DIVISION

02

SITEWORK

SECTION 02200 - EARTHWORK

1.1 GENERAL

A. Definitions in this Section include the following:

1. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
2. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
3. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.
4. Subbase Course: The layer placed between the subgrade and surface pavement or walk.
5. Drainage Fill: Course of washed granular material placed under slab-on-grade to cut off upward capillary flow of pore water toward slab.
6. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
8. Utilities include on-site underground pipes, conduits, ducts, cables, and underground services within building lines.

B. Codes and Standards: Perform earthwork complying with requirements of authorities with jurisdiction.

C. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

D. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided.

1.2 PRODUCTS

A. Soil Materials: Provide approved borrow soil materials from off site when sufficient approved soil materials are not available from excavations.

B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter.

C. Backfill and Fill Materials: Satisfactory soil materials.

D. Bedding Material: Subbase materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Detectable Warning Tape: Polyethylene film warning tape encasing a metallic core, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility.

1.3 EXECUTION

A. Preparation: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Provide erosion and sedimentation control measures.

C. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

D. Protect subgrades and foundation soils from softening and damage by rain or water accumulation and from freezing temperatures or frost.

E. Explosives: Do not use explosives.

F. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of character of materials and obstructions encountered.

G. Excavate for structures, pavements, and walks to indicated elevations and dimensions. Widen excavations to permit placing and removing concrete formwork, installing services and other construction, and for inspections. Trim subgrades to required lines and grades to leave solid base to receive other work.

H. Excavate utility trenches to indicated slopes, lines, depths, and invert elevations of uniform widths to provide a maximum 12 inches of working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than the top of pipe or conduit.

1. Excavate and shape trench subgrade to provide uniform bearing and continuous support for pipe and conduit. Where encountering rock or other unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

I. Approval of Subgrade: When Architect determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed. Payment will be made according to Contract provisions for changes in the Work.

1. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

J. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Fill unauthorized excavations under other construction as directed by Architect.

K. Store excavated and borrow soil materials acceptable for backfill and fill in shaped, graded, drained, and covered stockpiles. Locate stockpiles away from edge of excavations and outside drip line of remaining trees.

L. Backfill excavations promptly following acceptance of affected work below final grade.

M. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.

1. Coordinate backfilling with utilities testing.
2. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

N. Fill Preparation: Plow strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

1. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil, and recompact to required density.

O. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer to within 2 percent of optimum moisture content before compaction.

1. Remove and replace, or scarify and air dry, satisfactory soil material that is too wet to compact to specified density.

P. Compaction: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Place evenly alongside structures and utilities to required elevations.

Q. Compact soil to not less than the following percentages of maximum dry density according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material to 95 percent.
2. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material to 95 percent.
3. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material to 95 percent.

R. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 0.10 foot and pavements and areas within building lines to plus or minus 1/2 inch.

S. Field Quality Control: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), ASTM D 2922 (nuclear method) or ASTM D 2937 (drive cylinder method), as applicable.
2. Footing Subgrades: Test each soil stratum to verify design bearing capacities.
3. Paved Areas and Building Slabs: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
4. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact, and retest until obtaining required density.

T. Protection: Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction.

U. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

V. Disposal: Transport surplus satisfactory soil to designated stockpiles on the Owner's property. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

W. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 02200

SECTION 02282 - TERMITE CONTROL

1.1 GENERAL

A. Summary: This Section specifies soil treatment for termite control.

B. Product Data: Submit manufacturer's technical data and application instructions.

C. Quality Assurance: In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for Work, including preparing substrate and application rates.

D. Engage a licensed professional pest control operator to apply soil treatment solution.

E. Use only termiticides that bear a federal registration number of the U.S. Environmental Protection Agency (EPA).

F. Restrictions: Do not apply soil treatment solution until excavating, filling, and grading operations are completed, except as otherwise required in construction operations.

1. To ensure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of soil toxicant manufacturer.

1.2 PRODUCTS

A. Soil Treatment Solution: Use an emulsible, concentrated termiticide that dilutes with water, specially formulated to prevent termite infestation. Provide a working solution of one of following chemical elements in concentrations recommended by termiticide manufacturer.

1. Chloropyrifos:

a. Dursban TC, Dow Chemical Co.

2. Permathrin:

a. Dragnet FT, FMC Corp.
b. Torpedo, ICI Americas, Inc.

3. Cypermethrine:

a. Prevail FT, FMC Corp.
b. Demon, ICI Americas, Inc.

4. Fenvalerate:

a. Gold Coast Tribute, Du Pont.

5. Isofenphose:

a. Pryfon, Mobay Corp.

B. Other solutions may be used as recommended by Applicator if approved for intended application by local governing authorities. Use only soil treatment solutions that are not harmful to plants.

1.3 EXECUTION

A. Surface Preparation: Remove foreign matter that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Termiticide may be applied before placing compacted fill under slabs, if recommended by manufacturer.

B. Application Rates: Apply soil treatment solution at rates and concentrations recommended by soil termiticide manufacturer.

C. Post signs in areas of application warning workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.

D. Reapply soil termiticide treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

END OF SECTION 02282

SECTION 02300 - EARTHWORK

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for the pavement.
2. Excavating and backfilling for buildings and structures.
3. Subbase course for concrete walks and pavements.

1.2 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

B. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

C. Excavation: Removal of material encountered above subgrade elevations.

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

E. Structures: Buildings, footings, foundations, retaining walls, curbs or other man-made stationary features constructed above or below the ground surface.

F. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.

1.4 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

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

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

D. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

3.4 APPROVAL OF SUBGRADE

A. Notify Construction Manager and Architect when excavations have reached required subgrade.

B. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

3.5 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.6 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Surveying locations of underground utilities for record documents.
2. Removing trash and debris.
3. Removing temporary shoring and bracing, and sheeting.

3.7 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under building slabs, use satisfactory soil materials.
3. Under footings and foundations, use satisfactory materials.

3.8 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill 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.

3.9 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at as percent.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.11 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
2. Shape subbase and base to required crown elevations and cross-slope grades.
3. When thickness of compacted base course is 6 inches or less, place materials in a single layer.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

3.13 PROTECTION

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

C. 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.

1. Scarify or remove and replace soil material to depth as directed by Construction Manager and Architect, reshape and recompact.

3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SECTION 02455

DRIVEN PILES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Composite piles, consisting of untreated timber lower section and cast-in-place upper section for selected building piles.
2. Preservative-treated round timber piles for light standard supports, equipment platforms, and selected building piles.

B. Related Sections:

1. Section 01450 - Testing Laboratory Services.
2. Section 02300 - Earthwork.
3. Section 03300 - Cast-In-Place Concrete.

1.02 TESTING LABORATORY SERVICES

A. Permanent Piles: The independent Testing Laboratory specified in "Section 01450" will perform the following services.

1. Inspection: Perform inspections at source and at project site. Mark conforming piles for identification.
2. Logging: Log the driving of all piling and record the following:
   a. Date driven, type of hammer, pile description including tip, length and butt dimensions measured just prior to driving.
   b. Location of pile.
   c. Number of blows per foot for full length of pile.
   d. Tip and butt elevation.
   e. Vibration Measurements.
   f. Record control elevations provided by Contractor.
   g. Heaved piles.
3. Pile load tests.
4. Reporting: Submit driving records daily.
5. Inspect pile shells before concreting.

1.03 CONTRACTOR DUTIES

A. Protection of Property: The Contractor shall document the conditions of existing paving, structures, sewers, utilities, and other property on and adjacent to the work site and shall take suitable precautions to protect such property from damage which could result from the piling work. Should damage occur due to Contractor's operations, the Contractor shall repair or replace the damaged work to restore it to its original condition, without additional cost to the Owner.

1. Documentation: Photograph existing conditions of structures, finishes, equipment, and adjacent improvements that might be construed as damage resulting from pile driving operations. File photos with Architect before starting pile driving.

B. Notification: The Contractor shall notify the Architect and the Testing Laboratory 48 hours prior to driving initial pile. Pile driving must not commence without representatives of the Architect and the Testing Laboratory being present.

C. Regulatory Agency: In accordance with the applicable Building Code, the Contractor shall notify the Director of the responsible regulatory agency at least 24 hours in advance of pile driving.