawings.

B. Methods of installation shall be used which prevent the loss of ground due to erosion or jetting during the installation of tiebacks.

C. Each tieback installed for support of the system shall be proof tested to verify and establish its capacity. The acceptable criteria for proof tests shall be established by the Contractor, and shall be identified on the shop drawings.

D. Protect tiebacks from damage during construction.

3.04 INTERNAL BRACING SYSTEM

A. Use wales, struts and bracing members as required to provide support of the excavation support and protection system.

B. Install and maintain all support members in tight contact with each other and with the surface being supported. Care shall be taken by the Contractor in layout and locating internal bracing so that it will clear all permanent construction.

3.05 REMOVAL OF EXCAVATION SUPPORT AND PROTECTION SYSTEMS

A. The removal of excavation support and protection systems members shall be performed in such a manner that there is no disturbance or damage to any portion of the new construction, as well as to adjacent buildings, structures, streets, utilities or other features.

B. The bracing shall not be removed until the backfill has been placed and compacted to the required density to within two (2) feet below the level of bracing.

C. Repair all damage to property resulting from excavation support and protection systems removal at no additional cost to the owner.

D. The Contractor shall leave in place to be embedded in the backfill any portion of the excavation support and protection systems which the Architect may direct in writing for the purpose of preventing damage to the new construction, buildings, structures, streets, utilities and to maintain a stable excavation bottom. Elements left in place for convenience of the Contractor which were not specifically directed in writing to be left in place shall be at the Contractor's expense.

E. All excavation support and protection systems left in place shall be cut off at least six (6) feet below final grade.

END OF SECTION

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY OF WORK:

A. Work included:

1. All excavating, filling, backfilling and removal of materials.

B. Related Work in Other Sections:

1. Site Clearing: Section 02230
2. Shoring and Bracing: Section 02260
3. Erosion and Sedimentation Control: Section 02150
4. Dewatering: Section 02240

1.03 PROTECTION:

A. Paved surfaces: Do not operate equipment on paved surfaces which will damage these surfaces.

B. Maintain excavations with approved barricades, lights and signs to protect life and property until excavation is filled and graded to a condition acceptable to the Architect.

C. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

D. Locate and clearly flag trees and vegetation to remain or to be relocated. Obtain approval from Architect before clearing operations begin.

E. Tree Protection:

1. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

2. Do not store construction materials, debris, or excavated material within protection area.

3. Do not permit vehicles, equipment, or foot traffic within protection area.

4. Maintain protection area free of weeds and trash.

5. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

a. Cover exposed roots with burlap and water regularly.

b. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.

c. Coat cut faces of roots more than 1-1/2inches (38 mm) in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

d. Backfill with soil as soon as possible.

1.04 PROJECT CONDITIONS

A. Site Information: Prior to submitting a bid, the Contractor shall review and understand the information contained in the geotechnical report "Report on Subsurface and Foundation Investigation, Proposed Addition Maine Historical Society Library" by Sebago Technics, Inc. dated August 4, 2006. This report is made available to the Contractor for information only and shall not be interpreted as a warranty of subsurface conditions.

If the contractor desires to make his own investigation of subsurface conditions at the site he may do so after the permission of the owner is granted. Any work performed by the contractor prior to signing of the contract shall be at his own expense and risk and expense, it being understood that any services excavations or existing conditions disrupted by the contractor shall be immediately restored to conditions existing prior to the investigation at the expense of the contractor. The contractor shall be assumed to have familiarized himself with the nature of the subsurface and groundwater conditions to his own satisfaction.

B. Use of Explosives: Permitted with Owner's explicit written approval, see Part 3 - Execution for requirements.

C. Prior to excavation, verify the underground utilities, pipes, structures, and facilities. Maine Dig-Safe law requires at least the following minimum measures:

1. Pre-mark the boundaries of your planned excavation with white paint, flags or stakes, so utility crews know where to mark their lines.

2. Call Dig Safe, at 1-888-DIGSAFE, at least three business days - but no more than 30 calendar days - before starting work. Do not assume someone else will make the call.

3. If blasting, notify Dig Safe at least one business day in advance.

4. Wait three business days for lines to be located and marked with color-coded paint, flags or stakes. Note the color of the marks and the type of utilities they indicate. Transfer these marks to the As-Built drawings.

5. Contact the landowner and other non-member utilities (water, sewer, gas, etc.), for them to mark the locations of their underground facilities. Transfer these marks to the As-Built drawings.

6. Re-notify Dig Safe and the non-member utilities if the digging, drilling or blasting does not occur within 30 calendar days, or if the marks are lost due to weather conditions, site work activity or any other reason.

7. Hand dig within 18 inches in any direction of any underground line until the line is exposed. Mechanical methods may be used for initial site penetration, such as removal of pavement or rock.

8. Dig Safe requirements are in addition to town, city and/or state DOT street opening permit requirements.

9. For complete Dig Safe requirements, call the PUC or visit their website.

10. If you damage, dislocate or disturb any underground utility line, immediately notify the affected utility. If damage creates safety concerns, call the fire department and take immediate steps to safeguard health and property.

11. Any time an underground line is damaged or disturbed, or if lines are improperly marked, you must file an Incident Report with the PUC. For an Incident Report form visit www.state.me.us/mpuc or call the PUC at 800-452-4699.

1.05 QUALITY ASSURANCE:

A. Standards:

"Standard Specification for Highways and Bridges" revision of April 1995, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").

B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

C. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 SUBMITTALS:

A. Test Reports: Submit the following:

1. Reports on material gradations and compaction testing.

B. Blasting Plan: For record purposes, approved by authorities having jurisdiction.

C. Seismic Survey Report: For record purposes; from seismic survey agency.

D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

PART 2 - MATERIALS

2.01 MATERIALS:

A. General

1. Suitable materials: As shown on the Drawings or as specified.

2. Unsuitable materials: Material containing excessive plastic clay, vegetation, organic matter, debris, pavement, stones or boulders over 6 inches in greatest dimension, and frozen material. Material which, in the opinion of the Geotechnical Engineer or Architect, will not provide a suitable foundation or subgrade.

3. On-Site Material: Any suitable material from on-site excavation.

4. Material for embankments and general fills may contain pieces of excavated ledge having a greatest dimension of up to 8 inches if approved by the Geotechnical Engineer.

5. Testing: The Architect may inspect off-site sources of materials and order tests of these materials to verify compliance with these specifications. Provide a gradation analysis on any imported material or material processed on site.

B. Base and Subbase:

1. Aggregate Subbase Material: sand or gravel meeting the requirements of Maine Department of Transportation Standard Specifications Section 703.06(b), Type D.

Sieve Size	Max % Passing by Weight
4"	100
¼"	25-70
No. 40	0-30
No. 200	0-7

2. Aggregate Base Materials: Screened or crushed gravel meeting the requirements of MDOT Standard Specifications Section 703.06(a), Type A.

Sieve Size	Max % Passing by Weight
2"	100
½"	45-70
¼"	30-55
No. 40	0-20
No. 200	0-5

C. Sand: Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
3/8"	100
No. 4	95 – 100
No. 16	50 - 85
No. 100	2 - 10

D. Crushed Stone: Durable, clean angular rock fragments obtained by breaking and crushing rock material. Crushed stone for underdrain shall be durable, washed angular rock fragments. Sieve analysis by weight.

Sieve Size	Max % Passing by Weight
2"	100
1½"	95 - 100
3/4"	35 - 70
3/8"	10 - 30
No. 4	0 - 5

E. Refill Material: Crushed stone for refilling excavation below grade or rock excavation unless otherwise directed by the Architect.

F. Common Borrow: Inorganic mineral soil suitable for embankment construction free from frozen material, perishable rubble, peat and other unsuitable material.

G. Select fill: Use aggregate material for fill operations. Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
4"	100
3"	90 - 100
¼"	25 - 90
No. 40	0 - 30
No. 200	0 - 5

H. Granular Fill: Well-graded material for fill operations. Sieve analysis by weight.

Sieve Size	Max % Passing by Weight
6"	100
3"	80 - 100
No. 200	0 - 40

I. Structural Fill: Hard, durable gravel containing only particles passing the 3" sieve. Sieve analysis by weight.

Sieve Size	Max % Passing by Weight
6"	100
No. 4	30 - 90
No. 40	10 - 50
No. 200	0 - 8

J. Underdrain Backfill Filter Sand:

Granular material for underdrain shall be free from organic matter and shall conform to the MDOT "Standard Specifications" Section 703.22 for underdrain Type B. Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
1"	95 – 100
½"	75 – 100
No. 4	50 – 100
No. 20	15 – 80
No. 50	0 – 15
No. 200	0 – 5

K. 3/4" Crushed Stone:

Durable, clean angular rock fragments obtained by breaking and crushing rock material. 3/4" Crushed stone for underdrain shall be durable, washed angular rock fragments. Sieve analysis by weight.

Sieve Size	Max % Passing by Weight
1"	100
3/4"	95-100
1/2"	35-70
3/8"	0-25

PART 3 - EXECUTION

3.01 EXCAVATION:

A. General: Remove all materials encountered to the limits shown on the drawings, or designated in the Specifications.

1. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

a. All previous construction and fill, including foundations, walls, floor slabs and abandoned utilities, be removed from within the limits of the building be replaced with compacted structural fill.

b. All previous construction below parking, roadways and landscaped areas should be removed to at least 2 feet below the bottom of pavement section and replaced with compacted structural fill.

B. Classifications:

1. The following classifications of excavation may be made which will be paid for on a unit cost basis:

a. Excavation and backfill with excavated material – per cubic yard (in place) – open.

b. Excavation of material and removal from site – per cubic yard – open.

c. Excavation and backfill with excavated material – per cubic yard (in place) – trench.

d. Excavation of material and removal from site – per cubic yard - trench.

e. Rock excavation – per cubic yard – open.

f. Rock excavation – trench.

g. Common borrow fill and backfill – in place per cubic yard.

h. Aggregate base, in place – per cubic yard.

i. Aggregate subbase, in place – per cubic yard.

j. Crushed stone, in place – per cubic yard.

2. Do not perform excavation of unsuitable materials until material to be excavated has been cross-sectioned and classified by Architect.

C. Earth Excavation: Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as unauthorized excavation.

D. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 1-inch, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

2. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand or using equipment with smooth edged buckets to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work. Loose, softened or disturbed material due to construction traffic or replacement of reinforcement shall be removed prior to placement of concrete.

3. Excavation shall be approximately level, clean and clear of loose material. Debris, rock material, organic material or unsuitable material encountered in the excavation shall be removed and disposed of as specified above.

4. Excavation beyond the design limits, made without authorization from the Owner or Geotechnical Engineer, will be refilled with gravel subbase material compacted to 95% maximum dry density at the Contractor's expense.

5. Excavate the area within the building lines level to 6 inches below the underside of the concrete floor slab. Excavate foundation wall footings and column footings level to the bottom of the footing. Excavate for pipes, utilities, pits, and incidentals.

6. Densify the native soils beneath building slabs and foundations, prior to placing fill soils or concrete. Compact using at least 5 passes of a vibratory roller weighing at least 5 tons. Areas that continue to yield after 5 passes should be over-excavated, as directed by the Geotechnical Engineer, removing the unstable soil, and backfilling with granular borrow. Native soils shall be compacted to at least 95% of its maximum dry density as determined by ASTMD-1557.

7. If bearing is not suitable at levels shown on the Drawings, within the design limits, the Architect or Geotechnical Engineer shall be notified so that adjustments in level or changes may be made immediately. The Geotechnical Engineer will determine the extent of excavation of unsuitable material. Payment for excavation of unsuitable material, beyond the design limits, and replacement with structural fill will be made under the unit price listed in the Bid Form, when the excavation has received prior approval from the Owner or Geotechnical Engineer.

8. All previous construction, including foundations, walls, floor slabs and abandoned utilities, be removed from within the limits of the building be replaced with

compacted structural fill. Excavate unsuitable material such that the approved backfill material beneath the building will slope 1H to 1V down and away from the footings.

9. Prevent freezing of the subgrade soils inside the building lines. Freezing of these soils beneath footings and slabs may result in frost heaving or post-construction settlement. If frost penetration occurs, the native soil and overlying fill effected should be removed and replaced, as directed by the Geotechnical Engineer

E. Rock Excavation:

1. Removal and disposal of materials that cannot be excavated without drilling and blasting, or requiring use of special equipment, except such materials that are classed as earth excavation.

2. Typical materials classified as rock are solid rock, rock in ledges, and rock-hard cementitious aggregate deposits two cubic yards or more in volume.

3. Intermittent drilling or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

4. Rock excavation does not include:

a. Removal of material which can be removed with a hand pick or power shovel.

b. Loose or previously blasted rock or broken stone in rock fills or elsewhere.

F. Rock Payment Lines:

Two feet outside of concrete work for which forms are required, except footings and base slabs.

One foot outside perimeter of footing, base slabs, and precast concrete.

Pipe trenches: 3' minimum width and 6" under pipe, or as indicated on Drawings.

Neat outside dimensions of concrete work where no forms are required.

Under slab on grade: 6-inch below bottom of concrete slab or as shown on drawings.

G. Excavation in Paved Areas:

1. Saw cut pavement prior to excavation to provide a clean, uniform edge. Minimize disturbance of remaining pavement. Cut and remove the minimum amount of pavement required to do the work.

2. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

3. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

H. Excavation for Trenches:

1. Excavate trenches to indicated gradients, lines, depths, and elevations shown on the Drawings.

2. Produce an evenly graded flat trench bottom at the subgrade elevation required for installation of pipe and bedding material.

3. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

4. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

a. Clearance: 12 inches (300 mm) each side of pipe or conduit

5. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

a. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

b. In roadways, load excavated material directly into trucks unless otherwise permitted by the Architect.

c. In roadways, place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in roadways unless otherwise permitted by the Architect.

I. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work directed by Architect including refilling, is at Contractor's expense.

J. Refilling Unauthorized Excavation:

1. Trenches: Use crushed stone or gravel as directed by the Geotechnical Engineer.

2. Below Building Footings: Use crushed stone fill.

3. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.

K. Excavation of Unsuitable Materials:

1. When excavation has reached required subgrade elevations, notify Architect who will make an inspection of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper as

directed by Architect and replace excavated material with gravel or crushed stone.

2. Removal of unsuitable material and its replacement as directed will be paid for as detailed in the Contract.

L. Material Storage:

1. Stockpile and maintain suitable surplus excavated materials for re-use as backfill within the project limits as directed by the Architect. Place, grade and shape stockpiles for proper drainage.

2. Locate and retain soil materials away from edge of excavations.

3.02 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.03 STABILITY OF EXCAVATIONS

A. General: Slope sides of excavations to comply with OSHA regulations and local codes. Shore and brace where sloping is not possible because of space restrictions or stability to material excavated.

Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Refer to Section 02260 for shoring and bracing requirements.

3.04 DEWATERING:

A. Refer to Section 02240 for dewatering requirements.

3.05 BACKFILL AND FILL:

A. General: Place acceptable soil material in layers to required subgrade elevations as shown on the Drawings and as listed below such that required density is achieved throughout each lift.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use common borrow.

2. Under walks and pavements, use base and subbase material.

3. Under steps and ramps, use structural fill.

4. Under building slabs, use structural fill.

5. Prior to placing any soil or concrete inside building lines, obtain approval from the Geotechnical Engineer.

C. Fill, backfill and compact to produce minimum subsequent settlement of the material and provide adequate support for the surface treatment or structure to be placed on the material. Place material in approximately horizontal layers of beginning at lowest area to be filled. Do not impair drainage.

D. Re-Use of On-Site Soils and Excavated Bedrock

The marine soils existing at the site are susceptible to frost action. Therefore, these soils shall not be used as backfill adjacent to foundation walls, retaining walls, or exterior foundations for light poles or signs, etc.

E. Backfill of Structures

1. Compacted Structural fill shall be placed under building slabs, footings and adjacent to perimeter foundation walls (both inside and out) and exterior sign or pole foundations and below site slab areas.

2. Compacted structural fill on the exterior of the foundation and basement walls shall extend laterally a minimum of 2 feet from the wall. Backfill beyond this limit on the exterior of the building may consist of common fill. The top 12 inches of fill on the exterior of the building shall consist of low permeability material or bituminous concrete pavement to minimize water infiltration next to the building. Grading shall provide for runoff away from the building.

3. Compacted structural fill should be placed in layers not exceeding eight (8") inches in loose measure and compacted by self propelled vibratory equipment at the approximate optimum moisture.

4. In confined areas, the maximum particle size shall be reduced to three (3) inches and the loose layer thickness should be reduced to six (6) inches and compaction performed by hand-guided vibratory equipment.

5. Six (6) inches of crushed stone shall be placed below the on-grade floor slabs.

6. A non-woven geotextile fabric shall be placed on any soil subgrade prior to placing the crushed stone layer.

7. The existing marine soils and fill material are not suitable for reuse as sub-slab, foundation or concrete retaining wall backfill.

8. Fill placed inside building lines shall be placed under the direct supervision of a testing agency. Fill placed without the presence of the testing agency shall be removed and refilled under their supervision.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. Scarify surfaces so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment and not more than 6" in loose depth for material compacted by hand-operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice. Place backfill and fill materials evenly adjacent to structures to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

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

1. Acceptance of construction below finish grade including, dampproofing, waterproofing, and perimeter insulation.

2. Installation, inspection and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Backfill cast-in-place concrete structures when the concrete has developed adequate strength as determined by the Architect.

8. Use care in backfilling to avoid damage or displacement of underground structures and pipe.

9. Backfill under all existing utility pipes crossed during construction operations with 3/4" crushed stone. The crushed stone backfill will extend continuously from the bedding of new utility pipes to the utility pipe crossed, including a 6" thick envelope of crushed stone all around the existing utility pipes.

10. The 3/4" crushed stone backfill shall stand at its own angle of repose. No "haunching" or "forming" with common fill will be allowed.

F. Backfilling Trenches:

1. Place backfill on subgrades free of mud, frost, snow, or ice.

2. Place and compact crushed stone bedding course on trench bottoms and where indicated. Limits of bedding and requirements for remaining trench backfill are shown on the Drawings. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits

3. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of

footings. Concrete shall comply with requirements specified in Division 3 Section "Cast-in-Place Concrete."

4. Provide 4-inch- (100-mm-) thick, concrete-base slab support for electrical or telecommunications conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfillling or placing roadway subbase.

5. Backfill under all existing utility pipes crossed during construction operations with 3/4" crushed stone. The crushed stone backfill will extend continuously from the bedding of new utility pipes to the utility pipe crossed, including a 6" thick envelope of crushed stone all around the existing utility pipes. The 3/4" crushed stone backfill shall stand at its own angle of repose. No "haunching" or "forming" with common fill will be allowed.

6. Place and compact initial backfill of crushed stone, free of particles larger than ¾ inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.

   a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

7. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

8. Place and compact final backfill of satisfactory soil to final subgrade elevation.

9. Trenches in Cross-Country Runs: Upon completion of final backfill, restore surface to that which existed prior to construction. Mound the trench 6 inches above existing grade if required by the Architect.

10. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

G. Roads, Parking Lots and Walks:

1. Prepare subgrade to proper grade and proof-roll to 95% maximum dry density. Place fill in 6" to 8" layers compacted to 95% maximum dry density.

2. Do no work when subgrade is muddy or frozen.

3. Subbase course material shall be placed in maximum 8-inch thick loose lifts and compacted at approximately optimum moisture content to a dry density of at least 95 percent of maximum dry density, as determined in accordance with ASTM Test Designation D1557.

4. Base course material should be placed in one lift and compacted with a minimum of two coverages with self-propelled vibratory compaction equipment.

5. Finish surface tolerance shall be 1/2" above or below the required grade. Puddling in paved or unpaved areas will not be acceptable except in areas designated as ponds.

H. Electrical and Telecommunications Conduit

1. Electrical Conduits: Bury beneath finish grade a minimum of 30 inches to top of conduit, or as required by the National Electrical Code or local utility company, whichever is deeper. Surround conduits by a minimum of 6 inches of sand or bedding material.

2. Telephone and Communication Conduits: Bury beneath finish grade a minimum of 30 inches to top of conduit, or as required by the local utility company, whichever is deeper. Surround conduits by a minimum of 6 inches of sand or bedding material.

I. Replacement of unsuitable materials: Below normal grade: See Paragraph 3.01K. Above normal grade: Replace unsuitable material with suitable on-site material. If additional material is required, use Select Backfill.

3.06 COMPACTION:

A. Methods: Use methods which produce the required degree of compaction throughout the entire depth of material placed without damage to new or existing facilities and which are approved by the Architect.

B. Moisture Control: Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. Adjust moisture content of soil as required to achieve specified compaction. Remove and replace material which is too wet to compact to required density.

C. Degree of Compaction: Compact each layer of fill and slopes as work progresses. Compact to the following minimum densities:

FILL AND BACKFILL LOCATION	DENSITY
Under structure foundations	95% of max.
Crushed stone fill	100%
Select fill below slab areas and sidewalks	95%
Top 2 feet under pavement	95%
Below top 2 feet under pavement	92%
Trenches through unpaved areas	90%
Embankments	90%
Pipe Bedding	92%
Beside structure foundation walls, tank walls, and retaining walls	95%
Under pipes through structural fills	90%
Underdrain filter sand	92%
Sand bedding for conduit	95%

3.07 GRADING:

A. Grading: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Grading Outside Structure Lines: Grade areas adjacent to structure lines to drain away from structures and to prevent ponding.

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

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 1 inch above or below the required subgrade elevations.

2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than one-half (1/2) inch above or below the required subgrade elevation.

3. Fill Under Slabs: Grade smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10' straightedge.

3.08 MAINTENANCE:

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.09 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 2 Section "02710 Sewers Drains and Site Piping".

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

C. Compact each filter material layer to specified compaction of soil backfills and fills requirements

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Allow testing agency access to off-site sources of materials for compliance verification. Provide samples of each fill material from the proposed source of supply. Allow sufficient time for testing and evaluation of results before material is needed. Submit samples from alternate sources if proposed material does not meet the specifications. Submit test results to the Architect.

D. Tests of soil as delivered may be performed from time to time. Materials in question may not be used, pending test results. Remove rejected material and replace with new, approved soil.

E. Cooperate with the laboratory in obtaining field samples of in-place, bank-run, or stockpiled materials. Samples should be obtained by laboratory personnel from various suppliers, but other individuals may obtain and deliver samples if approved by the Architect.

F. Coordinate schedule with testing agency and Architect to allow testing agency representative to be on site prior to foundation formwork and at the start of filling operations.

G. The Contractor shall bear cost of retesting when initial test results indicate non-compliance with specifications, or when alternate sources are submitted.

H. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

I. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. ASTM C-29 (dry rodded unit weight) for crushed stone fill. Tests will be performed at the following locations and frequencies.

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 100 feet (30m) or less of trench length, but no fewer than 2 tests

J. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.11 DISPOSAL OF EXCESS MATERIALS:

A. Removal from Owner's Property:

1. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property

2. Keep roads free of rocks, soil, trash, and debris. Use suitable watertight vehicles for hauling wet materials over roads and streets. Clean up materials dropped from or spread by vehicles promptly or when directed by the Architect.

B. If hazardous waste or special waste as defined by the U.S. Environmental Protection Agency or State Department of Environmental Protection is encountered during excavation, the Contractor shall avoid disturbance of that material, and shall notify the Architect immediately. The State Bureau of Oil and Hazardous Waste Control shall be notified and consulted prior to disturbance of the waste or contaminated soil. Removal and disposal of contaminated materials is not included in the Contract, and will be paid for by appropriate change order.

END OF SECTION

SECTION 02450 - DRILLED MINIPILES

PART 1 - GENERAL

1.1 GENERAL

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 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 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. The purpose of the drilled minipiles is to provide support for the footings adjacent to existing structures. Drilled minipile installations will require drilling with a temporary casing and extracting the casing bottom to within 12 inches below ground surface following grouting and cutting off at 6 inches above bottom of pipe cap.

B. The Contractor shall furnishing all labor, materials, equipment and incidentals necessary to install vertical 40-kip allowable design capacity drilled minipiles at the locations and to the lines and grades shown on the Drawings.

C. The Contractor shall cut-off of pile stickups at the design elevation following installation.

D. The Contractor shall provide survey control, layout of design pile locations and as-built sketches by a registered land surveyor.

1.3 RELATED SECTIONS

A Section 02145: Dewatering and Predrainage
B. Section 02225: Excavation, Backfilling and Compaction
C. Section 02401: Lateral Support of Excavation

1.4 DEFINITIONS AND REFERENCE STANDARDS

A. ASTM: Specifications of the American Society for Testing and Materials
B. AWS: Standard Code for Welding in Building Construction, of the American Welding Society
C. ACI: American Concrete Institute
D. OSHA: Occupational Safety and Health Administration
E. AISC: American Institute of Steel Construction
F. Owner: The Owner is the Maine Historical Society

G. Architect: Authorized representatives of the Architect or Owner. For the work covered under this Section, this term will include Sebago Technics, Inc.
H. 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 site improvements and features that are outside the limits of the site, or those elements within the limits of the site that are to remain.

1.5 JOB CONDITIONS

A. Prior to submitting a bid, the Contractor shall review and understand the information contained in the following report. This report is made available to the Contractor for information only and shall not be interpreted as a warranty of subsurface and/or environmental conditions whether interpreted from written text, boring logs, laboratory chemical test data or other data.

1. "Report on Subsurface and Foundation Investigation, Proposed Addition, Maine Historical Society Library, Portland, Maine," prepared by Sebago Technics, Inc., dated August 4, 2006.

B. Available soil samples recovered from borings may be examined at the office of Sebago Technics, Inc., One Chabot Street, Westbrook, Maine 04092. The boring information is considered to represent the conditions at the locations of test borings at the time the test borings were made. The Contractor should anticipate variations from the conditions disclosed by the borings in planning and estimating the work.

1.6 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of the State of Maine, the City of Portland and all other authorities having jurisdiction over the Work,

B. The Owner will provide full-time monitoring of pile installations. No piles shall be drilled, installed or grouted except in the presence of an authorized representative of the Owner.

C. The Owner will provide on-site inspection of grout placement. Grout test cylinders will be taken by the Owner's Inspection Agency during placement. The Contractor shall fully cooperate with the Owner's Inspection Agency to facilitate observing and assisting in taking and storing samples. No piles shall be grouted except in the presence of an authorized representative of the Owner.

D. The presence of the Architect 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 all site improvements against damage, and for safety on the construction site.

E. The Contractor shall furnish appropriate certifications of the quality of all pile materials to be used in the work prior to the start of the Work.

F. The Contractor shall have a minimum of three years experience within the last 10 years in minipile installations of similar type and complexity as indicated on the Drawings.

G. The Contractor shall perform any and all preparatory work at no additional cost to the Owner to discover, protect, maintain, relocate, and restore existing and new site improvements (i.e., utilities). The Contractor shall include and incorporate the findings of this preparatory work on his/her submittals.

1.7 SUBMITTALS

A. General

1. The Contractor shall forward submittals to the Architect a minimum of 2 weeks prior to any planned work related to the Contractor's submittals.

2. The time period(s) for submittals are the minimum required by the Architect to review, comment, and respond to the Contractor. The Architect may require resubmission(s) for various reasons. The Contractor is responsible for scheduling specified submittals and resubmittals so as to prevent delays in the work.
3. The Contractor's submittals shall be reviewed and accepted by the Architect prior to conducting any work.
4. The Contractor's submittals shall be prepared and stamped by a Professional Engineer(s) registered in the State of Maine, retained by the Contractor. The Contractor's Professional Engineer(s) shall have a minimum of 5 years' experience in the design and performance of drilled minipiles similar to those required for this project.
5. Acceptance of the Contractor's submittals by the Architect does not relieve the Contractor of the responsibility for the adequacy, safety, and performance of the Work.

B. The Contractor shall provide the following submittals regarding the drilled minipiles:

1. Plans, elevations, sections, details and calculations for minipiles if the Contractor proposes a minipile design different than that shown on the Drawings.
2. Description of the proposed drilling and grouting equipment and installation procedure.
3. Manufacturer data sheets for the proposed steel reinforcing bars (including splicing details and centralizers).
4. Mill certificates for the steel reinforcing bars and permanent steel casing containing results of material tests conducted by a certified laboratory.
5. Detailed narrative outlining the construction sequence (i.e., installation and maintenance, as applicable) with respect to minipile installation.
6. As-built pile location plan with pile cut-off elevations. The submittal shall include a table summarizing the deviation of as-built plan locations and cut-off elevations in feet (to the nearest 0.01 feet) from plan design locations and elevations.

1.8 TOLERANCES

A. Minipiles shall be installed to within 1-1/2 inches of design plan locations. If the as-built location tolerance is exceeded for any reason, the minipile shall be analyzed to determine the actual loads to be supported. The minipile shall be rejected if the calculated actual load exceeds the design load by more than 10% and/or the materials are stressed beyond the allowable limits.

PART 2 - PRODUCTS

2.1 GROUT

A. Non-shrink grout made with TYPE I, II, or III Portland Cement conforming to ASTM C-150 specifications shall be used. Cement should be fresh and should not contain any lumps or other indications of hydration. Additives such as retarders, water reducing agents and superplasticizers shall not be used unless approved by the Architect.

B. The grout shall be proportioned to attain 5,000-psi compressive strength at 28 days. The grout shall be mixed on-site with a paddle and blade type mixer and pumped using an air powered rotary or piston type positive displacement pump. Grout equipment shall be capable of continuous mechanical mixing and producing a uniform grout, free of lumps and undispersed cement.

2.2 STEEL REINFORCING

A. Steel reinforcing bars shall be of the dimensions and grades as shown on the Drawings, and shall be new and of uniform quality.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Minipiles shall be installed at the locations and to the sizes shown on the Drawings. Minipiles shall be drilled using rotary drilling methods. Down-the-hole hammers, core barrels or other similar equipment may be necessary to drill into bedrock. Holes shall be temporarily cased from ground surface to the bottom of minipile or top of bedrock. The length of the combined soil/rock socket shall be 20 feet as shown on the Drawings. The drill hole shall be flushed prior to inserting the steel reinforcing bar to remove cuttings.

B. Steel reinforcing bars of the sizes, lengths and grades shown on the Drawings shall be inserted into the completed drill hole. The bars shall be centrally located in the drill holes using approved centralizers.

C. Grouting shall be conducted prior to removing the temporary casing, and shall be completed within 20 minutes of starting. Grout shall be placed via tremie from the bottom of the drill hole until clean grout exits from the top of the casing.

D. The bottom of the temporary casing shall be withdrawn to within 12 inches of the top of ground surface. Withdrawal of temporary casing shall be conducted in a controlled manner such that the grout level is maintained at the top of the casing at all times. During withdrawal of the casing, the grout level inside the casing shall be monitored by the Contractor to confirm that the flow of grout inside the casing is not obstructed.

E. The minipile shall be connected to the existing footing as shown on the drawings.

F. Construction of minipiles within 8 feet of any previously installed minipile shall take place only after the grout has cured for a minimum of 12 hours.

G. All excavated material, slurry and slurry contaminated materials shall be removed and legally disposed of off-site by the Contractor. Prior to drill water discharge, the excess water shall be processed to remove soil fines. Additional treatment of water or slurry shall be performed as necessary to comply with any and all applicable regulatory requirements.

END OF SECTION

SECTION 02580 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. Bituminous Concrete Paving: Section 02510

1.03 SUMMARY OF WORK:

A. Provide all materials, equipment, and labor necessary for marking of pavement, including parking lots, walks and roadways, as indicated on the drawings.

PART 2 - MATERIALS

2.01 GENERAL: All materials conforming to M.D.O.T. specifications Section 708.03.

2.02 Paint For Pavement Marking: White, yellow and blue as shown on Drawings meeting the requirements of AASHTO M248, Type N.

PART 3 - INSTALLATION

3.01 GENERAL: Comply with requirements of the Manual on Uniform Traffic Control Devices latest edition.

3.02 PREPARATION OF SURFACE: Immediately prior to applying pavement marking, clean the surface of dirt, grease, oil, water and other foreign matter. Dry the surface if necessary.

3.03 LAY OUT: Lay out required markings with chalk prior to applying paint to ensure proper alignment. Use standard stencils for all directional arrows.

3.04 APPLICATION: Apply paint by hand or with striping machine to a minimum wet thickness of 15 mils.

3.05 PROTECTION: Place temporary barriers to keep traffic off paint throughout required drying time.

END OF SECTION

SECTION 02665 - WATER MAINS AND APPURTENANCES

PART I - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 SUMMARY OF WORK:

A. Work Included: Furnish and install the site water pipe materials, fittings, valves and appurtenances of the type(s) and size(s), and in the location(s) shown on the Drawings and as specified herein. Connect site water system to the municipal system. Comply with all applicable local, State and Federal regulations.

B. Related Work Specified in Other Sections:

1. Earthwork: Section 02300

1.03 SUBMITTALS

A. Product Data: Before delivering pipe to site submit name of proposed manufacturers for each type of pipe to Architect for review.

B. Submit manufacturer's certification that the product meets requirements of the Specification.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Except where the type of class or use of pipe is explicitly indicated on plan or specified herein, the Contractor may provide any of the kinds of pipe specified. However, in the interest of future maintainability, only one type of pipe will be approved for a given utility for general use in all those areas where the Contractor has choice. For any given pipe material, use pipe of the same manufacturer through the project.

B. Pipe and appurtenant materials shall conform to the specifications of the Portland Water District, which are incorporated herein by reference, unless specifically approved otherwise by the Architect.

C. Pipe and fittings within the project (beyond the meter pit) shall conform to the Portland Water District's standards and applicable State and Federal Regulations.

2.02 WATER PIPE:

A. Ductile Iron Pipe Shall be cement lined ductile iron pipe, Class 52 meeting the standards of ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51, and ANSI/AWWA C104/A21.4.

B. Fittings shall be of ductile iron conforming to ANSI/AWWA C110/A21.10 for fittings larger than 24" and AWWA C153 for fittings 3" through 24"

C. Pipe and fittings shall be furnished with factory applied bituminous coating 4 mils thickness. Pipe and fittings shall be cement lined meeting the standards of AWWA C104

D. Pipe and fittings shall be furnished for a minimum rated working pressure of 125 psi.

E. Domestic service pipe of 2" diameter or smaller shall be Type "K" annealed copper tubing with compression type fittings.

2.03 PIPE AND FITTINGS FOR SERVICE CONNECTIONS:

A. Size and type to meet local and State codes and standards.

2.04 GATE VALVES:

A. Manufacturers: U.S.P. Metroseal or equal.

B. Design:

1. Meet requirements of AWWA C509.

2. Buried valves for fire protection system designed for minimum 200 psi working pressure.

3. Interior Valves for Fire Protection System: Flanged joints with rising stem; furnish with post indicators.

4. Buried Valves: Mechanical joints, non-rising stem, turn right clockwise to open.

5. Bituminous coated.

6. UF and F.M. approved.

7. Design permits repacking in wide-open position while in service without leakage.

B. Fabrication:

1. Ductile iron body meeting the latest revision of AWWA C-153, resilient seat wedge type gate.

2. Cast manufacturer's name and catalog number in valve body.

2.05 VALVE BOXES:

A. Acceptable Manufacturers: M & H as manufactured by Dresser Industries, Inc., A.P. Smith as manufactured by U.S. Pipe and Foundry Co., or approved equal product of the size indicated on the plans.

B. Design:

1. Cast iron and of the adjustable, telescoping, heavy-pattern type.

2. Construct to prevent the direct transmission of traffic loads to the pipe or valve.

C. Fabrication:

1. The Upper or Sliding Section of the Box: 24-in. top with top flange, 36 in. bottom slide type, cast iron, provided with a flange having sufficient bearing area to prevent undue settlement.

2. The Lower Section of the Box: Designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.

3. Adjustable through at least 6 in. vertically without reduction of the lap between section to less than 4 in.

4. Length: As necessary to suit the ground elevation.

5. Inside Diameter of Box: At least 5 1/4 in.

6. Covers: Close fitting and substantially dirt-tight, and top of cover flush with the top of the box rim.

7. The word "WATER" shall be cast in the covers.

2.06 FLEXIBLE COUPLINGS:

A. Acceptable Manufacturers: Ford Meter Box Co., Dresser, Inc or Architect approved equal.

B. Design:

C. Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

D. Standard: AWWA C219.

E. Center-Sleeve Material Ductile iron.

F. Gasket Material: Natural or synthetic rubber.

G. Pressure Rating: 200 psig (1380 kPa) minimum.

H. Metal Component Finish: Corrosion-resistant coating or material.

2.07 CORPORATION STOPS:

A. Design: Meet AWWA standard designation C 800.

B. Bronze with a lapped, ground key.

C. Inlet Thread: Steep taper type.

D. Outlet Connections: As required to suit the type of pipe or tubing connected.

E. Threaded inlet and flared copper outlet with I.P. thread under tube nut, or be an approved equal product.

2.08 CURB STOPS:

A. Ground key, round way, inverted key with drain type. Fabricate from bronze conforming to ASTM B61 to B62. Furnish stop suitable for the working pressure of the system with

appropriate connection to the service piping. Cast into the stop body an arrow indicating direction of flow.

2.09 TAPPING SLEEVES AND VALVES:

A. Acceptable Manufacturers: Mueller Co. or A.P. Smith, or Architect approved equal.

B. Design: Meet the latest AWWA Specifications.

C. Fabrication:

1. Tapping Sleeves:

a. Two-part castings, flanged on the vertical centerline.

b. Surface area of each flange: Thoroughly machine.

c. Sleeve flanges: Fit with lead gaskets, covering the entire surface area of each flange and providing a watertight join for full length of the sleeve.

d. Bolts used to assemble the sleeves: Pass directly through each flange and through each gasket.

e. Provide with raised beads at the base of each bell, to aid in centering the sleeve on the pipe and to provide a stop for caulking.

f. Sleeve outlets: Provide counterbored flanges to insure proper centering of the tapping valve.

2. Tapping Valves:

a. Flanged by mechanical joint.
b. Meet specifications for gate valves.

3. Installing: Check the dimensions of the pipe on which the tapping sleeves are to be installed, prior to ordering the sleeve.

2.10 PIPE INSULATION:

A. Styrofoam SM insulation as manufactured by Dow Chemical Co.

2.11 ACCESSORIES:

A. Thrust Blocking: Place 2,500 psi concrete as indicted on the plans and to provide sufficient bearing are to transmit unbalanced thrust from bends, tees, caps or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 150 psi.

B. Locked mechanical joint fittings shall be installed where vertical changes in direction are required.

PART 3 - EXECUTION

3.01 INSTALLATION:

A General:

1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations, and in conformance with Portland Water District's standards.

2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation. Typical minimum depth of cover for water main shall be 5' - 6" unless otherwise indicated on the plans. Pipe shall be insulated where depth of cover is less than 5'-6".

3. Install adapters, as required, when connecting pipes constructed from different materials.

B. Pipe Laying:

1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.

2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.

3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.

4. Excavate suitable holes for the joints so that only the barrel of the pipe received bearing pressure from the supporting material after placement.

5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade. The pipe shall be laid with the bell ends facing the direction of the laying.

6. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.

7. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.

8. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.

9. Take all necessary precautions to prevent flotation of the pipe in the trench.

10. Precautions shall be taken to prevent foreign material from entering into the pipe as it is being placed in the trench and backfilled. No foreign matter shall be allowed to enter the joints between pipes.

C. Temporary Plugs:

1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.

2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.

3. Do not use the pipelines as conductors for trench drainage during construction.

D. Jointing Push-On Pipe:

1. Connect pipe in accordance with the latest manufacturer's instructions and recommendations.

2. Clear each pipe length, coupling and fitting of all debris and dirt before installation.

3. Shove home each length of pipe against the pipe previously laid a hold securely in position. Do not pull or cramp joints.

4. Make all pipe joints as watertight as possible with no visible leakage and no sand, silt, clay, or soil of any description entering the pipeline at the joints.

5. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.

E. Jointing Bolted Joints:

1. Before the pieces are assembled, remove rust-preventative coatings from machined surfaces.

2. Pipe Ends, Sockets, Sleeves, Housings, and Gaskets: Thoroughly clean and smooth burrs and other defects.

F. Jointing Mechanical Joints:

1. Thoroughly brush surfaces against which the gasket will come in contact with a wire brush prior to assembly of the joint.

2. Clean and lubricate the gasket, bell, and spigot by washing with soapy water.

3. Slip gland and gasket, in that order, over the spigot, and insert the spigot into the bell until it is correctly seated.

4. Seat gasket evenly in the bell at all points, centering the spigot, and press the gland firmly against the gasket.

5. After all bolts have been inserted and the nuts have been made up fingertight, progressively and uniformly tighten diametrically opposite nuts all around the joint to the proper tension by means of a torque wrench.

6. The correct range of torque as indicated by a torque wrench and the length of wrench (if not a torque wrench) used by an average man to produce such range of torque, is as follows:

TORQUE RANGE VALUES

Range of torque	60-90 ft.-lb.
Length of wrench	10 in.

7. If effective sealing of the joint is not attained at the maximum torque indicated above, disassemble the joint, thoroughly clean, and reassemble.

8. Do not overstress bolts to tighten a leaking joint.

G. Pipe Cutting:

1. Cut in accordance with manufacturer's recommendations.

2. Cut the pipe with a hand saw, metal-inserted abrasive wheel (except asbestos-cement pipe), or pipe cutter with blades (not rollers).

3. Examine all cut ends for possible cracks caused by cutting.

H. Pipe Insulation:

1. Install 2 in. thick x 4 ft. wide between pipe and culvert or over pipe when noted on plans.

2. Between culvert and pipe, extend insulation 6 ft. each side of the culvert along the pipe.

3. Install over the pipe when there is less than 5.5 ft. of cover between the top of pipe and original ground grade insulation over pipe shall be a minimum of 4 feet in width unless otherwise indicated on the plans.

4. For dual pipe trenches the insulation shall be 8 ft. wide.

5. Provide 6 in. sand blanket above and below insulation or as shown on Drawings.

I. Pipe Deflection Allowances: Per manufacturer's recommendations.

J. Valve Installation:

1. Install in accordance with the specifications for the pipe to which they are to be connected.

2. Make up valve joints in accordance with the Contract Drawings.

3. The valves shall bear no stresses due to loads from the adjacent pipe.

4. Inspect, clean, and lubricate before installation.

K. Bracing and Blocking:

1. Block and anchor all bends, 22½° or greater, tees, plugs, etc. with concrete to prevent movement of the pipe in the joints due to internal or external pressures.

2. Place concrete around fittings to the walls of the trench, as shown on the Drawings, so placed that joints may be caulked or tightened, if necessary.

3. Do not backfill until the concrete has set.

4. If the soil does not provide firm support for thrust block placement, provide retainer clamps and tie rods as shown on the Drawings and/or directed by the Owner's Representative.

L. Hydrant Installation:

1. Set hydrants, buried valves and valve boxes plumb, and center with each valve box directly over the valve.

2. Carefully tamp earth fill around the valve box to a distance of 4 ft. on all sides of the box, or to the undisturbed trench face, if less than 4 ft.

3. Set as shown on the Drawings or as directed by the Architect.

4. Clean interiors of all foreign matter before installation and inspect in opened and closed positions.

M. Air Vents and Blowoffs, Corporation Stops, Curb Stops, Valve Boxes, Copper Tubing and Styrofoam Insulation: Install in accordance with the Drawings and as directed by the Architect.

N. Vertical Separation From Sanitary Sewer:

1. Whenever water mains must cross sewers, lay at such an elevation that the top of the sewer is at least 18 in. below the bottom of the water main.

2. When the elevation of the sewer cannot be buried to meet the above requirements, center one full length of water main over the sewer so that both joints will be as far from the sewer as possible.

O. Water Service Leads and Stops:

1. Provide and install corporation valves, water service leads, and curb stops for proposed building connections as shown on the Drawings, or where directed by the Architect.

3.02 PRESSURE TESTING AND DISINFECTION:

A. Pressure testing and disinfection shall be performed in strict accordance with Portland Water District Specifications.

B. Pressure testing and disinfection shall be performed in the presence of the representative of the Portland Water District, and the Architect.

END OF SECTION

SECTION 02710 - SEWERS, DRAINS AND SITE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK:

A. This work shall consist of the construction of storm drains, sewer pipes foundation/underslab drainage system and miscellaneous site piping by means of trenched or trenchless installation, casing pipe, service leads, hereinafter referred to as "pipe" as shown on the plans, details, and specified herein.

B Related Work Specified in Other Sections:

1. Earthwork: Section 02200 (includes excavation, bedding, backfill).
2. Manholes, Catch Basins drainage structures, Precast Concrete: Section 02720

1.03 SUBMITTALS:

A. Product Data: Provide data on pipe materials, pipe fittings, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

1.04 PROJECT RECORD DOCUMENTS:

A. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.05 DELIVERY, STORAGE AND HANDLING:

A. All pipe and fittings shall be delivered to the site and unloaded with handling that conforms to the manufacturer's instructions for reasonable care. Pipe shall not be rolled or dragged over gravel or rock during handling. The Contractor shall take necessary precautions to ensure the method used in lifting or placing the pipe does not induce stress fatigue in the pipe.

B. PVC pipe shall not be stored in direct sunlight. PVC pipe shall be covered with an opaque material while permitting adequate ventilation above and around the pipe to prevent damage due to excessive heat. PVC pipe shall be handled in a manner to prevent cracking due to dropping. Additional care shall be required in cold temperatures. Additionally, care shall be taken with temperatures above 73.4°F to avoid excessive deflection.

1.06 INSPECTION:

A. Pipe may be inspected at the manufacturing plant, or on the work site and shall be subject to rejection at any time, even though sample pipes may have been accepted as satisfactory at the manufacturing plant.

B. All pipes shall be subject to thorough inspection and tests. All tests shall be made in accordance with the methods prescribed by, and the acceptance or rejections shall be based on, applicable ASTM specifications.

C. Pipe will be inspected upon delivery and all pipes which does not conform to the requirements of this contract will be rejected and shall be immediately removed from the work area by the Contractor.

D. Unsatisfactory pipe will be either permanently rejected or minor repairs made. After delivery, any pipe will be rejected which has been damaged beyond the possibility of satisfactory repair.

E. If such pipe is found in the pipeline, it shall be removed and replaced or encased in a Class A concrete collar or envelope as directed, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS:

A. General: Provide fittings of same type and class of materials as pipe. Provide commercially manufactured wyes or tees for service connections. Fitting must have single piece gasket.

B. Foundation Perimeter Drain and Roadway Underdrain: : perforated corrugated polyethylene drainage tubing with smooth wall interior, highway grade, AASHTO M252, ASTM F-405-74, or Architect approved equal to that produced by American Drainage Systems. Geotextile drainage fabric shall be joints shall be Mirafi 140N. 36 inch roll or approved equal.

C. Underslab Drains: Perforated PVC subdrain pipe conforming to ASTM D-2792. Geotextile drainage fabric shall be Mirafi 140N. 36 inch roll or approved equal.

D. Storm Drain Pipe:

1. Corrugated smooth interior polyethylene pipe conforming to AASHTO Designation M252 and M294 equal to HI-Q pipe as manufactured by Hancor, Inc., or ADS N-12 as manufactured by Advanced Drainage Systems, Inc. Joints shall be bell-and-spigot meeting the watertight requirements of AASHTO M252 or AASHTO M294. Watertight joints shall meet the ASTM D3212 10.8 psi (74kPa) laboratory test. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

2. Reinforced Concrete Pipe: ASTM C 76, Class IV unless another class type is required by depth of burial, installed with flexible plastic, bitumen gaskets at joints.

   a. Gaskets: ASTM C443-07. Installed in strict accordance with pipe manufacturer's recommendations.

E. Sewer Pipe: Buried Piping: PVC meeting ASTM D3034 or ASTM D3033, strength requirement SDR 35, push-on joints ASTM D3212, gaskets ASTM F-477.

F. Sewer Pipe: Buried Piping: Ductile Iron pipe meeting the requirements of AWWA C151; thickness class 52 AWWA C150; double cement lined, AWWA c104, push on joints or mechanical joints with rubber gaskets, AWWA C111; fittings AWWA C110.

G. Electric/Tel-Data Conduit: Schedule 40 PVC pipe. Conduit for Central Maine Power (CMP) conductors shall be provided per CMP specifications.

2.02 MISCELLANEOUS

A. Flexible Adapters:

1. Non-pressure: Neoprene sleeve with stainless steel bands Engineer approved equal to those manufactured by Fernco.

2. Non Pressure: Dresser Style 53 as manufactured by Dresser, or Engineer approved equal .

B. Insulation: Extruded, closed cell rigid formed polystyrene, 2-inch minimum thickness, Styrofoam HI-60 as manufactured by Dow Chemical.

PART 3 - EXECUTION

3.01 INSTALLATION OF GRAVITY PIPE AND FITTINGS, GENERAL:

A. Methods: Install in accordance with manufacturer's recommendations. Use a laser beam for line and grade unless otherwise permitted by the Architect. Secure each length of pipe with bedding before placing next length. Plug open ends when work is suspended. Bed pipe as shown on drawings. A 30-inch minimum cover over the top of PVC and DI pipe should be provided before the trench is wheel-loaded.

B. Grade and Line: Lay pipe to line and grade shown on the drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points.

Line and grade may be adjusted by the Architect as required by field conditions.

C. Conditions: Lay pipe in the dry. Do not use installed pipe to remove water from work area.

D. Flush all pipes and remove debris. Flushing method approved by Architect. Gravity flushing is not acceptable.

E. Connections to manholes and catch basins: Provide short length of pipe so that joints are located within 3 feet of inside surface of manholes and catch basins for other than PVC pipe.

F. All connections shall be made in conformance with the Plumbing Code of the City of Portland and the Maine State Plumbing Code.

3.02 INSTALLATION OF REINFORCED CONCRETE PIPE

A. Reinforced concrete pipe shall be obtained only from a manufacturer of established good reputation in the industry. The pipe shall have a smooth and even interior surface, free from projections, indentations, or irregularities of any kind.

B. The joint shall be such that, when joined, the pipes will form a continuous and uniform line without projections, off-sets or irregularities and be capable of satisfying the specified leakage requirements.

C. Pipes shall be joined with rubber or rubber type gaskets that conform to the requirements established in ASTM Designation 443-67.

D. Each length of pipe shall be provided with proper ends made either of concrete formed on machined rings to ensure accurate joint surfaces or of metal rings. The diameters of the joints surface, depended upon to compress the gasket, shall not vary from the theoretical diameters by more than 1/16 inch. The joint shall be sealed by the rubber gasket so that the joint will remain tight under all conditions of service.

E. The rubber gasket shall be applied in accordance with the manufacturer's recommendations.

F. After the pipes are aligned in the trench and are ready to be jointed, all joint surfaces shall be cleaned. Immediately before jointing the pipe, the inside surface of the groove shall be thoroughly lubricated with a recommended lubricant. Pipe shall then be coupled immediately by carefully pushing each pipe into place without damage to pipe or gasket. The position of the gasket in the joint shall then be inspected to be sure it is properly put together and is tight.

G. Pipes shall be coupled by any suitable arrangement of come-along, winch, jack, or other power equipment that can exert sufficient force to couple pipe to its tightest position.

H. All pipe thirty-six inches in diameter or larger shall be sealed on the inside with cement mortar or with gunite by the grout-weld method using a pneumatic machine of the Nicholson, Bondactor, or equal type. Cement mortar if used shall be applied by trowel and the joint shall be thoroughly filled and finished smoothly with the inside surface of the pipe. The grout-weld seal shall be applied only by experienced and skilled workmen in accordance with the instructions of the manufacturers of the machine.

I. The pipe shall be laid accurately to line and grade. Pipe bedded in compacted crushed stone shall not be supported on blocking, wedges, brick, or anything except the bedding material. Pipe on concrete cradle shall be supported on solid concrete blocks or precast concrete saddles which become part of the completed cradle.

J. Each length of pipe shall be shoved home against the pipe previously laid, and held securely in position. Joints shall not be "pulled" or "cramped". Holes provided for jointing shall be filled and compacted.

K. Pipe from which a core has been cut and the resulting hole repaired, shall be placed with the cored hole located forty-five degrees above or below the horizontal centerline of the pipe.

L. To prevent the entrance of earth and other materials when pipe laying is not actually in progress, the open ends of pipe shall be closed by suitable temporary bulkheads. The Contractor shall take all necessary precautions to prevent floatation of the pipe because of flooding of the trench. If water is in the trench when work is resumed, the bulkheads shall not be removed until the danger of earth and other materials entering the pipe has passed.

M. All pipe joints and structures shall be made water tight. There shall be no visible leakage, spurting or gushing of water, sand, silt, clay or soil of any description entering the pipe lines at the joints or structures. Where there is evidence of water or soil entering the pipeline, connecting pipes or structures, defects shall be repaired.

3.03 INSTALLATION OF PVC SEWER PIPE

A. Pipes shall be coupled by any suitable arrangement of come-along, winch, jack, or other power equipment that can exert sufficient force to couple pipe to its tightest position.

B. All pipe thirty-six inches in diameter or larger shall be sealed on the inside with cement mortar or with gunite by the grout-weld method using a pneumatic machine of the Nicholson, Bondactor, or equal type. Cement mortar if used shall be applied by trowel and the joint shall be thoroughly filled and finished smoothly with the inside surface of the pipe. The grout-weld seal shall be applied only by experienced and skilled workmen in accordance with the instructions of the manufacturers of the machine.

C. The pipe shall be laid accurately to line and grade. Pipe bedded in compacted crushed stone shall not be supported on blocking, wedges, brick, or anything except the bedding material. Pipe on concrete cradle shall be supported on solid concrete blocks or precast concrete saddles which become part of the completed cradle.

E. Each length of pipe shall be shoved home against the pipe previously laid, and held securely in position. Joints shall not be "pulled" or "cramped". Holes provided for jointing shall be filled and compacted.

F. Pipe from which a core has been cut and the resulting hole repaired, shall be placed with the cored hole located forty-five degrees above or below the horizontal centerline of the pipe.

G. To prevent the entrance of earth and other materials when pipe laying is not actually in progress, the open ends of pipe shall be closed by suitable temporary bulkheads. The Contractor shall take all necessary precautions to prevent floatation of the pipe because of flooding of the trench. If water is in the trench when work is resumed, the bulkheads shall not be removed until the danger of earth and other materials entering the pipe has passed.

H. All pipe joints and structures shall be made water tight. There shall be no visible leakage, spurting or gushing of water, sand, silt, clay or soil of any description entering the pipe lines at the joints or structures. Where there is evidence of water or soil entering the pipeline, connecting pipes or structures, defects shall be repaired.

3.04 INSTALLATION OF HIGH DENSITY POLYETHYLENE PIPE

A. Install in strict accordance with pipe manufacturer's recommendations and in accordance with general pipe installation specifications included in Paragraph 3.01

B. Joints shall be constructed in accordance with manufacturer's installation instructions.

C. All Bell-and-Spigot pipe joints shall be thoroughly cleaned. Joint lubricant, supplied by the manufacturer, shall be liberally applied to the entire interior of the bell and gasket on the spigot prior to assembly.

3.05 UTILITIES TO BE ABANDONED

A. Closing Abandoned Utilities: Close open ends of abandoned underground utilities which are not indicated to be removed. Provide sufficiently strong closures acceptable to Architects to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed.

3.06 INSULATION

A. Install as shown on Drawings. Minimum 2" thickness, compacted sand layers above and below insulation.

3.07 TESTING

A. Gravity sewers shall be tested by low pressure air tests. Testing of each section of sewer installed shall include the portions of service laterals installed under this contract.

1. Low Pressure Air:

When low pressure air test is used, it shall be conducted in compliance with the following:

After completing backfill of the wastewater line, the Contractor shall, at no additional cost to the Owner, conduct a line acceptance test using low pressure air. The test shall be performed according to stated procedures and in the presence of the Engineer.

Procedures: All pneumatic plugs shall be seal tested before being used in the actual test installation. One (1) length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs at 25 psig. The sealed pipe shall be pressured to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipes.

After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure off any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line

being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

Pipe Diameter (In Inches)	Minutes
4	2.0
6	3.0
8	4.0
10	5.0
12	5.5
15.	7.5
18	8.5
21	10.0
24	11.5

In areas where groundwater is known to exist, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 10" long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of the water is 11-1/2 feet, then the added pressure will be 5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing shall remain the same.)

If the installation fails the air test, the contractor shall, at no additional cost to the Owner, determine the source of the leakage. He shall then repair or replace all defective materials and/or workmanship.

3.08 IDENTIFICATION

A. For all stormwater and subsurface drainage piping, install green warning tape directly over pipe and at outside edges of underground structures.

1. Green warning tape or detectable warning tape shall be installed over ferrous piping.

2. Detectable warning tape shall be installed over nonferrous piping and over edges of underground structures.

END OF SECTION

SECTION 02720 - MANHOLES, CATCH BASINS, DRAINAGE STRUCTURES PRECAST CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK

A. Provide drainage manholes and catch basins, and precast concrete items as shown on the drawings. This section includes:

1. Precast drainage manholes.
2. Precast catch basins.
3. Frames and covers, and grates.
4. Concrete light bases.
5. Stormwater treatment units.
6. PVC curb and surface drainage inlets.

B. Related Work Specified in Other Sections:

1. Earthwork: Section 02300.
2. Curbing: Section 02525
3. Sewers, Drains and Site Piping: Section 02710.

1.03 QUALITY ASSURANCE

A. Provide complete manhole, curb inlet, catch basin, and precast concrete structures capable of supporting AASHTO H20 loading.

B. All precast concrete shall comply with ASTM C913 "Standard Specification for Precast Concrete Water and Wastewater Structures."

C. Precast Manhole and Catch Basin Components: ASTM C478.

D. Provide PVC surface drainage inlets and curb inlets capable of supporting AASHTO H25 wheel loading.

1.05 SUBMITTALS

A. Shop Drawings:

1. Precast Manholes: Submit for approval precast manholes, catch basins and all precast concrete items prior to fabrication. Show components to be used and elevations of top of precast sections, base and pipe inverts, location of pipe penetrations, steps, for each structure.

2. Stormwater Treatment Units: Submit: Provide shop drawings showing the general arrangement and dimensional drawings of the stormwater treatment system; handling, storage and installation instructions; operation and maintenance instructions.

3. Submit for approval shop drawings of all PVC drainage structures and associated ductile iron frames and grates, prior to fabrication. Provide details of concrete rings around grates recommended by manufacturer to achieve H-25 loading requirements.

B. Product Data: Manufacturers' product data and installation instructions for frames, covers, grates, precast items, manhole sleeves, joint sealants and frost barrier.

PART 2 - PRODUCTS

2.01 SANITARY MANHOLE:

A. Base Sections: Precast monolithic construction with steps.

B. Barrel Sections: Precast with steps.

C. Top Sections: Precast eccentric cone with steps. Use flat cover only if shown on drawings.

D. Steps: Aluminum allow 6061-T6 or polypropylene reinforced with steel rod. Meet OSHA requirements, Min. width 14". Coat aluminum to be cast into concrete with bituminous paint.

E. Pipe to Manhole Connections: See Drawings.

F. Joints Between Precast Sections: Watertight, shiplap type, seal with two rings of 1-inch diameter butyl rubber sealant.

2.02 CATCH BASINS AND DRAIN MANHOLES

A. Base Sections: Precast.

B. Barrel Sections: Precast.

C. Top Sections: Precast concentric cone, eccentric, or flat cover if required by grade.

D. Joints between precast sections: Watertight, shiplap type, seal with two rings of 1-inch diameter butyl rubber sealant.

2.03 PRECAST CONCRETE RISERS

A. General: Reinforced precast concrete annular rings, size as shown on drawings. Provide with four 1-inch diameter vertical cast through holes.

2.04 MASONRY MATERIALS

A. Concrete Masonry Units: ASTM C139.

B. Mortar: Type M, ASTM C270. Use Type II Portland cement, Type S lime. Proportions for Mortar: 1 part Portland cement, 1/4 part hydrated lime. 3 to 3 3/4 parts sand.

2.05 FRAMES, GRATES AND COVERS

A. Cast iron: ASTM A48 Class 30.

B. Manhole frames and covers: Minimum 24" dia. opening, minimum weight 350 pounds.

1. Standard drainage frame and cover: All drainage manholes to be Etheridge Foundry M248S.

2. Waterproof locking frames and covers: Model R1755-F frame and Type C cover by Neenah Foundry.

B. Catch Basin Frames and Grates: To be Etheridge Foundry M248G, or Architect approved equal.

2.06 CONCRETE LIGHT BASES

A. Precast Light Bases: Superior Concrete Item No. 6851, or equal.

2.07 STORMWATER TREATMENT UNIT

A. Provide "Downstream Defender" stormwater treatment units as manufactured by Hydro-International, Inc. Furnish all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the stormwater treatment system as shown on the drawings. Contractor shall install the equipment in accordance with the manufacturer's Handling, Storage, and Installation Instructions.

2.08 PVC SURFACE DRAINAGE INLETS AND DRAINAGE STRUCTURES

A. PVC surface drainage inlets shall be of the road and highway structure type as manufactured by Nyloplast a division of Advanced Drainage Products. The ductile iron frame, grate and hood for each structure is considered to be an integral part of the surface drainage inlet and shall be furnished by the same manufacturer.

B. The PVC Structures shall be manufactured from PVC pipe stock utilizing a thermo molding process to reform the pipe stock to the specified configuration.

C. Drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. Joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals.

D. The pipe bell spigot shall be joined to the main body of the structure. The pipe stock used to manufacture the main body and pipe stubs of the curb inlet basin shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings.

E. The grate and frame for all road and highway structures shall be ductile iron and shall be made specifically for each so as to provide a round bottom flange that closely matches the diameter of the PVC basin body. The grate and frame shall be capable of supporting H-25 wheel loading for heavy-duty traffic. The metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron.

F. Installation: The specified PVC road and highway structure shall be installed using conventional flexible pipe backfill materials and procedures. The backfill material shall be crushed stone or other granular material meeting the requirements of class 1 or 2 material as defined in ASTM D2321. The road and highway structure shall be bedded and backfilled uniformly in accordance with ASTM D2321. An 8" to 10" thick concrete ring will be poured under the frame and grate as recommended by details provided from the manufacturer. The road and highway structure body will be cut at the time of final grade so as to maintain a one piece, leak proof structure. No brick, stone or concrete block will be used to set the frame and grate to the final grade height.

2.09 MISCELLANEOUS

A. Joint Sealants:

1. Butyl Rubber Sealant: One inch diameter strips as manufactured by Kent Seal, or Architect approved equal.

B. Dampproofing: Bituminous coating to be Dehydrate No. 4 Dampproof by W. R. Grace of Bitumastic Super Service Black by Koppers Co. for field application, or Architect approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION PRECAST MANHOLES

A. Placement: Place bases on compacted bedding material so manhole structure is plumb and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout.

B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.

C. Frame and Covers: Set to final grade as shown on the Drawings or set flush with pavement grade in paved areas or 2" below finish grade in unpaved roads or 24" above grade in cross-country areas. Provide adequate temporary covers (conforming with applicable local, State and Federal regulations) to prevent accidental entry until final placement of frame and cover is made.

Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.

D. Inverts: See detail on drawings.

E. Steps: Replace steps out of plumb and out of proper horizontal placement.

3.02 INSTALLATION OF CATCH BASINS

A. Placement: Place bases on compacted bedding material so catch basins structure is plumb and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout.

B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.

C. Frame and covers: Set to final grade as shown on the drawings. Use two rings of 1-inch diameter butyl rubber sealant between frame and chimney joints. Provide downward force to frame so as to compress the joint and provide a watertight seal and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.

D. Inverts: See detail on drawings.

3.03 PRECAST CONCRETE RISERS

A. General: For chimney heights of 3 to 12 inches as required.

B. Joints: Provide two rings of 1 inch diameter butyl rubber sealant. Compress joints to create permanent seal and prevent future settlement. Point joints with butyl rubber caulk sealant.

C. Install as shown on drawings.

D. Hardware: As specified on drawings.

3.04 INSTALLATION OF MISCELLANEOUS PRECAST STRUCTURES

A. Install as shown on drawings.

3.05 INSTALLATION OF PVC DRAINAGE STRUCTURES

A. Install as shown on drawings and in accordance with manufacturers specifications and instructions.

3.05 INSTALLATION OF STORMWATER TREATMENT UNITS

A. Install as shown on plans and approved shop drawings in accordance with manufacturers specifications and instructions.

END OF SECTION

SECTION 02740 - CURBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The Plans, General Conditions of the Contract, and Supplementary General Conditions, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK:

A. Provide all materials, equipment, and labor necessary for the placement of granite curbing, precast concrete curbing, and bituminous concrete curbing as shown on the Plans and as specified herein.

B. Related Work Specified Elsewhere:

1. Earthwork: Section 02300
2. Unit Pavers: Section 02780
3. Portland Cement and Concrete Sidewalks: Section 02520
4. Bituminous Concrete Paving: Section 02741

1.03 PERFORMANCE SPECIFICATION:

"Standard Specification for Highways and Bridges" revision of December 2002, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").

PART 2 - MATERIALS

2.01 GRANITE CURBING: Quarried granite stone conforming to MDOT Section 712.04.

2.02 CIRCULAR GRANITE CURB: Circular granite curb shall be in reasonable close conformity with the shape and dimensions as shown on the Plans and to the applicable material requirement.

2.03 BITUMINOUS CONCRETE CURBING: Bituminous concrete curbing shall be as shown on the Drawings.

PART 3 - INSTALLATION

3.01 PLACEMENT OF CURBING:

A. Installation of Granite:

1. Vertical Granite Curb: Set curb on a compacted foundation so that the front top arris line conforms to the lines and grades required. Assure the required spacing between stones by the use of an approved spacing device to provide an open joint between stones of at least 1/8 inch and no greater than 1/2 inch.

2. Sloped Granite Curb: Prepare the concrete foundation in advance of setting the stone by grading the proper elevation and shaping to conform as closely as possible to the shape of the bottom of the stone. Fill voids between stones with mortar mix. Maximum joint spacing is 1/2 inch.

B. Backfilling:

1. Fill all remaining spaces under the curb with approved material and thoroughly hand tamped so the stones will have a firm uniform bearing on the foundation for the entire length and width.

2. Fill any remaining excavated areas surrounding the curb to the required grade with approved materials. Place this material in layers not exceeding 8 inches in depth, loose measure and thoroughly tamped.

3. Vertical Granite Curb: To ensure backfill material does not infiltrate through the joints between the stones, place geotextile fabric in the back portion of the joint to prevent such infiltrating.

C. Protection:

1. Protect the curb and keep in good condition.

2. Clean and restore all exposed surfaces smeared or discolored to a satisfactory condition or remove and replace the curb stone.

D. Installation Bituminous Concrete Curb: Install in conformance with MDOT specifications.

END OF SECTION

SECTION 02741 - BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK:

A. Furnish all labor, materials, and equipment to construct plant mix bituminous concrete pavement in conformity with the Contract Drawings and as specified herein.

B. Related Work Specified in Other Sections:

1. Earthwork: Section 02300
2. Curbing: Section 02740
3. Unit pavers Section 02780

1.03 QUALITY ASSURANCE:

A. Performance in accordance with State of Maine, Department of Transportation, Standard Specifications - Highways and Bridges, Revision of December 2002, hereafter designated as MDOT Specifications.

B. Qualifications of Bituminous Concrete Producer: Use only materials which are furnished by a bulk bituminous concrete producer regularly engaged in production of hot-mix, hot-laid bituminous concrete.

C. Qualifications of Testing Agency: Use only recognized commercial testing laboratories with not less than 5 years experience in conducting tests and evaluations of bituminous concrete materials and design.

1.04 SUBMITTALS:

A. Mix Design: Provide the Architect with a job mix formula for each course used in the work.

B. Test Reports: Provide two copies of each test described below at the frequency determined in paragraph C.

1. Aggregate Material: Submit laboratory test reports that aggregates used in the bituminous mix conform to Section 703 of the MDOT Specifications.

2. Asphalt Cement: Submit laboratory test reports that bituminous material used in the bituminous mix conforms to Section 702 of the MDOT Specifications.

3. In-Place, Compacted Bituminous Concrete Mix: Submit laboratory test reports of samples cut from the in-place, compacted pavement indicating the percentage of theoretical maximum density (TMD), based on laboratory specimens of the mix combined in the proportions of the job mix formula.

C. Frequency of Testing:

1. Aggregate Material: Submit laboratory test reports of the stockpiled aggregates initially used in the mix and additional test reports for each change of course.

2. Asphalt Cement: Submit laboratory test reports for asphalt cement used in the initial mix and additional test reports for each change of source.

3. In-Place, Compacted Bituminous Concrete Mix: Submit laboratory test reports at frequencies not less than one of the following:

   a. Every 300 tons placed.
   b. Each day's placement.
   c. Each course, each day's placement.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Aggregates: Conform to Section 703 of MDOT Specifications.

B. Asphalt Cement: Conform to Section 702 of MDOT Specifications. Grade shall be AC-20.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Plant Mix Hot Bituminous Pavement: Produce and place in conformance with Section 401 of MDOT Specifications.

B. Pavement Overlay:

1. Raise all utility structures to grade.

2. Sweep entire area clean of all sand, dirt and debris.

3. Apply tack coat to entire service prior applying finish coat.

C. Temporary Trench Pavement Repair:

1. After trenching operations are complete, the Architect may order temporary pavement repair.

2. Material: Grading "B" hot bituminous concrete.

3. Clean surfaces of existing pavement which will be bonded to the temporary pavement.

4. Place material to a compacted depth of 2 inches.

5. Maintain temporary pavement smooth, free from potholes and to required grade.

6. Periodically inspect temporary pavement areas and repair as necessary, especially during the Winter months when the temporary pavement remains in place for an extended period. The Architect shall have the authority to order repair by the Contractor to areas which are, in his opinion, in unsatisfactory condition.

D. Permanent Trench Pavement Repair:

1. Saw edges of existing pavement to provide a vertical bonding face.

2. Remove temporary paving and sawn out existing paving.

3. Reset manhole frames and covers.

4. Apply a tack coat to the sawn edges.

5. Apply 3 in. of bituminous concrete paving, consisting of 2 in. base course (Grading "B") and 1 in. wearing course (Grading "C") unless otherwise shown on the Drawings.

6. Roller compact both courses, compacting the final wear course to meet existing pavement surfaces exactly.

END OF SECTION

SECTION 02780 - UNIT PAVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 SUMMARY OF WORK:

A Work included: Provide labor, materials, and equipment necessary to complete the work of this Section, and without limiting the generality thereof, furnish and include the following:

1. Preparation of site.
2. Supply and place laying course.
3. Supply and install paver stones in quality, shape, thickness and color as specified.

B. Related Work Specified in Other Sections:

1. Earthwork: Section 02200
2. Bituminous Concrete Paving: Section 025741

1.03 SUBMITTALS:

A. Samples: Submit samples of following:

1. Each paver indicating full range of color and texture to be expected in completed work.

1.04 WEATHER LIMITATIONS:

A. Protect unit paver work against freezing when temperature is 40° F (4° C) and falling. Protect unit paver work in hot weather to prevent excessive evaporation of setting beds.

PART 2 - PRODUCTS

2.01 UNIT PAVERS:

A. Brick Pavers (City Sidewalks) – Pavers shall conform to requirements of ASTM Standard Specifications for Building Brick (made of clay or shale) Designation C62-66 for Grade SW with the following modifications:

1. The absorption limits shall be from 8 to 12 percent for the average of 5 bricks.

2. The compressive strength shall not be less than 8,000 pounds per square inch (psi).

3. The modulus of rupture shall not be less than 1,000 pounds per square inch (psi).

4. The bricks shall be No. 1, wire cut type for paving.

Bricks shall be of standard size (2-1/4" x 3-3/4" x 8") with permissible variations not to exceed 1/16" in depth, 1/8" in width, or ¼" in length.

Bricks shall be as manufactured by the Morin Brick Co. of Danville, Maine, or an approved equal. Prior to ordering the brick, samples shall be submitted in whole straps to show color range.

2.02 EDGE RESTRAINT:

A. The edge restraint will be as shown on drawings; where pavers abut landscape areas, use Ideal Block Pave Edge product.

2.03 GRADED AGGREGATE SUBBASE AND BASE COURSE:

A. Aggregate subbase and base course as shown on Drawings. See Section 02200 - EARTHWORK.

2.04 BITUMINOUS BASE COURSE

A. The bituminous base course shall be 2" of hot bituminous paving, Grade B.

2.05 DRY GROUT FOR LEVELING COURSE AND JOINTS:

A. A mixture of six parts sand to one part Portland Cement. Sand shall consist of clean, coarse, concrete sand or granite screening, not Mason sand, with the following gradation limits:

Sieve Size	% Passing
3/8"	100
4	90 - 100
8	80 - 95
16	55 - 85
50	10 - 35
200	0 - 5

PART 3 - EXECUTION

3.01 CONSTRUCTION OF THE AGGREGATE SUBBASE AND BASE COURSE:

A. The aggregate base course shall be constructed to the proper subgrade in accordance with Section 02200, EARTHWORK.

3.02 BITUMINOUS BASE

A. A layer of hot bituminous pavement grading "B" shall be spread upon the properly prepared crushed gravel. After being thoroughly compacted, the bituminous base course shall have a minimum thickness of two inches (2") and shall be parallel to the proposed finish grade.

3.03 DRY GROUT SETTING BED:

A. The laying course shall be spread evenly over the area to be paved and screeded to a level that will produce the required 1" thickness when the unit pavers have been placed and compacted.

B. Once screeded and leveled, the laying course shall not be disturbed in any way.

3.04 UNIT PAVER INSTALLATION:

A. After the dry grout setting bed has been properly prepared, the unit pavers shall be placed in a pattern to be specified by the Architect. Butt joints between the pavers shall be no wider than that allowed by the natural texture of the paver itself.

B. After the pavers are carefully set, a plank or heavy sheet of plywood covering several pavers shall be placed upon the pavers and carefully rammed with a heavy hammer until the paver reaches a firm, unyielding bed and present a surface of the proper slope and grade. Any divergence from line and grade is to be corrected by taking up and relaying the pavers. After the ramming of the pavers, a sufficient amount of dry grout shall be swept so as to fill the butt joints. All surplus grout remaining on the sidewalk after the joints have been properly filled shall be carefully removed by sweeping. Care shall be taken to avoid raking out the joints during removal of excess grout. Planted joints shall be filled with loam and plant plugs. The entire surface shall then be thoroughly dampened with a low volume fine spray of water.

END OF SECTION

SECTION 02781 - BRICK PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide (or use material provided by the owner) clay brick paving within the property lines as shown on the Drawings and specified herein. The work includes:

1. Supplying and placing sand setting bed.
2. Collecting and cleaning existing brick pavers and clay edging from site and storing for reuse.
3. Supplying and installing brick pavers in quality, shape, thickness and color as specified.
4. Supplying and installing Paving Edge Restraints

B. Related work:

1. Section 02300 for Earthwork
2. Section 02780 for brick paving at City Sidewalks.
3. Division 3 – Concrete
4. Division 4 - Masonry

1.2 QUALITY ASSURANCE

1. Comply with Section 02000 requirements.
2. Materials and methods of construction shall comply with the standards of the American Society for Testing Materials, (ASTM).
3. Installation: Performed only by skilled workers with experience installing specified product in specified pattern on a complete project of comparable scale and quality.
4. Sample panel: Provide sample panel for approval by the Landscape Architect, using materials and patterns indicated for project work. The sample area may be a portion of the project paving, but must pass approval before continuing paving work. Provide an area of not smaller than thirty (30) square feet. Correct and rebuild sample panels until Landscape Architect's acceptance of the work. Subsequent work must match approved sample are for methods, color, texture and workmanship.
5. Do not change source of materials during the course of this work.

1.3 SUBMITTALS

1. Submit manufacturer's product data and installation instructions for brick paver units.
2. Submit a minimum of five (5) full size samples of each paving unit required. Include the full range of type, size, exposed finish, color, and texture proposed for the work.
3. Submit manufacturer's certification that paving units comply with specified material and physical requirements.
4. Submit material certificates for bedding materials.

1.4 DELIVERY, STORAGE, AND HANDLING

1. Protect paving units from damage, chipping, and soiling during delivery and storage. Store off the ground on pallets or wood platforms, or as per approved industry standards.
2. Store loose granular materials in a well drained area on a solid surface to prevent mixing with foreign materials. Cover loose granular materials in inclement weather to prevent saturation.

1.5 PROJECT CONDITIONS

1. Review installation procedures and coordinate paving work with other work affected by the unit paving work.
2. Cold weather:

    a. Do not use frozen materials or materials mixed or coated with ice or frost.
    b. Do not build on frozen work or wet, saturated or muddy subgrade. Remove and replace paving damaged by frost or freezing.

3. Protect partially completed paving against weather damage when work is not in progress.
4. Provide temporary barricades and warning lights as required for protection of project work and public safety.
5. Protect adjacent work from damage, soiling, or staining during paving operations.

PART 2 - PRODUCTS

2.1 MATERIALS / MANUFACTURERS

1. All brick pavers for areas labeled “new” on the drawings shall be Medium Ironspot #46 Wirecut paver units from Endicott Clay Products Co., Box 17, Fairbury NE 68352
2. All brick pavers for areas labeled “salvaged” on the drawings shall be bricks collected from existing garden walks. Any additional bricks necessary to complete work shall match existing bricks in color, size, and type.
3. Sand Setting Material: The sand laying course shall be a well graded, clean, washed sharp sand with 100% passing a 3/8” sieve size and a maximum of 3% passing a No. 200 sieve size. ASTM C33 or AASHTO M43, #10 graded clean coarse concrete sand. Do not use mason sand.
4. Subbase as indicated on the drawings and specified in Section 02300 - Earthwork.

PART 3 - EXECUTION

3.1 INSPECTION

1. Examine installation conditions. Do not start paving work until unsatisfactory conditions are corrected.

3.2 PREPARATION

1. Do not use paving units with chips, cracks, voids, discolorations, or other visible defects.
2. Cut paving units with motor-driven saw equipped with a diamond blade designed to cut masonry with clean, sharp unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use only full units without cutting wherever possible. Where cutting is required, use only half sized units. Avoid the use of small pieces of pavers or large joint spaces.

3.3 INSTALLATION

1. Spread sand leveling course materials evenly over the entire area to be paved, screed to a minimum 1" thickness when the paving units have been placed and vibrated. The compacted maximum thickness of the sand leveling course shall not exceed 2".
2. Set brick pavers as indicated on the drawings and as specified, insuring consistent, hand-tight, straight lines and joints throughout the work.
3. Install pavers with uniform butt joints as tight as possible. Avoid joint spacing.
4. Provide cut units with straight even cut surfaces, free from chips or cracks.
5. Vibrate paver units to their final level with three or more passes of a vibrating plate compactor.
6. After 1st pass of vibrator, brush ½" sand over the surface and vibrate into joints. Continue procedure until joints are full.
7. Clean completed paved area, leaving a surface free of all sand and other materials.
8. Final surface shall be true to grade and shall not vary from drawings by more than ¼" when tested with a 10' straightedge at any location on the surface.
9. Protect work area and completed paving against damage throughout construction. bedding course from damage until covered with paver units.

3.4 CLEANING

1. Remove and replace paving units which are broken, chipped, stained, or otherwise damaged as directed by the Landscape Architect. Provide and install new matching pavers as specified, and eliminate evidence of replacement.
2. Perform cleaning during installation of work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from unit paving operations.

3.5 3.05 STOCKPILE

1. Contractor shall provide Owner with ten (100) additional pavers. Pavers shall be carefully stockpiled as per manufacturer's recommendation storage facility designated by the Owner for use as replacements as needed.

END OF SECTION

SECTION 02800 – GRANITE STEPS

PART 1 - GENERAL

1.1 DESCRIPTION

1. Provide all granite for steps.
2. Provide all necessary sub base and setting bed materials etc., to install granite improvements as shown on the drawings.
3. Related work:

    a. Section 02300: Earthwork.
    b. Section 03300: Cast in Place Concrete.
    c. Division 4: Masonry.

1.2 SUBMITTALS

1. Shop Drawings: Provide shop drawings to the Landscape Architect for approval prior to ordering materials.

    a. Shop Drawing shall show all granite pieces, identified by number and related to their locations in the construction drawings.
    b. All drawings shall include dimensions of all granite units; and shall indicate details, fasteners connections, joints, finishes, and adjacent work.

2. Samples: Deliver to job site a representative granite sample (min. 12" x 2'-0" for each element in the design. (i.e.: step, bench leg, bench top, and curb wall) and Owner will review for color, texture, finish, and general condition.

    a. Samples that do not meet approval shall be replaced until approval is met.
    b. Samples: Deliver to job site a representative granite sample (min. 12" x 2'-0" for each element

1.3 QUALITY ASSURANCE

1. Single Source: Obtain all granite from a single source throughout the project.
2. Qualifications: All granite shall be installed by a single installer that has primary training and a specialty business is stone masonry.

    a. American Society for Testing and Materials, (ASTM).

3. Schedule and hold a pre-installation meeting with the Landscape Architect at the site, at a mutually agreeable time, to review the methods and materials included in this section.

1.4 DELIVERY, STORAGE, AND HANDLING

1. All granite shall be packed, transported and stored in materials and methods that insure against damage, discoloration or other undesirable changes in the quality of the materials from mechanical, weather or other forces.

PART 2 - PRODUCTS

2.1 GRANITE

1. Granite: All granite components shall be Freshwater Pearl (darker color ranges) from Crotch Island Quarry or approved equal.
2. All granite shall be free of cracks, seams, or starts that might impair the structural integrity or function of the stone. Inherent color variations characteristic of the source quarry will be acceptable.
3. All granite surfaces that will be exposed after installation shall be sawn and thermal finished unless indicated otherwise on the drawings.

2.2 ACCESSORIES

1. Sand Setting Material: The sand laying course shall be a well graded, clean, washed sharp sand with 100% passing a 3/8" sieve size and a maximum of 3% passing a No. 200 sieve size. ASTM C33 or AASHTO M43, #10 graded clean coarse concrete sand. Do not use mason sand.
2. Subbase as indicated on the drawings and specified in Section 02300 - Earthwork.

PART 3 - EXECUTION

3.1 FABRICATION

1. Fabrication: Create granite components to dimensions and finishes indicated on the drawings.
2. Tolerances: All granite steps shall be of the specified dimensions within 1/8" of the nominal dimension shown.
3. Ease all edges 1/8".

3.2 INSTALLATION

1. Prior to installation, inspect and verify grades of all surfaces upon which granite is to be installed. Adjust grades as necessary before installing granite.
2. Place units at the locations and grades indicated on the drawings so that they are plumb, level, and in alignment on prepared base. Use care in moving units to avoid scratching, chipping, or gouging the surfaces. Adjust elevation of units by shimming with fine gravel
3. Joints: All joints shall be square and true, to the dimensions indicated on the drawings.

4. Clean all granite surfaces with an organic, biodegradable solution to remove traces of soil or other materials.

END OF SECTION

SECTION 02900 - PLANTING

PART 1 - GENERAL

1.1 SUMMARY

1. This Section includes the following;

    a. Trees / Shrubs
    b. Groundcover.
    c. Topsoil and soil amendments.
    d. Fertilizers and mulches.
    e. Stakes and guys.

2. Excavation, filling and rough grading required to establish elevations shown on drawings are not specified in this section. Refer to Section 02300 - Earthwork.

1.2 SUBMITTALS

1. Submit certificates of inspection as required by governmental authorities. Submit manufacturer's or vendors certified analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.
2. Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
3. Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance periods.
4. Submit reports of chemical and mechanical analysis of topsoil.

1.3 QUALITY ASSURANCE

1. Landscape work shall be performed by a single firm specializing in landscape work.
2. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Landscape Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
3. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
4. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability together with proposal for use of equivalent material.
5. Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable.
6. Provide trees, shrubs and plants of quantity, size, genus, species and variety shown on the drawings in compliance with ANSI Z60.1 "American Standard for Nursery Stock". Provide

healthy, vigorous stock, grown in a recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sun scald, injuries, abrasions, or disfigurement.

7. Label each tree and shrub with securely attached waterproof tag bearing legible designation of botanical and common name.
8. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
9. The Landscape Architect may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Landscape Architect retains right to further inspect trees and shrubs for size and condition of balls and root systems insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.
10. Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6" (150 mm) above ground for trees up to 4" (100-mm) caliper size, and 12" (300 mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

1.4 DELIVERY, STORAGE AND HANDLING

1. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.
2. Provide freshly dug trees and shrubs. Do not prune plants prior to delivery unless otherwise approved by the Landscape Architect. Do not bend or bind tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.
3. Immediately after digging bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
4. Handle balled and burlapped stock by the root ball.
5. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
6. Do not remove container grown stock from containers until planting time.

1.5 PROJECT CONDITIONS

1. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
2. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required.
3. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.
4. Plant trees and shrubs after final grades are established, unless otherwise acceptable to the Landscape Architect.

1.6 SPECIAL PROJECT WARRANTY

1. Warranty trees and shrubs, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond landscape installer's control.
2. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of , it is advisable to extend warranty period for a full growing season.
3. Another inspection will be conducted at end of extended warranty period to determine acceptance or rejection. Only one replacement per tree, shrub or plant will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.
4. This warranty shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 TOPSOIL

1. Topsoil for landscape work is not available at site and shall be furnished as specified.
2. Provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.
3. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well drained sites where topsoil occurs in a depth of not less than 4"; do not obtain from bogs or marshes.
4. Perform chemical and mechanical analysis on topsoil. Topsoil shall contain at least 5% organic matter determined by loss of ignition of moisture-free samples dried in accordance with the current method of the Association of Official Agricultural Chemists. The acidity range shall be pH 6.5 to pH 7.0 inclusive. The chemical analysis shall state the percentages of nitrogen, phosphoric acid and potash. The mechanical analysis of the soil shall be:

PASSING	RETAINED ON	PERCENTAGE
1” Screen		100%
1” Screen	¼” screen	(Gravel not more than) 3%
¼” Screen	#100 USS sieve	(Coarse, medium & Fine sand) 40-60%

2.2 SOIL AMENDMENTS

1. Lime: ASTM C 60-2, Class T, agricultural limestone containing a minimum of 80% calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm)

sieve and a minimum 75% passing a No. 60 (250 micrometer) sieve. Provide lime in the form of dolomitic limestone.

2. Aluminum Sulfate: Commercial grade, unadulterated.
3. Sand: Clean, washed sand, free of toxic materials.
4. Perlite: Horticultural perlite, soil amendment grade.
5. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
6. Peat Humus: for acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.
7. Manure: Well rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

2.3 FERTILIZER

1. Bonemeal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.
2. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.
3. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing not less than 5% total nitrogen, 10% available phosphoric acid and 5% soluble potash.

2.4 MULCHES

1. Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants and consisting of finely ground bark, dark in color. Submit 5 gallon sample for approval.
2. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water absorbing capacity of 1100 to 2000%.

2.5 PLANT MATERIALS

1. Deciduous Trees: Provide trees of a minimum height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed.

    a. Provide only balled and burlapped deciduous trees.

2. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.

    a. Provide Container grown deciduous shrubs subject to specified limitations for container grown stock.

3. Coniferous and Broadleafed Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types, such as globe, dwarf, cone, pyramidal, broad upright, and columnar. Provide normal quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension shown.

a. Provide only balled and burlapped evergreen trees.
b. Provide Container grown deciduous shrubs subject to specified limitations for container grown stock.

2.6 MISCELLANEOUS LANDSCAPE MATERIALS

1. Anti-Desiccant: Emulsion type, film forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
2. Wrapping: Tree wrap tape not less than 4" wide, designed to prevent bore damage and winter freezing.
3. Stakes and Guys: Provide stakes and deadmen of sound new hardwood, treated softwood, free of knot holes and other defects. Provide wire ties and guys of 2 strand, twisted, pliable galvanized iron wire not lighter than 12 ga. with zinc coated turnbuckles. Provide not less than 1/2" diameter rubber or plastic hose, cut to required lengths and of uniform color, material and size to protect tree trunks from damage by wires.

PART 3 - EXECUTION

3.1 PREPARATION

1. Layout individual tree, shrub and groundcover locations and areas for multiple plantings. Stake locations and outline areas and secure 's acceptance before start of planting work. Make minor adjustments as requested. Notify the at least five (5) working days prior to placement of all plantings.
2. Preparation of planting soil:

    a. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
    b. Planting mixture:

        i. Provide planting mixture consisting of 7 parts topsoil to 1 part humus.
        ii. Incorporate ground limestone with the topsoil at the following rate per cubic yard of topsoil used in the planting mixture, depending on the pH value shown by the chemical analysis of the topsoil.

pH	Rate lbs.
4.0 to 4.5	7
4.5 to 5.0	5
5.0 to 5.5	3
5.5 to 6.0	1
over 6.0	0

        iii. Incorporate 1 pound fertilizer per cubic yard of topsoil.

3. For pit and trench type backfill, mix planting soil prior to backfilling and stockpile at site.
4. For planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

a. Mix lime with dry soil prior to mixing of fertilizer.
b. Prevent lime from contacting roots of acid loving plants.
c. Apply phosphoric acid fertilizer, other than that constituting a portion of complete fertilizers, directly to subgrade before applying planting soil and tilling.

5. Preparation of planting beds:

a. Loosen subgrade of planting bed areas to a minimum depth of 6" using a cultimulcher or similar equipment. Remove stones over 1-1/2" in any dimension, sticks, stones, rubbish and other extraneous matter.
b. Spread planting soil mixture to a minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. Place approximately 1/2 of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer, then place remainder of the planting soil.

6. Excavation for trees and shrubs, and groundcover beds.

a. Excavate pits and beds with vertical sides and with bottom of excavation slightly raised at center for trees, to provide proper drainage. Loosen hard subsoil in bottom of excavation.

i. For balled and burlapped trees and shrubs, make excavations at least half again as wide as the ball diameter and equal to the ball depth, plus allowance for setting of ball on a 3" setting layer of planting soil mixture.
ii. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

b. Dispose of subsoil removed from landscape excavations offsite, or as directed by the . Do not mix with planting soil or use as backfill without prior approval of the .
c. Fill excavations for trees and shrubs with water and allow to percolate out before planting.

3.2 PLANTING TREES AND SHRUBS & GROUNDCOVER

1. Set balled and burlapped stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water the pits thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.
2. Create an earthen saucer around each tree pit to allow for mulching, as shown on the drawings.
3. Mulch pits, trenches and planted areas. Provide not less than 4" thickness of mulch and work into top of backfill and finish level with adjacent finish grades.
4. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage.
5. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again 2 weeks after planting.
6. Prune, thin out and shape trees and shrubs only as directed by the . All pruning shall be completed in accordance with standard horticultural practices. Prune trees to retain

required height and spread. Unless otherwise directed by , do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character.

7. Plants damaged by unapproved or improper methods shall be removed and replaced with new plant material at the contractor's expense.
8. Wrap tree trunks of 2" caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.
9. Guy and stake trees immediately after planting, as indicated.

3.3 MAINTENANCE

1. Begin maintenance immediately after planting.
2. Maintain trees, shrubs and other plants until final acceptance but in no case less than 90 days after Substantial Completion.
3. Maintain trees, shrubs and other plants by cultivating and weeding as required for healthy growth. Restore and maintain planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

3.4 CLEANUP AND PROTECTION

1. During landscape work, keep pavements clean and work area in an orderly condition.
2. Protect landscape work and materials against damage from landscape operations, operations by other contractors and trades and vandalism. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.5 INSPECTION AND ACCEPTANCE

1. When landscape work is 100% complete, including maintenance, Landscape Architect will, upon request, make an inspection to determine acceptability. Landscape work may be inspected for acceptance in portions agreeable to the Landscape Architect and the owner, provided work offered for inspection is complete, including maintenance.
2. Where inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the Landscape Architect and found to be acceptable. Remove rejected plants and materials promptly from project site.

END OF SECTION