

**SECTION 02200**

**SITE EARTHWORK**

**PART 1. GENERAL**

**1.1 Related Work Specified Elsewhere**

- a. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.
- b. Geotechnical Report – Section 00300
- c. Site Drainage - Section 02400
- d. Site Utilities - Section 02420
- e. Construction Drawings - Refer to architectural plans and specifications for specific requirements regarding the earthwork beneath the building. Where the architectural plans earthwork requirements for the building subgrade pad are more stringent than those stated herein, the architectural plans and specifications shall govern.

**1.2 Utility Easements**

- a. The Contractor shall contact all utility companies and determine if additional easements will be required to complete the project.

**1.3 Standards**

- a. Conform to all applicable city, county and state codes for excavation, earthwork and disposal of debris.
- b. Conform to all applicable standards of the various utility companies.

**1.4 Inspection**

- a. Drawings do not purport to show above ground objects existing on site. Contractor shall visit site and acquaint himself with all observable conditions as they exist before submitting his Bid.

**1.5 Grade and Elevations**

- a. The Drawings indicate, in general, the alignment and finished grade elevations. The Landscape Architect, however, may make such adjustments in grades and alignment as are found necessary in order to avoid interference or to adapt piping to other special conditions encountered.

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- b. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain by means of suitable stakes placed in the field.

### 1.6 Limit of Work

- a. Take special care to keep all operations within the Limit of Work as shown on the Drawings. The Contractor shall take all necessary precautions to protect existing site elements to remain.

### 1.7 References

- a. Where M.D.O.T. appears it shall be taken to mean The State of Maine Department of Transportation Specifications, Highways and Bridges - (Latest Revision).

### 1.8 Reference Standards

- a. The following most current publications form part of this specification to the extent indicated by references thereto and shall be followed for all construction testing:

American Society for Testing and Materials (ASTM):

|        |   |
|--------|---|
| D 422  | Method for Particle Size Analysis of Soils  |
| D 698  | Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) hammer and 12-inch (304.8mm) Drop (Standard Proctor)  |
| D 1556 | Test for Density of Soil in Place by the Sand Cone Method   |
| D 1557 | Test for Moisture-Density Relations of Soils Using 10-lb (4.5 Kg) hammer and 18-inch (457 mm) Drop (Modified Proctor)     |
| D 1559 | Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus                                |
| D 2167 | Test for Density of Soil in Place by the Rubber Balloon Method  |
| D 2216 | Laboratory Determination of Moisture Content of Soil  |
| D 2487 | Classification of Soils for Engineering Purposes  |
| D 2922 | Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)                                  |
| D 3017 | Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)                          |
| D 4318 | Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils   |
| C 25   | Chemical Analysis of Limestone, Quicklime and Hydrated Lime   |
| C 110  | Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method  |
| C 618  | Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete |

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### 1.9 Tests

- a. Tests for soil density and/or gradations as herein designated shall be taken at the option of the Architect and or Landscape Architect. Costs of testing shall be paid by the Owner.
- b. Soil samples representative of the borrow source and suitable laboratory testing shall be furnished by the Contractor for each material listed in Section 2.1. Test results shall be submitted at least two (2) weeks prior to their proposed use or placement on the site. In the event a proposed material does not meet the specified gradation requirements, the material type shall not be placed on-site until an alternative borrow source is selected and the laboratory test results indicate the material meets the specified gradation requirements.
- c. Compaction tests shall be determined on the basis of laboratory Proctor tests (ASTM D.1557, Modified Proctor).
- d. Field density tests not specified on a comparative basis shall be to the percent density specified in this Section for both earth excavation and earth and granular type fills. Tests shall be in accordance with ASTM D.1556, ASTM D.2167, ASTM D.2922 OR ASTM D.3017.

### 1.10 Test Pits

- a. Test Borings have been made in the area of the proposed building and parking area and the logs can be reviewed in Section 00300.

### 1.11 Protection of Existing Structures and Utilities

- a. Barricade open excavations occurring as part of this work and post with warning signs. Backfilling or secured covering of excavations shall be required.
- b. Provide necessary supports, bracing and covering to protect existing and new structures and utilities during all phases of excavation and backfill.
- c. Notify appropriate owners before excavating adjacent to poles, cables, pipes, and other utilities.
- d. Note that location of existing underground utilities on plans is approximate and may be incomplete. Responsibility for exact locations and protection of all utilities rest with the Contractor. The Contractor shall be responsible for confirming invert elevations for existing and proposed sewer installation and connection. Where location of existing underground utilities differs from that shown on plans, notify the Landscape Architect immediately.

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- e. Conflicts between existing and new utilities and/or structures to be built under this contract shall be reported to the Landscape Architect or Owner's Representative.

### **1.12 Erosion and Sedimentation Control**

- a. The General Contractor shall perform all work necessary to control erosion. Installation of erosion control structures prior to construction shall be performed in accordance with the Standards of the U.S. Department of Agriculture, Soil Conservation Service, "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices" by the Cumberland County SWCD, State of Maine, and as shown on the Plans.
- b. Weekly inspections, as well as routine inspections following rain falls, shall be conducted by the Contractor of all temporary and permanent erosion control devices until final acceptance of the project. Necessary repairs shall be made immediately to correct undermining or deterioration. Final acceptance shall include a site inspection to verify the stability of all disturbed areas and slopes. Until final inspection, all erosion and sedimentation control measures shall immediately be cleaned, and repaired by the Contractor after each storm event, as required. Disposal of all temporary erosion control devices shall be the responsibility of the Contractor. Removal of temporary erosion control devices shall not occur until a minimum 75% catch of vegetation occurs or permanent structural measures are in place.

### **1.13 Removals**

- a. The Contractor shall perform all work necessary for clearing and grubbing and/or removal, backfill and disposal of all existing materials noted on the Drawings, as well as temporary structures installed for construction.

## **PART 2. PRODUCTS**

### **2.1 Materials**

- (1) Fill Materials: Backfill and ordinary fill materials shall be as follows:
  - a. Materials from excavation: Excavated material which can be readily spread and compacted, and consists of mineral soil, substantially free of organic materials, loam, wood, rubbish or other perishable substance may be used for common fill. Boulders (rocks over eight (8) inches) shall be removed from excavated material before using for fill.

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- b. Backfill over pipes shall be free of stones over one (1) inch diameter for first one (1) foot over pipes.
- c. Aggregate Base, Crushed - M.D.O.T. 703.06, (a), Type A. (No rocks larger than two inches). - Compacted at 95% ASTM D-1557
- d. Aggregate Subbase Gravel - M.D.O.T. 703.06, (a), Type C, Size of stone no larger than six (6) inches. - Compacted at 95% ASTM D-1557.
- e. Aggregate Subbase Gravel, M.D.O.T. 703.06 (b) Type D (no stone larger than 4 inches – compacted at 95% ASTM D – 1557.
- f. Structural Fill - M.D.O.T. 703.06, (a), Type C. Size of stone no larger than six (6) inches, and further limited to a maximum particle size equal to three (3) inches within twelve (12) inches of slab grade. Compacted at 95% ASTM D-1557
- g. Aggregate for Foundation Backfill: M.D.O.T. 703.6 (a) Type B. Size of stone no larger than four (4) inches.
- h. Gravel Borrow - M.D.O.T. 703.20. Size of stone no larger than six (6) inches. Compacted at 95% ASTM D-1557
- i. Drainage Stone - M.D.O.T. 703.22, Type C. - Vibrated with hand vibrating plate.
- j. Native silty sand (Glacial till) found on-site can be re-used for subgrade preparation provided that the natural moisture content at the time of placement and compaction is at slightly below optimum moisture as determined by MPMDD. On-site soils should not be utilized as backfill against foundations or as slab-on-grade base material.

### (2) Bedding Material: Bedding and Backfill Material for Pipes

- a. The refilling of all excavation below the pipe invert and below the crown of the pipes (as indicated by the details) shall be made with crushed stone meeting the following criteria:

| <u>Screen Size Square Openings</u> | <u>% by Weight Passing</u> |
|------------------------------------|----------------------------|
| 1- 1/2"                            | 100                        |
| 1"                                 | 90 - 100                   |
| 1/2"                               | 0 - 15                     |

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- b. Where ordered by the Landscape Architect to stabilize the trench base or for excavation below grade, use 3/4 inch crushed stone.
- c. PVC Pipe and Polyethylene Pipe: Use 1/2 inch to 1 inch crushed stone in the zone twelve (12 ) inches above and six (6) inches below the pipe.

### (3) Sand Blanket

- a. Use (over and under insulation) where insulation is installed over pipe or culvert and at such other places as required in the Contract Documents, or when ordered by the Landscape Architect. Clean sand, free from organic matter, so graded that 90 - 100 percent passes a 1/2 inch sieve and not more than 7 percent passes a No. 200 sieve. (**Exception:** For corrugated polyethylene pipe where crushed stone is required over top of pipe).

### (4) Suitable Backfill Material

- a. Structural fill or natural material excavated during the course of construction, excluding debris, pieces of pavement, organic matter, topsoil, all wet or soft muck, peat, or clay, all excavated ledge material, and all rocks over six (6) inches in largest dimension, or any material which will not provide sufficient support or maintain the completed construction in a stable condition, all approved by the Landscape Architect. (**Exception:** may not be used to backfill foundation or under slab).

### (5) Geotextile Materials

- a. Acceptable Geotextiles and Geogrids:

- (1) Mirafi 600x
- (2) Phillips 66 Supac 6WS
- (3) Dupont Typar 3401 and 3601
- (4) Trevira S1114 and S1120
- (5) AMOCO 2006
- (6) Tensar SS-1 and SS-2
- (7) Exxon GTF-200 or 350
- (8) Conwed Stratagrid GB-5033
- (9) Miragrid 3xT

- b. Filter/Drainage Geotextiles:

- (1) Mirafi 160N or equal

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- c. Silt Fencing Geotextiles:
  - (1) Mirafi 100x or equal

### **PART 3. EXECUTION**

#### **3.1 Classifications**

- a. Earth Excavation - Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, any material indicated in the data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
- b. Rock Excavation - Removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment except such materials that are classed as earth excavation.
  - 1. Typical Materials: Boulders 2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
  - 2. Intermittent drilling performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- c. Footing and Slab on Grade Excavation
  - 1. **Refer to the Geotechnical Report in Section 00300 for specific recommendations.**
  - 2. Foundation subgrade improvements will require the excavation of all existing fill within the influence zone of the footings and replaced with compacted structural fill. Excavation of all fill material within two (2) feet of slab on grade shall be required and filled with compacted structural fill material.
- d. Unauthorized Excavation
  - 1. Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect or Landscape Architect.
  - 2. Under footings or foundation bases, fill unauthorized excavation by filling with Structural Fill and compacting to 95 percent of ASTM D-1557 without altering top elevation.

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### **3.2 Topsoil Removal**

- a. Topsoil shall be stripped to its entire depth from area within the Limit Of Work and reusable materials shall be temporarily removed from the site, screened, and returned to the site as needed. Stripped topsoil shall be free from clay, large stones, debris, and peat. Topsoil for reuse on site shall be screened and tested in accordance with Section 02500 - Landscaping.

### **3.3 General Excavation**

- a. Grades, Dimensions - excavate where indicated and as necessary to obtain subgrades as shown on the Drawings and hereinafter specified. All excavation shall include the satisfactory removal of all materials of whatever substance encountered within the indicated limits. Only suitable materials shall be used or stockpiled for later use in backfill preparation. Disturbed subgrade material shall be removed prior to pouring of footings and replaced with either compacted structural fill or thickened footing concrete. All footing subgrades shall be approved by the owner's representative prior to pouring concrete for footings.
- b. The Contractor shall provide temporary drains, ditches and the necessary equipment, as required, to maintain the site of work and adjacent areas in a well drained condition. Keep all excavations free of both ground and surface water at all times. All water pumped or drained from the work shall be disposed of so as not to endanger public health, property or any portion of the work under construction or completed.
- c. The Contractor shall provide shoring, sheeting and bracing as may be required to maintain excavations and trenches secure and safe from collapse and to protect adjacent structures.
- d. Excavation shall not be made below specified subgrades except where rock or unstable material is encountered. If suitable bearing is not found at levels shown on the Drawings, the Architect and or the Landscape Architect shall be notified in writing immediately so that adjustments or changes may be made. Material removed below specified subgrade without the approval of the Landscape Architect shall be replaced and compacted with an approved gravel at the Contractor's expense.
- e. All work shall be carried out in a manner consistent with the regulations of such Federal, State and Local authorities as may have jurisdiction over such activities.



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### **3.4 Summary of Utility Installation**

- a. Set all lines, elevations and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments or other reference points.
- b. Perform all excavation for underground piping and utility systems to the depths indicated on the Drawings or as otherwise specified. Trenches shall be excavated by open cut.
- c. Maintain in operating condition existing utilities, active utilities and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.
- d. Verify location, size, elevation and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.
- e. Inspection of stormwater system excavation, utility excavation and backfilling subject to review by utility company, city engineer and third party inspection by project engineer.

### **3.5 Excavation, Trenching and Backfilling**

- a. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in an orderly manner far enough from bank of trench to avoid overloading, slides or cave-ins.
- b. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.
- c. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.
- d. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.
- e. Excavations for all foundation work shall be backfilled with structural fill meeting specifications set forth herein.

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### **3.6 Trench Excavation**

- a. The Contractor shall contact the local utility companies before excavation begins. Dig trench at proper width and depth for laying pipe, conduit or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over-excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.
- b. All trench excavation side walls greater than five (5) feet in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches four (4) feet or deeper.
- c. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer or wider than needed to make joint connection properly.
- d. Trench width requirements below the top of the pipe shall not be less than 12 inches nor more than 18 inches wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit or cable shall be least practical width that will allow for proper compaction of trench backfill.
- e. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:
  - (1) Water Mains: 66 inches to top of pipe barrel.
  - (2) Sanitary Sewer: Elevations and grades as indicated on Drawings. Note: Pipe with less than five (5) feet of cover in pavement areas or four (4) feet in landscaped areas, provide two (2) inches of rigid insulation as shown on detail.
  - (3) Storm Sewer: Depths, elevations and grades as shown on Drawings. For pipe with less than four (4) feet of cover, provide two (2) inches of rigid insulation per plan and detail.

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- (4) Electrical Conduits: 40 inches minimum to top of conduit for primary and 30 inches to top of conduit for secondary or as required by NEC 300-5, NE 710-36 codes, or the local utility company requirements, whichever is deeper.
- (5) TV Conduits: 18 inches minimum to top of conduit or as required by the local utility company, whichever is deeper.
- (6) Telephone Conduits: 18 inches minimum to top of conduit, or as required by the local utility company, whichever is deeper.

### **3.7 Sheeting and Bracing**

- a. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

### **3.8 Pipe Bedding**

- a. Accurately cut trenches for pipe or conduit that is to be installed to designated elevations and grades to line and grade as specified below bottom of pipe and to width as specified. Place specified depth of bedding material, compact in bottom of trench, and accurately shape to conform to low portion of pipe barrel. After pipe installation, place select bedding material in accordance with details and compact as required.

### **3.9 Trench Backfilling**

- a. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact as specified, to properly correct condition in an acceptable manner.
- b. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in eight (8) inch maximum loose lifts.
- c. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. Compact to minimum density of 95% of maximum dry density in accordance with ASTM D 698 (or 92% of maximum dry density in accordance with ASTM D1557). For utility trenches located in pavement and sidewalk areas, place backfill in eight (8) inch maximum loose lifts and compaction to 95% of ASTM D.1557 maximum dry density.

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### **3.10 Structural Excavation**

- a. Earth shall be excavated to the depth and sections required for installation of all catchbasins, manholes, footings, floor slabs or other appurtenant facilities to the extent indicated on the Plans. Care shall be taken that the foundation areas of structures are not excavated below subgrade or are disturbed so as to lessen their bearing capacity.
- b. All excavations for structures shall be sheeted, braced, sloped, or otherwise protected in the same manner and meeting the safety requirements and conditions specified above under paragraph Section 3.6 (b). Any excess excavated material shall be removed from the site.

### **3.11 Rock Excavation**

- a. Soils investigations indicate that removal of rock will not be required for this project. If however, removal of rock is required, the Contractor shall take the following steps:
  - (1) Uncover and expose material claimed as rock.
  - (2) Notify the Landscape Architect immediately before proceeding with any work in this regard.
  - (3) Obtain written consent and approval from local authorities for the methods to be used before proceeding with blasting or related work.
  - (4) Perform a pre-blast survey of neighboring properties.
  - (5) Handle and employ explosives as stipulated in the Manual of Accident Prevention in Construction of the A.G.C.
- b. Rock excavation shall include boulders over two (2) cubic yards in volume and masses of rock or conglomerate masses requiring systematic drilling and blasting to be removed.
- c. Payment
  - (1) Payment for rock required to be removed shall be based upon a cubic yard basis. Provide ledge removal inspection for quantity verification of ledge removal by the site contractor.
  - (2) Payment for rock trench excavation shall be calculated to depths of six (6) inches below the bottom of pipes, twelve (12) inches below bottoms of footings, and for a width equal to the diameter of the pipe plus eighteen (18) inches beyond each side. Removal cost shall be based upon a unit cost to include rock removal and required trench backfill material.

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- (3) Rock excavation removed with open masses but below the required elevation for the mass, as for footing drains, shall not be considered as trench excavation.
- (4) Excavation which does not meet the above requirements for Rock Excavation will be classified as General Earth Excavation.

### **3.12 Drainage**

- a. The Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose of properly all water entering excavations. Such excavations shall be kept dry until the structures and appurtenances to be built therein, have been completed to such extent that they will not be damaged.
- b. Dewatering shall be accomplished in a manner that will preserve the undisturbed state of the foundation soils. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, other surfaces, or property. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work.
- c. Temporary underdrains, if used, shall be laid in trenches beneath the grade of the structure. Trenches shall be of suitable dimensions to provide room for the chosen size of underdrain and its surrounding screened gravel.
- d. Temporary underdrains, if used, shall be laid at an approved distance below the bottom of the normal excavation and entirely surrounded by screened gravel. The distance between the bottom of the pipe or structure and the top of the bell of the underdrain pipe shall be at least three (3) inches, unless otherwise permitted. The space between the underdrain and the pipe or structure shall be filled with sand meeting the requirements of ASTM Designation C-33 which shall be rammed if necessary and left with a surface suitable for laying the pipe or building structure. Following their use, underdrains shall be plugged as directed by the Landscape Architect.

### **3.13 Compaction**

- a. Compaction densities specified herein shall be the percentage of the maximum dry density obtainable at optimum moisture content as determined and controlled in accordance with ASTM D.1557. Field density tests shall be made in accordance with ASTM D.1556, D.2167 or D.2922. Each layer of backfill shall be moistened or dried as required, and shall be compacted to the required densities unless otherwise specified in the project specifications.

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- b. Fills placed under footings, floor slabs, roads, parking areas and walks shall be compacted to not less than 95 percent of the ASTM D - 1557 maximum dry density.
- c. The subbase material placed under the road gravel base in fill areas shall be compacted to not less than 95 percent of the ASTM D1557 maximum density.
- d. Fills adjacent to building walls from the exterior face of the building and/or retaining walls to a point not less than 10'-0" from the exterior face of the wall shall be compacted to not less than 92 percent of the ASTM D. 698 maximum compaction dry densities as herein before specified.
- e. Bedding material and trench sand under pavement: 95%
- f. Bedding material and trench sand non-pavement areas: 92%
- g. Loam areas: 90%
- h. All other areas: 85%
- i. Methods and equipment proposed for compaction shall be subject to the prior acceptance by the Owner's representative. Compaction generally shall be done with vibrating equipment. Displacement of, or injury to the pipe and structure shall be avoided. Movement of in-place pipe or structures shall be at the Contractor's risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the Landscape Architect and at the expense of the Contractor.

### 3.14 Filling and Subgrade Preparation - Building Area

- a. **The recommendations for filling and subgrade preparation for the building area shall be in accordance with the Geotechnical Report, prepared by S.W. Cole Engineering.**
- b. Building subgrade pad shall be that portion of site directly beneath and ten feet (10') beyond the building and appurtenant limits.
- c. Unless specifically indicated otherwise on the Drawings, areas exposed by excavation or stripping and on which building subgrade preparations are to be performed, shall be compacted to a minimum of 95% of the Modified Proctor Maximum Dry Density (MPMDD). Building floor slab subgrades consisting of native sands, silty sands shall be compacted with a 15 ton highway roller to achieve 95% of MPMDD to a minimum of 12 inches.

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- d. Any soft areas revealed during compaction of the base of the excavation should be excavated and replaced with structural fill per the recommendations by S.W. Cole Engineering.
- e. All fill material shall be free of snow, ice, or foreign contaminants before placement. All lifts placed during winter construction shall be compacted by the end of the work day. Any lifts exposed to ice, snow and freezing conditions prior to compaction shall be removed at the Contractor's expense.

### **3.15 Filling and Subgrade Preparation - Exclusive of Building Area**

- a. **The recommendations for filling and subgrade preparation for the building area as stated in the Geotechnical Report, prepared by S.W. Cole Engineering, dated \_\_\_\_\_, shall govern.**
- b. All materials shall be placed and compacted to conform to the lines, elevations and cross-sections indicated on the Drawings. Do not start fills until the area has been inspected and approved by the Landscape Architect or Owner's Representative.
- c. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. All materials shall be approved by the Landscape Architect or Owner's Representative before being placed.
- d. Unless specifically stated otherwise on the Drawings, areas exposed by excavation or stripping and on which subgrade preparations are to be performed, shall be compacted to a minimum of 95% of maximum dry density, in accordance with ASTM D 1557. Subgrades consisting of native sands or silty sands shall be compacted with a 15 ton highway roller. These areas shall then be proof-rolled to detect any areas of insufficient compaction. Proof-rolling shall be accomplished by making a minimum of two (2) complete passes with a fully-loaded tandem-axle dump truck, or approved equivalent, in each of the two perpendicular directions. Areas of failure shall be excavated and recompacted as stated above.
- e. If sufficient suitable fill material is not available from excavations under this Contract, additional fill, suitable for use, shall be brought to the site from other sources. Subgrade fill in pavement areas shall consist of Gravel Borrow (M.D.O.T. 703.20) or Structural Fill (MeDOT 703.06 (a) Type C. Place in maximum 12 inch layers and compact to 92 percent of maximum density in accordance with ASTM D 1557. Each layer shall be free from ruts and shall meet compaction requirements before next layer is placed. Maintain layers with crown or other practical means of drainage.

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- f. Stones in fills shall be well distributed. Do not have stones over six (6) inches in diameter within twelve (12) inches of subgrade.

### **3.16 Finish Grading**

- a. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10 feet above or below established finished subgrade elevation, and all ground surfaces shall vary uniformly between indicated elevations. Ditches and swales shall be graded to allow for proper drainage without ponding and in a manner that will minimize erosion potential. For topsoil application, refer to Section 02500-LANDSCAPING.
- b. Correct all settlement and eroded areas within one year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace any grass, shrubs, trees or other vegetation disturbed by construction using corrective measures.

### **3.17 Field Quality Control**

- a. If Owner elects to test, an independent testing laboratory selected and paid by the Owner shall be retained to perform construction testing on site. Field density test may be ordered for each foot of depth of backfill at an average of 200 feet along the trench.
- b. If compaction requirements are not complied with at any time during the construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.
- c. The independent testing laboratory shall prepare test reports that indicate test location, elevation data and test results. The Owner, Architect and Contractor shall be provided with copies of reports within 72 hours of time test was performed. In the event that any test performed fails to meet these Specifications, the Owner and Contractor shall be notified immediately by the independent testing laboratory.
- d. All costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to the Owner. The Owner reserves the right to employ an independent testing laboratory and to direct any testing that is deemed necessary. Contractor shall provide free access to site for testing activities.



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### **3.18 Testing**

- a. Field density test may be ordered by the Landscape Architect for each foot of depth of backfill at an average interval of 200 feet along the trench.
- b. The Contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The Contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.
- c. Any costs of re-testing required as a result of failure to meet compaction requirements shall be borne by the Contractor.

### **3.19 Work In Public Streets**

- a. Work done in existing Municipal streets shall be done in accordance with local and/or State requirements as applicable.

### **3.20 Clean-up**

- a. The Contractor shall remove all debris, construction equipment, and material from the areas to be loamed and seeded.