SECTION 31 20 00

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Provide all labor, material, equipment, and services required to complete the work specified in this section, and as shown on the drawings.

B. The work of this section includes but is not necessarily limited to:
1. Excavation, trenching, filling, and backfilling for building foundations, driveway/parking areas, slabs-on-grade, site structures, utilities, site drainage, landscaping including compaction.
2. Excavation and offsite disposal of all unsuitable or excess materials. Excavation shall include removal and satisfactory disposal of all unclassified material encountered throughout the site.
3. Compaction of undisturbed original soil or existing fill as appropriate and as specified, prior to construction and placement of new fill and backfill.
4. Provide all necessary sheeting, shoring, and bracing to protect the Work and assure safety of Workers, adjacent property and the public.
5. Maintenance of all excavations free from water.
6. Coordinate field density test as required herein and as directed by the Engineer.
7. Compacted fill from top of utility bedding to subgrade elevations.
8. Rough grading, and final grading, including placement, moisture conditioning and compaction of fills and backfill.
9. The removal, hauling and stockpiling of suitable excavated materials for subsequent use in the work. Stockpiling shall include protection to maintain materials in a workable condition.
10. Re-handling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations.
11. Providing products in sufficient quantities to meet the project requirements.
12. Obtain all required permits, licenses, and approvals of appropriate municipal and utility authorities, prior to commencing the work of this Section, and pay costs incurred therefrom.

C. A Geotechnical Report may have been prepared in relation to the project, and if so, it is made available to the Contractor for informational purposes and is not considered part of the Contract Documents unless specifically identified as such in the General and Supplemental Conditions. If a potential conflict exists between the Geotechnical Report and these technical specifications, the Contractor shall, immediately upon its discovery, request clarification from the Owner's Representative.

D. Related Work is specified in other sections include, but are not necessarily limited to, the following:
1. Section 31 02 00 – Development Permits
2. Section 31 02 10 – Subsurface Investigations
3. Section 31 10 00 – Site Preparation
4. Section 31 25 13 – Erosion Control

5. Section 33 31 00 – Sanitary Sewer System
6. Section 33 41 00 – Storm Drainage
7. Section 32 11 23 – Aggregate Base Courses
8. Section 32 12 16 – Pavement, Walks & Curbs
9. Section 32 90 10 – Seeding
10. Section 32 90 00 - Planting

1.2 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Comply with Section 01 40 00 – Quality Requirements.

C. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

D. Test Reports: Submit the following reports:
1. Reports on material gradations (ASTM D422).
2. Verification of each footing subgrade.
3. Field density test reports (ASTM D2922).
4. One optimum moisture-maximum density curve for each type of material used in the Work (ASTM D-1557 modified).
5. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

E. Materials Source: Submit name of imported materials source.

F. Material Certifications: Submit materials certificate signed by the material supplier and Contractor, certifying that materials comply with, or exceed, the requirements herein.

G. Product Data: Submit data for geotextile fabric indicating fabric and construction.

1.3 CLOSEOUT SUBMITTALS

A. Comply with:
1. Section 01 33 00 – Submittal procedures.
2. Section 01 73 00 – Execution requirements.
3. Section 01 77 00 – Closeout procedures.

B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 COORDINATION

A. Comply with Section 01 31 00 – Project Management and Coordination.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 01 are hereby made a part of this Section.

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

D. All Work shall comply with the requirements of the Maine Department of Environmental Protection, the Cumberland County Soil & Conservation District Standards, U.S. Environmental Protection Agency NPDES Permit requirements, and City of Portland, Maine Standards to minimize adverse environmental impacts. Reference is made to the Erosion and Sedimentation Control Plan included in the Plan set for this project. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.

E. All Work shall comply with the conditions of the enclosed permits.

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

G. The Contractor shall protect structures, utilities, sidewalks, pavements, property monuments, monitoring wells, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created from earthwork operation.

H. The Contractor shall bear all cost associated with correcting any Work that does not meet the requirements of this Section or any damaged items due to construction activities. These costs include any professional services required for inspection of repairs or replacements.

I. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

J. Paved surfaces: Do not operate equipment on paved surfaces. Paved surfaces outside the limits of Work which become damaged shall be repaved by the Contractor.

K. Contractor shall be responsible for notifying all affected utility companies and Dig Safe before starting work.

L. Field Measurements:
   1. Verify that survey horizontal and vertical control reference points are present and correct as indicated. Protect these points from disturbance during the course of the Work, or correctly re-establish as necessary.
   2. During construction, provide all necessary line and grade staking to properly control the Work.

1.6 SAFETY

A. Maintain excavations with approved barricades, lights, and signs to project life and property until excavation is filled and graded to a condition acceptable to the Engineer.

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. When tests indicate materials do not meet specified requirements, change material and retest.

C. Furnish materials of each type from same source throughout the Work.

2.2 MATERIALS

A. Common Fill: shall be friable soil containing no stone greater than two-thirds (2/3) the loose lift thickness with a maximum stone size of twelve (12) inches in diameter. The material shall be essentially free of trash, ice snow, tree stumps, roots, and organic materials. The soil shall contain no more than 15 percent passing the #200 sieve. Common fill shall be placed in layers and compacted. Common fill should be placed and spread in layers not exceeding 12 inches in thickness and compacted with a minimum of two systematic passes of the equipment placing the fill.

B. Unsuitable Materials: Materials that cannot be compacted to required density or contain frozen material, organic material, peat, muck, coal, ash, debris, pavement, construction waste, or boulders greater than 6 inches in any dimension, and any material that, in the opinion of the Engineer, is not suitable for its use.

C. Excavated rock may not be used as fill material, except as general site fill outside pavement of structure limits with approval of the Engineer.

D. Structural Fill: Clean, non-frost susceptible, sand and gravel, free of organics and other deleterious materials meeting the following gradation:

Sieve Size	Percent Finer by Weight
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
No. 40	0 to 30
No. 200	0 to 5

E. 3/4-Inch Crushed Stone: Durable, clean angular rock fragments obtained by breaking and crushing rock material conforming to the following gradation:

Sieve Size	Percent Finer by Weight
1 Inch	100
3/4 Inch	95 to 100
1/2 Inch	35 to 70
3/8 Inch	0 to 25

F. Sand: Clean granular material, free from lumps, balls of clay, and organic material and shall be Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter and conforming to the following gradation:

Sieve Size	Percent Passing
1 inch	100
½ inch	75 to 100
No. 4	50 to 100
No. 20	15 to 80
No. 50	0 to 15
No. 200	0-5

G. Low Permeability Material: Material that when placed and compacted will provide in-situ permeability rate of not more than 1.0×10^{-5} cm/sec.

PART 3 EXECUTION

3.1 EXAMINATION

A. Comply with:
   1. Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.

B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

C. Verify structural ability of unsupported walls to support loads imposed by fill.

D. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

A. Ensure that erosion controls are in place and properly functioning prior to any earthwork.

B. Topsoil Excavation:
   1. Excavate topsoil from all areas to be further excavated, raised in grade, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

2. Do not excavate wet topsoil.
3. Stockpile on Site in area approved by the Engineer and protect from erosion.
4. Remove excess topsoil not intended for reuse, from site.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of materials. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

D. Locate and mark any and all existing underground and aboveground utilities before beginning any earthwork. Notify Dig Safe at 1-888-344-7233 not less than three working days before performing Work.

E. Remove and properly dispose of any pavement, structures, fences, debris, etc. scheduled for removal. Save and store any material scheduled for re-use.

F. Identify required lines, levels, contours, and datum locations.

G. Notify utility company to remove and relocate utilities.

H. Maintain and protect above and below grade utilities indicated to remain.

I. Protect plant life, lawns, rock outcroppings, and other features remaining as portion of final landscaping.

J. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

K. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

L. Compact subgrades to density requirements for subsequent backfill materials. If compaction is insufficient, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

M. All foundation subgrades shall be densified using a walk behind compactor capable of imposing a dynamic load of 5 kips.

N. Existing surficial fill encountered beneath the proposed building footprint and paved areas shall be proof-rolled using a vibrator roller-compactor capable of imposing a dynamic load of 15 kips.

O. Any areas that continue to yield after 3 to 5 passes of the compaction equipment should be over-excavated and replaced with Structural Fill.

P. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill as required in the Fill Schedule of this Section and compact to density equal to or greater than requirements for subsequent fill material.

Q. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. Testing and Field Observations:

1. The Owner may retain and pay for the services of an independent testing and inspection firm and/or a Geotechnical Consultant to perform on-site observation and testing during the various phases of the construction operations. The scope of services will be determined by the Owner and the independent testing and inspection firm and/or the Geotechnical Consultant and will be provided to the contractor. The Owner reserves the right to modify or waive the services of the independent testing and inspection firm and/or the Geo-technical Consultant. The services of a Geotechnical Consultant/Inspection and testing firm may include, buy not necessarily be limited to, the following:
   a. Observation during excavation and dewatering of building and controlled fill areas.
   b. Observation during backfilling and compacting operations within that area defined as building area or controlled fill area and other areas as appropriate.
   c. Laboratory testing and analysis of fill materials as specified herein and proposed by the Contractor for incorporation into the Work.
   d. Observation of construction and performance of water content, gradation and compaction tests at a frequency and locations that he shall select. The results of these tests will be submitted to the Owner, Engineer, and Contractor on a timely basis so that action can be taken to remedy indicated deficiencies. During the course of construction, the Geotechnical Consultant will advise the Owner in writing if at any time in his opinion the Work hereunder is of unacceptable quality. Failure of Geotechnical Consultant to give notice, shall not excuse the Contractor from latent defects discovered in his work.
2. The contractor shall make provisions for allowing observations and testing of contractor's Work by the independent testing and inspection firm and/or the Geotechnical Consultant. The Contractor shall assist the testing agency as required and shall deliver samples of all materials required to the testing agency at the Contractor's expense.
3. The presence of the independent testing and inspection firm and/or the Geotechnical Consultant does not include supervision or direction of the actual work of the Contractor, his employees or agents. Neither the presence of the independent testing and inspection firm and /or the Geotechnical Consultant, nor any observations and testing performed by them, nor failure to give notice of defects shall excuse the Contractor from defects discovered in his work.
4. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

D. Contractor will pay for all proposed material gradation testing. Owner will pay for initial field compaction tests.

E. Minimum Number of Tests:
   1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities.
   2. Paved Areas and Slab Subgrades: Make at least one field density test of subgrade for every 2,000 square feet of paved area or building slab, but in no case less than three tests for each. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying slab or paved area, but in no case less than 3 tests for each.
   3. Foundation Wall Backfill Outside of Structure: Make at least tow field density tests at locations and elevations directed by Engineer.

F. Proof roll compacted fill surfaces under slabs-on-grade, pavers, and paving.

G. Request visual inspection of subgrades and bearing surfaces by Engineer before installing subsequent work.

H. Slope sides of excavations to comply with OSHA regulations and local codes. Shore and brace where sloping is not possible.

3.4 EXCAVATION

A. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

B. When excavating through roots, perform work by hand and cut roots with sharp axe.

C. Underpin adjacent structures which may be damaged by excavation work.

D. Excavate subsoil to accommodate building foundations, slabs-on-grade paving, site structures, and construction operations.

E. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with this Section.

F. Slope banks with machine to angle of repose or less until shored.

G. Do not interfere with 45 degree bearing splay of foundations.

H. Grade top perimeter of excavation to prevent surface water from draining into excavation.

I. Trim excavation. Remove loose matter.

J. Remove lumped subsoil, boulders, and rock up to 1/3cu yd measured by volume.

K. Notify Engineer of unexpected subsurface conditions.

L. Correct areas over excavated with Structural Fill.

M. Stockpile subsoil intended for reuse on Site in area approved by the Engineer and protect from erosion.

N. Remove and dispose of excess and unsuitable material from site.

O. Remove excess subsoil not intended for reuse, from site.

P. Repair or replace items indicated to remain damaged by excavation.

Q. Prepare subgrade for lawn areas 4" below finished grade.

3.5 FILLING, BACKFILLING AND GRADING

A. Fill areas to contours and elevations with unfrozen materials.

B. Backfill excavations as promptly as work permits but not before completion of the following:
1. Acceptance of construction below finish grade, including dampening, waterproofing, and perimeter insulation.
2. Removal of concrete formwork.
3. Removal of trash and debris.
4. Removal of shoring, bracing, and backfilling of the remaining voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in a manner to prevent settlement of the structure or utilities or leave in place if required.
5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Use care in backfilling utility trenches to avoid damage or displacement of the utilities.

D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

E. Place fill material in continuous layers and compact in accordance with the Fill schedule in this section.

F. Employ placement method that does not disturb or damage other work.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Do not backfill against unsupported foundation walls.

I. Backfill concrete structures only after the concrete has developed adequate strength. Do not allow heavy machinery within 5 feet of structures during backfilling and compacting.

J. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

K. Slope grade away from building minimum 5 percent slope for minimum distance of 10 ft, unless noted otherwise.

L. Make gradual grade changes. Blend slope into level areas.

M. Remove surplus backfill materials from site.

N. Leave fill material stockpile areas free of excess fill materials.

O. Repair or replace items indicated to remain damaged by excavation or filling.

P. Subgrade Preparation for Pavements and Walks:
1. Excavate, form, shape and roll subgrade to conform to cross-section of finished pavement. Roller shall be 10-ton minimum weight.
2. Remove stones greater than 5" measured in any dimension from subgrade to a 12" depth. Fill depressions with suitable fill as required Fill schedule of the section.
3. When areas become impervious due to concentrations of fines, lightly scarify and re-compact. In severe cases, remove such material and replace with suitable soil as directed.

Q. Any settlement or erosion that occurs prior to acceptance of the Work shall be repaired, and re-graded to the required elevations and slopes.

3.6 TRENCHING

A. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume.

B. Do not advance open trench more than 200 feet ahead of installed pipe unless approved by the Engineer.

C. Remove water or materials that interfere with Work.

D. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.

E. Excavate trenches to lines depths indicated on Drawings with sufficient width to enable installation and inspection of the utility.

F. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

G. Use laser-beam instrument with qualified operator to establish lines and grades.

H. Provide uniform and continuous bearing and support for bedding material and utilities.

I. Do not interfere with 45 degree bearing splay of foundations.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered. Notify Engineer, and request instructions.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Structural and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

N. Remove excess subsoil not intended for reuse, from site.

O. Stockpile excavated material in area designated on site in accordance with this Section.

3.7 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation to comply with OSHA regulations and local codes.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.8 DEWATERING

A. Perform all work in the dry.

B. Dewater soils and excavations as necessary to adequately compact, excavate, and work existing soils.

C. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surround areas.

D. Do no allow water to accumulate in excavations. Provide and maintain pumps and de-watering system components necessary to convey water away from excavations.

E. Convey water removed from excavations adequately to prevent soil erosion.

F. Do not use trench excavations as temporary drainage ditches.

3.9 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Moisture content of fill material as it is being placed shall be within two percent of the optimum moisture content of the material as determined by ASTM D1557 modified.

C. Top Surface of Backfilling around Building Areas: Plus or minus 1 inch from required elevations.

D. Top Surface under Paved Areas and Pavers: Plus or minus 1 inch from required elevations.

E. Top Surface of Landscaped and Lawn Areas: Plus or minus 0.10 feet from required elevations.

F. Structural Fill under Slabs:
   1. Maximum Variation From Flat Surface: 1/2 inch measured with 10 foot straight edge.
   2. Maximum Variation From Elevation: 3/8 inch.

G. Footing Excavations:
   1. Maximum Variation From Elevation: 0.10 feet.

3.10 STOCKPILING

A. Stockpile materials on site at locations approved by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

F. Unsuitable materials delivered to the Site and materials that become unsuitable during the course of the project shall be stockpiled in a manner to prevent erosion and spreading of this material until it is removed and disposed of off-Site.

3.11 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.12 FILL SCHEDULE

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

B. Footings shall be placed on undisturbed native soils, or 6 inches of crushed stone overlying bedrock.

C. Fill shall be place in layers between 6 and 12 inches depending upon size and type of compaction equipment such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment.

D. Fill shall be placed at the approximate optimum moisture content.

E. Below Foundations and Floor Slabs:
   1. Fill Type: Structural Fill
   2. In confined areas, the structural fill should be compacted to the same standard except that the maximum particle size should be reduced to 3 inches and loose layer thickness should be reduced to 6 inches, and compaction performed by hand-guided equipment to the same percentage of compaction.
   3. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557 or 100 percent if crushed stone is used as determined by ASTM C-29.
   4. Where fill is required below footing grade, the zone of 95 percent compaction shall extend laterally beyond the edge of foundations at least 1 foot for each foot of depth below foundation grade.

F. Entrances and Approaching Sidewalks
   1. Fill Type: Structural Fill
   2. For slab/sidewalk entrances: Structural fill shall be placed to a depth of 4.0 feet below the top of slab/sidewalk, or to the top of bedrock. This thickness of Structural Fill should extend horizontally from the building outward to the entire width of the entrance slabs/sidewalks.
   3. Structural fill below entrance slab/sidewalks, including those supported on frost walls, shall have a gradual transition up to the bottom of the sidewalk and pavement subbase at a 1V to 3H slope or flatter.
   4. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557.

G. Foundation Backfill (interior and exterior):
   1. Fill Type: Structural Fill.
   2. Structural Fill shall extend laterally a minimum of 2 feet from the wall.
   3. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557.
   4. Backfill beyond this limit may consist of common fill.

H. Driveway and Parking Area Subgrade:
   1. Fill Type: Common Fill.
   2. Compaction: 92 percent of maximum dry density, as determined in accordance with ASTM Test Designation D1557.

I. Fill Under Lawn and Landscaped Areas:
   1. Fill Type: Common Fill.
   2. Compaction: 90 percent of maximum dry density as determined in accordance with D1557.

J. Trench Bedding and Backfill
   1. Storm drainage pipe and sanitary sewer pipe bedding:
      a. Pipe Bedding: 3/4" Crushed Stone compacted to 100 percent if crushed stone is used as determined by ASTM C-29.
      b. Fill Above Bedding:

1) Under Paving and Sidewalks: Common Fill similar to the trench sidewalls compacted to 92 percent of maximum dry density, as determined in accordance with ASTM Test Designation D1557.
2) In lawn and landscaped areas: Common Fill compacted to 90% of maximum dry density as determined in accordance with ASTM Test Designation D1557.

2. Water distribution pipe, electric, telephone, and cable utilities:
   a. Pipe Bedding: Sand.
   b. Fill Above Bedding:
      1) Under Paving and Sidewalks: Common Fill similar to trench compacted to a dry density of at least 92 percent of maximum dry density, as determined in accordance with ASTM Test Designation D1557.
      2) In lawn and landscaped areas: Common Fill compacted to 90% of maximum dry density as determined in accordance with ASTM Test Designation D1557.
3. Footing Drains and Underdrains:
   a. Pipe Bedding: 3/4" Crushed Stone compacted to 100 percent if crushed stone is used as determined by ASTM C-29.
4. Fill to Correct Over-excavation:
   a. Fill Type: Structural Fill flush to required elevation, compact uniformly to 95% percent of maximum density as determined in accordance with ASTM Test Designation D1557.

3.13 PROTECTION OF WORK

A. Section 01 73 00 - Execution Requirements: Protection of installed construction.

B. Reshape and re-compact fills subjected to vehicular traffic.

C. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION