PART 1 - DESCRIPTION

A. Description of work: Excavation, filling and grading includes but is not limited to:

1. Excavating, filling and backfilling to attain the indicated finished grades for the entire site.

B. Definitions:

1. Excavation: Removal and disposal of all material encountered when establishing required grade elevations.

2. Unauthorized excavation: Removal of materials beyond specified subgrade elevations without approval of the Engineer.

C. General: All fill and backfill materials shall be subject to the approval of the Engineer

D. On-Site Fill: The native soils will be used as fill, however, all on-site materials used for fill shall be subject to the approval of the Engineer, and to the following requirements:

1. Free from deleterious substances, stumps, brush, weeds, roots, sod, rubbish, garbage, glass, plastics, and matter that may decay.

2. Free of large rocks or lumps that, in the opinion of the Engineer, may create voids or prevent proper compaction, free of rubble, bricks, large wood and concrete pieces.

E. Borrow fill material: Free from deleterious substances, stumps, brush, weeds, roots, sod, rubbish, garbage and matter that may decay. The fill material shall consist of well-graded granular soils (sand and gravel) containing less than 15% fines (silt and clay). All fill shall be compatible with the in-situ soil, and shall meet the gradation requirements shown in table 901.11-1of the NJDOT Standard Specifications for Road and Bridge Construction, 2007, for Gradation Designation I-4. The borrow fill material shall be used only when the available on-site material is completely depleted and with the permission of the Engineer.

F. Notifications: For approval of borrow materials, notify the Engineer at least five (5) working days in advance of intention to import material, designate the proposed borrow area, and perform sampling and testing at Contractor's expense, if directed by the Engineer, to prove the quality and suitability of the material.

PART 3 – EXECUTION

A. Requirements of regulatory agencies:

1. All excavations shall be in compliance with Federal Occupational Safety and Health Act and Rules and Regulations of State of New Jersey Department of Labor and Industry, Bureau of Engineering and Safety, N.J.A.C. 12:180.
Excavation work shall be in compliance with applicable requirements of other governing authorities having jurisdiction.

The contractor may be required to provide soil sampling and testing reports to the waste management facilities in order to dispose of the soil. The contractor will be responsible for this work, and his/her costs shall be included in the unit price bid for the project. Copies of all testing results shall be submitted to the Owner and Engineer prior to the removal of the materials from the site for disposal.

A letter of compliance/acceptance from the disposal facility that will accept the soil shall be submitted to the Owner and Engineer prior to the removal of the materials from the site for disposal at the facility.

One copy of each waste disposal manifest shall be submitted to the Owner and Engineer after acceptance of the waste at the disposal facility.

B. Reference standards included in this Specification section:

   a. Table 901.11-1 Standard Soil Aggregate Gradations

   a. D-1556-07: Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
   b. D-1557-07: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)
   c. D4253-00(2006): Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
   d. D2166-06: Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
   e. D6938-08a: Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

C. Test reports:

1. The following test reports shall be made if the borrow fill material is used.

2. One optimum moisture, maximum density curve for each type of soil encountered, including a complete test report as specified in ASTM D-1557.

3. Field Density test reports.
4. Report of actual Unconfined Compressive Strength and/or results of bearing tests for each strata encountered at footing subgrades. The report shall be prepared in accordance with ASTM D-2166.

5. Test reports on all borrow material and select backfill material in accordance with the following standards:

D. The following Site Preparation Procedures are recommended:

1. Strip the site from all vegetation and other deleterious material as specified under Section 201-Clearing Site of the Standard Specifications.

2. Refer to Section M-2 for compaction information.

3. Remove all pavement and foundations and other subsurface obstructions completely.

4. Undercut any zones of instability disclosed by proof-rolling and replace the undercut material with fill, as approved by the Engineer.

E. Existing utilities:

1. Should any functioning utilities be encountered during excavation, notify the Engineer immediately and consult the Utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Utility Owner.

2. Do not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

3. Demolish and completely remove from site all abandoned, if any, existing underground utilities encountered during excavation.

4. Permit the appropriate utility companies access to the site for the purpose of clearing of the proposed utility easement and the relocation of the existing overhead utility system.

F. Use of explosives: The use of explosives is not permitted.

G. Protection of persons and property:

1. Barricade open excavations occurring as part of this work and post with warning lights as required to protect persons on the site. Operate warning lights as recommended by authorities having jurisdiction.
H. Dust Control:

1. Use all means necessary to control dust on and near the work if such dust is caused by the Contractor's operations during performance of the work or if resulting from the conditions in which the Contractor leaves the site.

2. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of other work on the site.

I. Weather conditions: Do not place, spread, roll or fill material during freezing, raining, or otherwise unfavorable weather conditions. Do not resume work until conditions are favorable as determined by the Engineer.

J. Inspection by Contractor: Examine the areas and conditions under which excavating, filling and grading are to be performed and notify the Engineer, in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

K. Preparation:

1. Prior to commencement of work, establish location and extent of all utilities in the work areas. Maintain, protect as required existing utilities which pass through the work area.

L. Excavation:

1. Unauthorized excavation:

Unauthorized excavation, including remedial work directed by the Engineer, shall be at the Contractor's expense.

2. Additional excavation:

a. When excavation has reached required sub-grade elevations, notify the Engineer who will make an inspection of conditions.

b. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.

3. Stability of excavations:

a. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space.

b. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
4. Shoring and bracing:
   a. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
   b. Maintain shoring and bracing in excavations regardless of time period excavations will be open.
   c. Exercise care in the drawing and removal of sheeting, shoring, bracing and timbering to prevent collapse and caving of the excavation faces being supported.

5. Dewatering:
   a. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding areas.
   b. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms and undercutting of footings, and prevent soil changes detrimental to the stability of subgrades and foundations. Provide and maintain cofferdams, pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

6. Material storage:
   a. Stockpile satisfactory excavated materials where directed until required for use as backfill or fill. Place, grade and shape stockpiles for proper drainage.
   b. Locate and retain soil materials away from edge of excavations.
   c. Dispose of excess soil material and waste materials as herein specified. Excavated material unsuitable for backfilling shall be kept separate from other materials excavated, and disposed of. Materials suitable for backfilling shall not be disposed of until completion of filling or back-filling operations.

M. Backfill, fill and compaction:
1. General:
   a. Five (5) pound samples of each material to be used as fill shall be submitted to the Engineer for approval, two weeks prior to commencing fill operations. Fill material shall not be used as compacted fill until approved by the Engineer.
   b. Fill material imported from an off-site source shall be tested prior to construction use, at the Contractor’s expense, to determine the suitability of the fill material and standard Proctor parameters. Test reports shall be submitted to the Engineer.
   c. Place acceptable material in layers to required subgrade elevations.
d. Fills: Use material obtained from on-site excavation, except use borrow material when specified and/or shown on the Plans.

e. Do not provide borrow material until all acceptable excavated materials on the site have been utilized in the work.

f. Place the various types of materials in the areas as designated on the Plans, or as directed by the Engineer.

2. Ground Surface Preparation, Placement and Compaction:

Following the necessary cuts to grade the site, all of the exposed subgrades shall be proof-rolled and densified until at least 95 percent of the Modified Maximum Dry Density, ASTM D-1557, is obtained. The proof-rolling and compaction should be performed using a large vibratory roller with a static weight of at least 10 tons. The proof-rolling and compaction operations should be performed in the presence of the Engineer. The vibratory function of the roller should not be used within 20 feet of any existing structure and the roller should be used in static mode in these areas. Any structural fill placement which is required below the foundation level shall extend a minimum distance of 10 feet beyond the foundation line and at least one foot above the footing sub-grade elevation. Above this elevation, the distance of the structural fill placement beyond the footing line may be reduced accordingly, if required.

All loose areas detected during the densification operation shall be corrected. Correcting shall consist of either (a) excavation of the soft area in those cases where the materials encountered are unsuitable, or too wet to be compacted; or (b) if the moisture content is adequate, densifying the exposed materials. After the proofrolling and densification process is completed, the Geotechnical Engineer's representative will authorize the placement of fill.

Any imported fill required to grade the site shall consist of well-graded granular soils (sand and gravel) containing less than 15 percent fines (silt and clay).

All fills should be placed in layers ranging from ten to twelve inches in loose thickness and shall be compacted to at least the following densities, expressed as a percent of the Maximum Modified Density, ASTM D-1557:

- Below Foundations: 98%
- Below Slabs: 95%
- Below Pavements: 90%
- Backfill of Retaining Walls: 95%
- Remaining Areas: 90%

The contractor shall provide soil moisture density tests in order to determine the optimum moisture content required to obtain the above specified densities. Where required, the contractor shall modify the in-place soil moisture content so as to ensure that the above specified densities are obtained.
3. **Moisture control:**
   a. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
   b. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
   c. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

4. **Puddling or jetting will only be permitted in landscape areas after approval by the Engineer.**

5. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice, or other unsuitable materials.

N. **Grading:**

1. **General:**
   Uniformly grade areas as shown in the proposed site plan, including adjacent transition areas. Smooth finish surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

2. **Grading surface of materials under proposed structures, and all other areas as shown on the plans:**
   Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a ten foot (10') straight edge.

3. **Compaction:**
   After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

4. **Treatment after grading:**
   a. After grading is completed and the Engineer has finished his inspection, permit no further excavating, filling or grading except with the approval of and inspection of the Engineer.
b. Use all means necessary to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

O. Field quality control:

1. Quality control testing: Allow testing service to inspect and approve fill layers after grading work is completed. The contractor will supply and pay for the testing service.

2. If in the opinion of Engineer based on testing service reports, subgrade or fills which have been placed are below specified density, the contractor shall provide additional compaction and testing as directed by the Engineer, at no expense to the Owner. This shall include compaction and testing at areas initially tested and at other locations as directed.

   a. Perform in-place field density tests in accordance with ASTM D-1556-07 (Sand Cone Method), or ASTM D-6938-08a (Nuclear Method).

   b. Footing Subgrade: At footing subgrades, at least one (1) test of each soil type to verify design bearing capacities. Subsequent verification and approval by the Engineer of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata.

   c. Pavement & Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one (1) field in-place density test for every 2,000 sq ft (186 sq. m) or less of paved area or slab, but in no case fewer than three (3) tests.

   d. Foundation Wall Backfill: In each compacted backfill layer, at least one (1) field in-place density test for each 100 ft (30 m) or less of wall length, but no fewer than two (2) tests along a wall face.

   e. Trench Backfill: In each compacted initial and final backfill layer, at least one (1) field in-place density test for each 150 ft (45 m) or less of trench, but no fewer than two (2) tests.

P. Maintenance:

1. Protection of graded areas:

   a. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

   b. Repair and re-establish grades in settled, eroded and rutted areas in specified tolerances.

2. Reconditioning compacted areas:

Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.
Q. Disposal of excess and waste materials:

1. Removal to designated areas on Owner's property:

   Transport acceptable excess excavated material to designated soil storage areas on the Owner's property. Stockpile soil or spread as directed by Engineer.

2. Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off the Owner's property.

3. Under no circumstances shall the contractor remove excess acceptable/useable fill material from the site.

4. Only disposal facilities with current registration and licensed by the State in which they are located for the acceptance of contaminated material shall be used for disposal.

5. The Contractor is responsible for all coordination with the disposal facility. The Contractor is required to manage, excavate, stockpile, store, handle, manifest, haul, classify and dispose of the material in accordance with all Federal, State, and Local requirements. Testing of materials required by the selected disposal facility prior to disposal shall be accomplished by the Contractor at his/her own expense. Only NJDEP certified laboratories shall be used for testing. All sampling shall be done in accordance with the applicable NJDEP guidance manuals and regulations.

6. All waste haulers used by the Contractor shall be currently licensed and registered. The Contractor will identify to the Owner and Engineer in writing, the name and address of any haulers and disposal facilities, at least 2 weeks prior to disposal of wastes.

PART 4-QUANTITY AND PAYMENT:

1. Payment will be made on a Lump Sum basis under the item “Site Excavating, Filling and Grading” in the proposal.

2. Payment shall include all, design, labor and material required for a complete installation as specified herein.

END OF SECTION 02315