

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling for cathodic protection upgrades and installations.
 - 2. Restoration of areas disturbed by project installations.
- B. Contractor shall be responsible for all earth moving and restoration activities associated with the cathodic protection upgrades and is to include all costs in its lump sum base bid.
- C. Related Sections:
 - 1. Division 01 and 26 Specification Sections

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe or other installation
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations, to lines and dimensions indicated and/or as defined by parameters otherwise established for project installations including (but not limited to) manufacturer's recommended installation procedures and governing codes.
- G. Fill: Soil materials used to raise existing grades.

- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. that cannot be removed by rock excavating equipment without systematic drilling, ram hammering, ripping, or blasting, when permitted:
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground, surface and elevated pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 QUALITY ASSURANCE

- A. Preexcavation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locating: Utility Information contained in the drawings is for general reference only and should not be construed as accurate or complete. Other active, inactive or abandoned utilities may exist. Contractor is responsible for the field verification of the nature, presence and location of all existing utilities (subsurface, surface and elevated). Contractor is to perform all due diligence to determine the existence and location of utilities to include contacting the Underground Utility Protective Organization (UFPO; PH: 1-800-962-7962) at least three (3) days in advance of project activity, contacting entities that do not participate in UFPO and engaging the services of a utility locating company. Related contractor efforts shall be at no additional cost to the Owner. Contractor shall maintain, preserve and protect against damage all

existing utilities. Contractor shall be responsible for costs and restoring (to existing condition or better and to the satisfaction of the utility Owner) any utility damaged from project activity.

- C. Site constraints and features may limit the nature and size of excavation equipment that can be utilized for project installations. Contractor is responsible to avail themselves of any limiting conditions. Contractor requests for additional compensation, resulting from the contractor's failure to provide for site constraints and features which may influence excavation means and methods, will not be entertained.
- D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures are in place.
- E. Contractor shall comply with all codes, laws rules and regulations governing excavation activity and shall provide all necessary means and measures (including shoring and bracing as applicable) at no additional cost to the Owner.
- F. In the event that excavation activities encounter deleterious or suspect-contaminated material, Contractor shall immediately notify the Engineer to obtain direction as to how to proceed.
- G. Areas around the main tank farm and adjacent, above ground piping complex may contain impervious and/or low permeability fill material or soil layers. Disruption to this material shall be kept to a minimum and every effort shall be made to maintain and/or restore the integrity of the existing conditions.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: It is generally intended that excavated spoils are to be used as backfill material for all project installations. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. The source and character of borrow soil material is subject to approval by the Owner and Engineer prior to use. Borrow soil material shall be free of debris, waste, frozen materials, vegetation, and other deleterious matter.
- B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- C. Base Course: 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 (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

- F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- H. Sand: ASTM C 33; fine aggregate.
- I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify the locations of buried fuel lines prior to excavation including depth of burial. Use extreme caution while digging in the vicinity of fuel piping, including nearby aboveground piping. Hand dig in and around pipes, do not undermine. Hand fill bedding material until a minimum of 6" cover is established.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- C. Protect and maintain erosion and sedimentation controls during earth moving operations.
- D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- E. Carefully remove and stockpile surface material (e.g. topsoil, surface stone veneer, etc.) intended for use during restoration. Stockpile materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust

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.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Comply with applicable federal, state and local laws, regulations, rules and guidance.
- B. Excavate as necessary to perform the Work, plus sufficient space to allow for installation of bracing, shoring or as may otherwise be required.
- C. Excavate to required depths and elevations regardless of the character of surface and subsurface conditions encountered. 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.
 - 2. Remove rock to required depths and elevations to permit installation of permanent construction.

3.5 EXCAVATION FOR PROJECT INSTALLATIONS

- A. Excavate to required depths and elevations. Do not disturb the bottom of excavations intended as bearing surfaces.
- B. Excavate trenches to uniform widths.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of installations. Shape subgrade to provide continuous support. Remove projecting stones and sharp objects along trench subgrade.

3.6 EXCAVATION INSPECTION

- A. Notify Engineer when excavations have reached required depths or elevations.
- B. Reconstruct excavations damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavations under other construction, pipe, or conduit as directed by the Engineer.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations.

3.9 BACKFILL, GENERAL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade.
 - 2. Surveying locations of installations, underground utilities and/or other subsurface features for Record Documents.
 - 3. Testing and inspecting underground installations and/or utilities.
 - 4. Removing trash and debris.
 - 5. Removing temporary shoring and bracing, and sheeting as applicable.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Place backfill to provide continuous support for project installations.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction.
 - 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 is too wet to compact.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.

2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.
5. Variation from the above requirements and/or requirements to obtain specific measurements of compaction is subject to Owner and Engineer approval.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements.
 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.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 1. Place base course material over subbase course under hot-mix asphalt pavement.
 2. Shape subbase course and base course to required crown elevations and cross-slope grades.
 3. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
 4. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 5. Compact subbase course and base course 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.

3.15 RESTORATION AND 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 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 Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.
- D. Restoration Material: Use materials for restoration identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Engineer for the visual and functional performance of in-place materials.
- E. Areas containing grass or turf prior to construction shall be topsoiled and seeded unless otherwise noted.
- F. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000