DIVISION 31 – EARTHWORK

SECTION 311000 – SITE CLEARING

1. General: This section includes general requirements for site clearing and removal of existing above- and below-grade improvements as indicated and as necessary to facilitate new construction, including the following:
   a. Protecting existing trees shrubs plants and grass to remain.
   b. Removing existing trees shrubs plants and grass.
   c. Clearing and grubbing.
   d. Stripping and stockpiling topsoil.
   e. Removing above- and below-grade site improvements.
   f. Disconnecting and capping or sealing site utilities.
   g. Temporary erosion and sedimentation control measures.

2. Sustainability: Identify requirements for contractor to separate recyclable materials produced during site clearing from other non-recyclable materials. Contractor shall store or stockpile without intermixing with other materials and transport them to recycling facilities.

3. Material Ownership: Except for stripped topsoil or other materials indicated to remain NU’s property, cleared materials shall become Contractor’s property and shall be legally removed from the project site and legally disposed of.

4. Project Conditions: The following project requirements shall be coordinated with NU during the design phase and indicated in the Contract Documents:
   a. Traffic: The City of Chicago and the City of Evanston have specific requirements for traffic control and load limits. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
      i. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from NU and authorities having jurisdiction.
      ii. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   b. Salvable Improvements: Coordinate items to be salvaged with NU and identify locations to be stored either on-site or off-site on NU’s premises.
c. Utility Locator Service: Identify requirements for Contractor to notify utility locator service for area where Project is located before site clearing.

d. Erosion and Sedimentation Control: Identify temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction. Contractor shall not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

e. Tree Protection: Locate and identify trees and vegetation to remain or to be relocated. Identify temporary fencing around tree protection zones. Contractor shall not excavate within tree protection zones, unless otherwise indicated. Contractor shall repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

f. Utilities: Identify utilities to be removed. Coordinate requirements with NU and utility companies to shut off indicated utilities.

   i. Existing Utilities: Contractor shall not interrupt utilities serving facilities occupied by NU or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

      1. Notify NU not less than fourteen (14) days in advance of proposed utility interruptions.

      2. Do not proceed with utility interruptions without NU’s written permission.

5. Products:

   a. Soil Materials: Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

6. Field Quality Control:

   a. Clearing and Grubbing:

      i. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

      ii. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density required for the proposed condition.
b. Topsoil Stripping:

   i. Remove sod and grass before stripping topsoil. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

   ii. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

   iii. Limit height of topsoil stockpiles to 72 inches

   iv. Dispose of excess topsoil as specified for waste material disposal

   v. Do not stockpile topsoil within drip line of trees to remain.

END OF SECTION
DIVISION 31 – EARTHWORK

SECTION 31 2000 – EARTH MOVING

1. General: This section includes minimum project requirements for earth moving, including the following:
   a. Preparing subgrades for walks, pavements, lawns and grasses and exterior plants.
   b. Drainage course for slabs-on-grade excluding building slabs.
   c. Base course for concrete walks and pavements.
   d. Base course for asphalt paving.
   e. Excavating and backfilling for utility trenches.
   f. Excavating and backfilling trenches for buried mechanical, plumbing and electrical utilities and pits for buried utility structures.

2. Definitions:
   a. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   b. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   c. Final Backfill: Backfill placed over initial backfill to fill a trench.
   d. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
   e. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
   f. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
   g. Drainage Fill:
   h. Course placed over the excavated subgrade before laying subdrainage pipe and placed around and over the subdrainage pipe.
   i. Course supporting the slab-on-grade excluding building that also minimizes upward capillary flow of pore water.
   j. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
k. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

l. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

m. Fill: Soil materials used to raise existing grades.

n. Structures: Modular Block Retaining walls, slabs on-grade (excluding building), tanks, curbs, sewerage, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface excluding building.

o. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and base course for a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

p. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, subbase, drainage fill, or topsoil materials.

q. Utilities: On-site underground pipes, conduits, ducts, and cables.

3. Quality Assurance:

   a. Contractor shall be responsible for contacting the Owner’s Geotechnical Testing Agency at those times required by the specifications for the appropriate materials and soils testing.

   b. Contractor shall coordinate with the Owner’s Geotechnical Testing Agency as to the Testing Agency’s requirements for advance notification, but allow for a minimum 24-hr notification.

4. Project Conditions:

   a. Existing Utilities: Contractor shall not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by NU and then only after arranging to provide temporary utility services according to requirements indicated.

      i. Notify NU not less than fourteen (14) days in advance of proposed utility interruptions.

      ii. Do not proceed with utility interruptions without NU’s written permission.
iii. Contractor shall contact utility-locator service (J.U.L.I.E.) for area where Project is located before excavating. A private utility locating service may be required for non-public utilities.

iv. Contractor shall demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

b. Dewatering: Review requirements for dewatering with NU during the design phase. Discharge from dewatering operations must meet with local and State National Pollutant Discharge Elimination System (NPDES) requirements.

c. Explosives: Do not use explosives.

5. Products:

a. Soil Materials:

   i. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

   ii. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, GC, SC, SW, SP, ML, CL and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

   iii. Unsatisfactory Soils: Soil Classification Groups MH, CH, OL, OH, and PT according to ASTM D 2487, or a combination of these groups. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

b. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; less than 3 percent stones 3/4-inch or larger in any dimension and roots, plants, sod, clay lumps, and other extraneous materials harmful to plant growth.

   i. Where possible try to match NU sandy loam soil conditions with topsoil re-use or importing similar soil structure.

   ii. Topsoil shall be free of all deleterious material that may adversely affect the use of the planted surface including any metal, wood, plastic, glass or other manmade materials not intended specifically as a soil supplement.

   iii. Topsoil shall be free of obnoxious weeds and invasive plants or other undesirable organisms and disease-causing plant pathogens. Topsoil shall be free of chemicals and pesticides, farm crop seeds, with documentation on topsoil origin and soil testing.

   iv. Topsoil particle sizes shall fall in the following ranges as percentages by mass both separately and in combination:
1. Clay: 35 percent to 60 percent
2. Silt: 35 percent to 60 percent
3. Sand: less than 60 percent
4. Silt and Clay in combination: less than 65 percent

v. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. Supplement with imported topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 6 inches deep; do not obtain from bogs or marshes.

vi. Topsoil Testing: Include specification to cover testing of topsoil (both from NU and from off site) and remediation of topsoil.

c. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone; ASTM D 2940; conforming to State of Illinois, Dept of Transportation Gradation CA-6 or CA-10.

d. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone ASTM D 2940; conforming to State of Illinois, Dept of Transportation Gradation CA-6.

e. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone; ASTM D 2940; conforming to State of Illinois, Dept of Transportation Gradation CA-6 or CA-7.

f. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; conforming to State of Illinois, Dept of Transportation Gradation CA-11.

g. Drainage Fill: Narrowly graded mixture of washed crushed stone, or washed crushed or uncrushed gravel; ASTM D 448; coarse-aggregate conforming to State of Illinois, Dept of Transportation Gradation CA-14

h. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

i. Geotextiles:

    i. General: Limit use of geo-textiles. Past experience and over-use has prevented adequate water/rainfall for plant absorption, created surface water collection and "ponding", and prevented optimal sub-surface drainage.

    ii. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from
polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 248 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Water Flow Rate: 110 gpm minimum; ASTM D 4491
8. Permittivity: 0.02 per second, minimum; ASTM D 4491.
9. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

iii. Separation Geotextile: Nonwoven needle punched geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 1; AASHTO M 288.
2. Grab Tensile Strength: 315 lbf; ASTM D 4632.
4. Tear Strength: 113 lbf; ASTM D 4533.
5. Puncture Strength: 113 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
7. Water Flow Rate: 110 gpm minimum; ASTM D 4491
8. Permittivity: 0.02 per second, minimum; ASTM D 4491.
9. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

j. Controlled Low-Strength Material:

i. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:

1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class C or F.

3. Fine Aggregate: Sand IDOT Gradation FA-1 or FA-2


5. Water: ASTM C 94/C 94M.


7. Compressive Strength: Minimum 30 psi at 28 days and 150 psi at 180 days when tested according to ASTM C 495.

k. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 4 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

i. Red: Electric.

ii. Yellow: Gas, oil, steam, and dangerous materials.

iii. Orange: Telephone and other communications.

iv. Blue: Water systems.

v. Green: Sewer systems.

6. Field Quality Control:

a. Geotechnical Testing Agency: NU will typically engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

i. Testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

ii. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 3500 sq. ft. or less of paved area or building slab, but in no case fewer than 2 tests.

iii. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 250 feet or less of trench length, but no fewer than 1 tests.

iv. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, contractor shall scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
b. Subgrade Inspection: Contractor shall notify NU’s Geotechnical Testing Agency when excavations have reached required subgrade. If NU’s Geotechnical Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

c. Proof-Rolling: Contractor shall proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Review requirements and additional compensation for authorized additional excavation and replacement material with NU during the design phase.

d. Unauthorized Excavation: Fill unauthorized excavations under other construction or utility pipe as directed by NU’s Geotechnical Testing Agency.

e. Storage of Soil Materials: Contractor shall stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Contractor shall place, grade, and shape stockpiles to drain surface water and cover to prevent windblown dust. Contractor shall stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

f. Protection:

i. Protecting Graded Areas: Contractor shall protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

ii. Contractor shall 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.

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

END OF SECTION
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