SECTION 31 22 00

SITE EXCAVATION AND ROUGH GRADING (Revised AD-2, AD-8)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Definitions:
   1. Unsuitable material: Debris and/or soil material judged unsuitable by Engineer for support of slabs or other site improvements.
   2. Engineer: Soils Engineer employed by BNL, empowered to conduct inspections and make approvals.

B. Related sections include but are not necessarily limited to:
   1. Division 0 - Procurement and Contracting Requirements.
   2. Division 1 - General Requirements.
   3. Section 02 41 00 - Site Clearing.
   4. Section 31 22 19 - Topsoiling and Finished Grading.
   5. Section 31 25 00 - Soil Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

A. Compaction density test:
   1. Modified Proctor, ASTM-D1557.

B. Layout work by Surveyor registered in State of New York.

AD-2: Section 31 22 00: Delete paragraph 1.2.C.

1.3 SUBMITTALS

A. Material Test Reports: From a qualified testing agency to comply with the following requirements:
   1. Classify on-site or borrow soil material to be used for fill and backfill in accordance with ASTM D 2487.
   2. Compaction curve for each on-site or borrow soil material to be used for fill and backfill in accordance with ASTM D 1557.

B. Preexcavation Photographs or Videotape: Identify existing conditions of adjacent construction and existing conditions to remain as required by BNL and submit to BNL before work begins.

1.4 JOB CONDITIONS

A. Site information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. BNL will not be responsible for interpretations or conclusions drawn from this data by Contractor:
   1. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
   2. Subsurface information:
      a. Test boring logs are available for information only. BNL assumes no responsibility for the accuracy of the information.
      b. The test borings are believed to be a reasonable indication of existing soil conditions. The Contractor shall verify conditions affecting the work and make his own interpretation of the test boring information.

c. A geotechnical engineering report has been prepared for this project by GEI Consultants and is available to Bidders and Contractors for information purposes and is not a part of the Contract Documents. The location and log of each boring is shown in this report for the Contractor's information. The depth of the water table at the time of the boring is shown on the log. This report was prepared for design purposes only and may not be sufficient to prepare an accurate bid or for other purposes. Contractors wishing copies of the report may secure them from GEI Consultants by calling 860-368-5300 at a nominal charge with the understanding that its scope is limited to design considerations.

B. Protect existing facilities, utilities (overhead and underground), sidewalks, and pavement:
   1. Repair damaged items.
   2. Cost of repair to items not indicated paid by BNL.
   3. Notify BNL and make emergency repair as directed.

C. Protect graded areas against erosion:
   1. Re-establish grade where settlement or washing occurs at no extra cost.

D. Site may have buried potentially hazardous materials:
   1. If encountered, contact BNL and Architect.
   2. BNL will be responsible for removal and disposal.

E. Traffic: Minimize obstruction or interference with adjacent roads, streets, walks, and occupied or used facilities during earthwork operations:
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from BNL.
   2. Provide alternate routes around closed or obstructed traffic ways as required by BNL.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Fill:
   1. Structural fill shall consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the "fines") shall be nonplastic. Structural fill shall meet the following gradation requirements:

Sieve Size	Percent Passing By Weight
3 inches	100
1/2 inch	50 – 100
No. 4	35 – 100
No. 16	20 – 90
No. 50	5 – 40
No. 200 (fines)	0 – 10

   2. In addition to complying with the above gradation requirements, the structural fill shall be well graded, i.e., there should have sufficient amounts of all particle sizes within the size range of the material.
   3. Structural fill shall be used within the building limits and where indicated on the plans (Note: Natural Sand can be considered suitable subgrade for building support. However, after excavation to the suitable subgrade level, the Sand layer should be proofrolled (Section 5.1 of the Geotechnical Report).

4. Excavated Natural Sand to be used for fill below foundations will generally be suitable for reuse as structural fill. However, additional gradation tests should be performed on the excavated Sand to determine its suitability as structural fill (Section 4.6 of the Geotechnical report).

B. Common Fill:
1. Common fill (identified as fill in the Geotechnical Report) shall consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the "fines") shall be nonplastic. Common fill shall meet the following gradation requirements:

Sieve Size	Percent Passing By Weight
6 inches	100
3 inches	80 – 100
No. 4	20 – 100
No. 200 (fines)	0 – 20

C. Aggregate Subbase:
1. Aggregate subbase shall consist of 3/8 inch minus crushed stone, and shall consist of hard, durable, crushed or broken rock material, free from loam or clay, surface materials, or other deleterious materials. The material shall conform to the following gradation requirements:

Sieve Size	Percent Passing By Weight
1/2 inch	100
3/8 inch	85 – 100
No. 4	10 – 30
No. 8	0 – 10
No. 16	0 – 5

PART 3 - EXECUTION

3.1 PREPARATION

A. Layout units, structures, piping, roads, parking areas and walks and establish their elevations.

B. Perform other layout work required.

C. Replace benchmarks to original location and elevation if displaced or destroyed.

3.2 GENERAL

A. Overexcavate soil below paving as shown on drawings.

B. Excavate and grade materials to design elevations.

C. Excavate and grade site to subgrades of paved and unpaved areas as indicated.

D. Excavate for miscellaneous footings, slabs, walks and other structures.

E. Cut and fill as required to bring existing grades to subgrades.

F. Furnish and place additional approved material required to bring subgrade to proper line and grade.

G. During construction, shape and drain embankments and excavation.

H. Maintain ditches and drains to provide drainage.

I. Provide pumping if required.

J. Remove unsuitable materials which cannot be compacted as specified and replace with suitable material:

AD-8: Section 31 22 00: Revise paragraph 3.2.J.1.

1. Dispose ~~material off site as directed~~of unsuitable material on-site as directed in Section 31 23 00, paragraph 1.4.B.1.

K. Remove materials unsuitable to receive fill and replace with suitable material.

3.3 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions:
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.4 LAYOUT FOR ROUGH GRADING

A. Before fill is started, scarify to a minimum depth of 6 IN under new roads, parking lots, or streets or on steep slopes.

B. Construct embankments and fills to lines and grades.

C. Make completed fill correspond to shape of typical cross section or contour indicated regardless of method used to indicate shape, size, and extent of line and grade of work.

D. Ensure that stones larger than 3 IN, are not placed in upper 8 IN of fill or embankment.

E. In areas where existing ground surface is steeper than one vertical to four horizontal, bench and scarify surface in order to spread fill horizontally so that fill material will bond with existing surface.

F. Place and compact fill material in 8 IN thick layers to required elevations.

G. Place soil fill on subgrades free of mud, frost, snow, or ice. Fill materials should not be placed on soils that have been recently subjected to precipitation or saturation. All wet soils should be removed or allowed to dry prior to continuation of fill placement operations. Borrow fill materials, if required, should not contain wet or frozen materials at the time of placement.

3.5 SUBGRADE INSPECTION (PROOF ROLLING)

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

B. Proof-roll subgrade in the presence of the Geotechnical Engineer.

C. Proof-roll subgrade below pavements to identify soft pockets and areas of excess yielding. Do not proof-roll wet or frozen subgrades:
   1. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons.
   2. Proof-roll subgrade in two directions perpendicular to each other. Vehicle speed shall not exceed 3 MPH.
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping and replace with compacted engineered fill.
   4. In small areas where proof rolling is not practical, dynamic cone penetration test may be performed.

D. Subgrades damaged by freezing, frost, rain, ponding water, or construction operations shall be reconstructed.

3.6 AGGREGATE SUBBASE COURSE

A. Place subbase course on subgrades free of mud, frost, snow, or ice:
   1. Shape aggregate subbase course to required crown elevations and cross-slope grades.
   2. A layer of aggregate subbase material 6 IN or less can be placed as a single layer and compacted.
   3. Aggregate subbase material exceeding 6IN in thickness shall be placed in equal thickness and compacted. No layer shall exceed 6 IN in depth.
   4. Compact aggregate subbase course at optimum moisture content at a minimum 95 percent of maximum dry unit weight according to ASTM D 1557.

3.7 SOIL MOISTURE CONTROL

A. Each fill or backfill soil layer should be within 2 percent of optimum moisture content before compacting:
   1. Subgrade soils exceeding optimum moisture content by 2 percent shall be removed and replaced with satisfactory soil.

3.8 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Soil layers compacted by heavy equipment shall not exceed 8 IN in depth.

B. Soil layers to be compacted by hand-operated tampers shall not exceed 4 IN in depth.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Structural fill shall be compacted in maximum 9 inch thick, loose lifts to at least 95 percent of the maximum dry density determined in accordance with ASTM D 1557 (Modified AASHTO Compaction).
   2. Common fill shall be compacted in maximum 12 inch thick, loose lifts to at least 92 percent of the maximum dry density determined in accordance with ASTM D 1557 (Modified AASHTO Compaction).
   3. Aggregate subbase shall be compacted in maximum 9 inch thick, loose lifts, and compacted with 4 to 6 passes of vibratory compaction equipment.

3.9 GRADING

A. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1 IN.
   2. Walks: Plus or minus 1 IN.
   3. Pavements: Plus or minus 1/2 IN.

3.10 FIELD QUALITY CONTROL

AD-8: Section 31 22 00: Add paragraph 3.10.A.and renumber.

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing. Testing reports shall be submitted to BNL for review within 2 days of test or laboratory analysis.

AD-2: Section 31 22 00: Delete paragraph 3.10.A. and renumber.

~~A.~~B. The testing agency will be responsible for inspecting and testing subgrades for each fill or backfill layer accordance with ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one (1) test for every 2000 SQ FT or less of paved area, but in no case fewer than three (3) tests.
   2. Retaining Wall Backfill: At each compacted backfill layer, at least one (1) test for each 100 FT or less of wall length, but no fewer than two (2) tests.

~~B.~~C. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

3.11 PROTECTION

A. Protect graded areas from traffic, freezing, and erosion.

B. Repair and reestablish grades in areas that have eroded, settled or disturbed by construction operations or weather conditions. Compact areas as specified.

C. Remove trash and debris from site.

3.12 LAYOUT FOR ROUGH GRADING

A. BNL to review rough grade.

END OF SECTION