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Date: 04/11/17

# SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and all Division 1 Specifications apply to the work specified in this Section.
B. "Geotechnical Report, Proposed Bay House II, Portland, ME, dated August 24, 2013", prepared by Geotechnical Services, Inc.

1.2 SUMMARY OF WORK:

A. This section includes the following:

1. All excavating, filling, backfilling and removal of materials.
2. This section EXCLUDES the installation of Stone Columns, however, coordination with the selected Stone Column subcontractor is included in the work.

B. Related Sections include the following:

1. Section 310000 "Erosion and Sedimentation Control"
2. Section 321216 "Asphalt Paving"
3. Section 312100 "Contaminated Soil Management"
4. Design submittal prepared by the selected Stone Column subcontractor.

1.3 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 Owner.

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.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

1.4 PROJECT CONDITIONS:

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

1. Notify Architect and Owner not less than five days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Architect's or Owner's written permission.

3. Contact utility-locator service for area where Project is located before excavating. Contact Dig Safe not less than 3 business days before starting the work. Dig Safe requirements are in addition to Town street opening permit requirements.

B. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn there from by Contractor.

1. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner. 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.

2. 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.

3. Exploration logs and related information depict subsurface conditions at specific locations and dates indicated. Conditions at other locations at the site may differ from the conditions encountered in the explorations. The contractor shall be assumed to have familiarized himself with the nature of the subsurface and groundwater conditions to his own satisfaction.

C. Use of Explosives: Not permitted.

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

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

1. Pre-mark the boundaries of the 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. 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 construction drawings.
4. 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 construction drawings.
5. Re-notify Dig Safe and the non-member utilities if the digging does not occur within 30 calendar days, or if the marks are lost due to weather conditions, site work activity or any other reason.
6. Hand dig within 18 inches in any direction of any underground line until the line is exposed.
7. Dig Safe requirements are in addition to Town street opening permit requirements.
8. For complete Dig Safe requirements, call the PUC or visit their website.
9. 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.
10. 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.

1.5 QUALITY ASSURANCE:

A. Standards:

1. "Standard Specification for Highways and Bridges" revision of April 1995, Maine Department of Transportation and “Standard Specifications”, revision of 2002, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").
2. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329.

62 India Str
Portland, M
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Reviewed for Code Compliance
Inspections Division
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Date: 04/11/17

1.6 SUBMITTALS:

A. Test Reports: Submit the following:

1. Reports on material gradations and compaction testing.

B. 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.

UNIT PRICES:

1.7 A. Provide Unit Prices as indicated in Section 01 2000, item 1.9 Unit Prices

PART 2 - MATERIALS

2.1 GENERAL:

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

B. 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.

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

D. Testing: The owner 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.

2.2 BASE AND SUBBASE:

A. 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 |

62 India Str
Portland,
Demo Per
Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

| | |
|---|---|
| ¼” | 25-70 |
| No. 40 | 0-30 |
| No. 200 | 0-7 |

B. 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. 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 |

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

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

Foundation Backfill : Well-graded material meeting the following gradation specifications:

| Sieve Size | Percent Finer |
|---|---|
| 3" | 100 |
| ¼" | 60-100 |
| No. 40 | 0-50 |
| No. 200 | 0 -7 |

F. Structural Backfill: Well-graded material meeting the following gradation specifications :

| Sieve Size | Percent Finer |
|---|---|
| 6" | 100 |
| No. 4 | 30 - 90 |
| No. 40 | 10 - 50 |
| No. 200 | 0 – 10 |

2.3 GEOTEXTILE FABRIC:

A. MIRAFI 140N fabric or approved equal at foundation drains.

B. MIRAFI 500X fabric at disturbed subgrades, if required.

2.4 RIGID INSULATION:

A. Extruded closed – cell rigid foamed polystyrene, 2 inch thickness, width of trench, Styrofoam HI-60 by Dow Chemical, or approved equal.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

PART 3 - EXECUTION

3.1 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, including paving and abandoned utilities, contaminated and/ or unsuitable materials shall be removed from within the limits of the building.
   b. Care must be taken to minimize disturbance of soil subgrades. A smooth – edged bucket shall be used to excavate soil subgade areas.

B. 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.

C. Excavation for Structures:

1. Existing organic soils, utilities, fill and backfill and paving materials shall be removed from beneath the proposed building until undisturbed, stable, native, non-organic soils are encountered. The overexcavation of unsuitable material shall continue 1- foot laterally outward from the outer edge of perimeter footings for every 1-foot of excavation depth.
2. Coordinate all excavations within building footprint with the Construction Manager and Stone Column subcontractor. Prior to work performed by Stone Column subcontractor, site subgrade shall be established within 6 inches of final design subgrade. Subsequent to the installation of the stone columns, maintain at least five feet of horizontal distance between the edge of any installed stone column and the excavation. In the event that utility excavations are required within five feet of any installed stone column, notify the Construction Manager and the Stone Column subcontractor. Potential solutions for these conditions are contained in the Geotechnical Report.
3. 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.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

4. 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. Foundation excavations to expose the tops of stone columns shall be protected until concrete placement, with proceedures and equipment best suited to (1) prevent softening of the matrix soil between and around the stone columns before pouring structural concrete, and (2) achieving direct and firm contact between the dense, undisturbed stone columns and the concrete footing. Recommended proceedures for achieving these goals are contained in the Geotechnical Report.
5. 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.
6. Excavation beyond the design limits, made without authorization from the Owner, Architect, or Geotechnical Engineer, will be refilled with specified materials compacted to 95% maximum dry density at the Contractor's expense.
7. Excavate the area within the building lines level one foot below the underside of the concrete floor slab. Excavate foundation wall footings and column footings 6 inches below the bottom of the footing. Excavate for pipes, utilities, pits, and incidentals.
8. 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 Architect or 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, Architect, or Geotechnical Engineer.

D. Excavation for 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.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

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.

E. 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.
   a. Hand excavate for bell of pipe.
   b. Excavate trenches 6 inches (150 mm) deeper than elevation required in unyielding bearing material to allow for bedding course.
   c. In roadways, load excavated material directly into trucks unless otherwise permitted by the Engineer.
   d. 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 Engineer.
6. 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.

F. Refilling Unauthorized Excavation:

1. Trenches: Use crushed stone or gravel as directed by the Geotechnical Engineer.
2. Below Building Footings: Use crushed stone or suitable fill as directed by the Geotechnical Engineer .
3. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the Geotechnical Engineer.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

G. Excavation of Unsuitable Materials:

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

H. 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.

3.2 SUBGRADE INSPECTION:

A. Notify Architect or Geotechnical Engineer when excavations have reached required subgrade.

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

1. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill 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 the Architect or Geotechnical Engineer, without additional compensation.

3.3 STABILITY OF EXCAVATIONS:

A. General:

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

1. 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.
2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

3.4 DEWATERING:

A. Perform all work in the dry. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Control water levels to at least one foot below subgrade elevation. Provide and maintain pumps, dewatering system components necessary to convey water away from excavations.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

D. Control water levels to at least one foot below subgrade elevation. Provide and maintain pumps, dewatering system components necessary to convey water away from excavations.

E. Convey water removed from excavations and rainwater to collecting or runoff areas.

3.5 BACKFILL AND FILL:

A. General:

1. 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. Prior to placing fill, subgrades shall be proofrolled, consisting of a minimum of five passes in a north-south direction, followed by a minimum of five passes in an east-west direction, using a vibratory roller or a vibratory plate compactor. If subgrades are disturbed during construction, the base of the subgrade shall be over-excavated and replaced with a minimum of 12 inches of crushed stone overlying Mirafi Polypropylene 500X geotextile fabric.
2. Place and compact fill material in layers to required subgrade elevations as follows:
   a. Under grass and planted areas, use common borrow.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

b. Under pavements, use aggregate subbase and base material.
c. Under buildings, use structural fill.
d. Adjacent to foundations, use foundation backfill.
e. Prior to placing any soil or concrete inside building lines, obtain approval of subgrade from the Architect or Geotechnical Engineer.

3. 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.
4. Re-Use of On-Site Soils:
   a. Existing soils may be used if approved by the Geotechnical Engineer.

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

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

C. Ground Surface Preparation:

1. 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.

D. Placement:

1. 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.
2. 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.
3. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.
4. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

E. Backfill of Structures:

1. 12” of compacted Structural fill shall be placed under building slab.
2. 6” of compacted structural fill shall be placed under footings. Structural fill or crushed stone shall extend laterally from the footings to at least 12” beyond the outer edge of footings.
3. Exterior foundation walls shall be backfilled with compacted foundation backfill. Compacted foundation backfill 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.
4. The top 12 inches of fill on the exterior of the building shall consist of low permeability material or pavement to minimize water infiltration next to the building. Grading shall provide for runoff away from the building.
5. 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.
6. 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.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

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.

4. 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.
5. 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.
6. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
7. Place and compact final backfill of satisfactory soil to final subgrade elevation.
8. 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. Exterior Pavement Areas:

1. The existing topsoil is not considered suitable for support of pavements. All topsoil material shall be removed from within the pavement limits.
2. Prepare subgrade to proper grade. Place fill in 6" to 8" layers compacted to 95% maximum dry density. Densify subgrades with several passes of a vibratory roller compactor and then proof-rolled with a loaded tri-axle dump truck. Areas that become soft or yield during proof-rolling shall be

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

overexcavated and backfilled with subbase gravel prior to installing the specified paving section.

3. Do no work when subgrade is muddy or frozen.
4. 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.
5. Base course material should be placed in one lift and compacted with a minimum of two coverages with self-propelled vibratory compaction equipment.
6. Finish surface tolerance shall be 1/4" above or below the required grade. Puddling in paved areas will not be acceptable.

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. Place plastic warning tape above conduit.
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.

3.6 COMPACTION:

A. Methods:

1. 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

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

soil as required to achieve specified compaction. Remove and replace material which is too wet to compact to required density.

C. Degree of Compaction:

1. 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% |
| Sand bedding for conduit | 95% |

3.7 GRADING:

A. General:

1. 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.
2. 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.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

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.

3.8 SUBSURFACE DRAINAGE:

1. Subsurface Drainage Pipe: Specified in Section 334100 "Sewers Drains and Site Piping".

2. Retaining Wall Drain: Place non-woven drainage geotextile around perimeter of sub drainage trench. Place a 6-inch course of ¾" crushed stone on subsurface drainage geotextile to support sub drainage pipe. Encase sub drainage pipe in a minimum of 6 inches of ¾" crushed stone and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

3.9 PROTECTION:

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

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

D. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

E. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.10 FIELD QUALITY CONTROL:

A. Testing Agency: Owner shall engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Contractor shall coordinate with Owner and testing agency respective to timing of testing.

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

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 shall 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. Refer to Bituminous Pavement specifications for pavement materials for in place testing of pavements

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 04/11/17

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.

END OF SECTION 312000