

## SECTION 31 20 00 - EARTH MOVING

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.
7. Respreading of topsoil.

## 1.2 DEFINITIONS

## A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

## B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

## C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

## D. Borrow Soil: Satisfactory soil imported from off-site or on site borrow pit for use as fill or backfill.

## E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

## F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner. Unauthorized excavation, as well as remedial work directed by Owner, shall be without additional compensation.

## G. Fill: Soil materials used to raise existing grades.

- H. Flowable Fill or Controlled Low Strength Material (CLSM): A self-compacting alternative to granular backfill material that is not concrete and has a compressive strength between 50 and 200 psi.
- I. Lean Concrete: Concrete of low cementitious material content.
- J. 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.
- K. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- M. Topsoil: Fertile soil meeting requirements of ASTM D 5268 with a pH range of 5.5 to 7 and a minimum of 2 percent organic material content. Clean soil per planting soil requirements in Section 329000 "Planting."
- N. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

### 1.3 QUALITY ASSURANCE

- A. Imported (borrow) soil must be tested and certified, by the Owner's testing agency, as suitable material, free of any environmental contaminants. Coordinate imported materials and their source with Division 31 Section "Erosion and Sedimentation Control" and the Storm Water Pollution Prevention Plan. The Contractor will be liable for all clean-up costs associated with unapproved, imported materials.

### 1.4 FIELD CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Owner 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. Provide ASTM D 2487 or AASHTO M 145 classified soil materials according to geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

- C. Satisfactory Soils: Recommended materials free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
  - 1. Satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction will be considered unsatisfactory soil materials.
- D. Provide granular soils materials according to local department of transportation (DOT) regulations or as follows. None of the materials below may contain slag:
  - 1. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; 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.
  - 2. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; 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.
  - 3. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; 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.
  - 4. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; 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.
  - 5. 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.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Comply with geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- C. Preparation of subgrade is specified in Division 31 Section "Site Clearing."
- D. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)" during earthwork operations.

### 3.2 EXCAVATION

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. No changes in the Contract Sum or the Contract Time will be authorized except for rock excavation or removal of obstructions not specifically indicated in the Contract Documents.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Authorized additional excavation and replacement material will be paid for according to Contract provisions as specified in Division 00 Section "General Conditions."
- B. Excavation for Structures: Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections
- C. Excavation for Walks and Pavements: Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
- D. Excavation for Utility Trenches: Excavate trenches to indicated gradients, lines, depths, and elevations or as required by authorities having jurisdiction. Reference trench detail CSD-2.
  - 1. Trench Width: Provide a minimum clearance of 9 inches (230 mm) on each side of pipe or conduit with a desired maximum clearance of 12 inches (300 mm) on each side. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
  - 2. Trench Bottoms: Provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
    - a. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material, 4 inches (100 mm) deeper elsewhere, to allow for bedding course as required by authorities having jurisdiction.

### 3.3 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Proof-roll in presence of Owner's testing agency.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's testing agency, without additional compensation.

### 3.4 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations, wall footings, utility pipe, or other construction as approved by the Owner's testing agency.

### 3.5 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 or temporarily stabilize as specified in Division 31 Section "Erosion and Sedimentation Control (Includes SWPPP)."
- 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.6 UTILITY TRENCH BACKFILL

- A. General: Backfill trenches as indicated on Drawings.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- D. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Structural Concrete."
- E. Provide concrete encasement for piping or conduit less than 24 inches (610 mm) below surface of roadways only when indicated on the Drawings or as required by authorities having jurisdiction.
- F. Place and compact initial backfill of subbase material or satisfactory soil.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing and Owner's testing agency.
- G. Place and compact final backfill as indicated on Drawings to final subgrade elevation.
- H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

### 3.7 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 to required elevations. Comply geotechnical engineer's written recommendations in Division 00 Section "Geotechnical Data."

### 3.8 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content or as directed by Owner's Testing Agency.
  - 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, at no additional cost to the Owner, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. See Division 31 Section "Dewatering"

### 3.9 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 698, Standard Proctor:
  - 1. Under structures, building slabs, future expansion areas, steps, walkways, and pavements, scarify and recompact top 8 inches (203 mm) of existing subgrade and each layer of backfill or fill soil material at 98 percent.
  - 2. Under lawn 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.

### 3.10 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawns and Unpaved Areas: Plus or minus 1 inch (25 mm).
  - 2. Pavements and Walks: Plus or minus 1/2 inch (13 mm).
  - 3. Coordinate respreading or placement of topsoil/planting soil with landscape contractor and section 329000 "Planting."
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

### 3.11 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
  - 1. Shape subbase and base course to required crown elevations and cross-slope grades.
  - 2. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698, Standard Proctor.

### 3.12 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - 1. Place drainage 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.
  - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

### 3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Coordinate scheduled earth moving work with the Owner's testing agency.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner's testing agency.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 6938, and ASTM D 2937, as applicable.
- E. Provide other field tests, such as bearing ratio of subgrades, subbases, and bases for paving, as required by authorities having jurisdiction.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest, at the Contractor's cost, until specified compaction is obtained.

### 3.14 BUILDING PAD CERTIFICATION

- A. Submit two signed copies of the Building Pad Certification Form at the end of this Section once the building pad is complete and ready for turnover to the building contractor. Form must be

completed by the Owner's testing agency, professional surveyor, and both the Site Contractor and the Building Contractor.

### 3.15 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 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.
- C. Where settling occurs before Project warranty period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

### 3.16 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.



**BUILDING PAD CERTIFICATION**

Store Number/Location: \_\_\_\_\_

This form is to certify the building pad is constructed per the contract drawings and is the official instrument for turn over of responsibility from the Contractor and/or Developer to the building contractor and/or Building Owner.

**GEOTECHNICAL (Owner's Approved Testing Agency)**

I certify that the building pad was constructed in accordance with the contract drawings dated \_\_\_\_\_, 20 \_\_\_\_ including proper inspection intervals for earthwork and compaction.

\_\_\_\_\_  
Geotechnical Company Name/Address\_\_\_\_\_  
Signature\_\_\_\_\_  
Date\_\_\_\_\_  
Name (Printed)\_\_\_\_\_  
Geotechnical Professional Registration Number**SURVEY (Owner's Approved Agency)**

I certify that the building pad was constructed in accordance with the contract drawings dated \_\_\_\_\_, 20 \_\_\_\_ including spot elevations on a 50-foot grid indicating the required subgrade, plus or minus 1 inch (25 mm). Proposed building corners and the pad orientation have been verified with established benchmarks and the Contract Documents.

\_\_\_\_\_  
Survey Company Name/Address\_\_\_\_\_  
Signature\_\_\_\_\_  
Date\_\_\_\_\_  
Name (Printed)\_\_\_\_\_  
Survey Professional Registration Number**SITE CONTRACTOR / DEVELOPER**

I certify that the building pad was constructed in accordance with the contract drawings dated \_\_\_\_\_, 20 \_\_\_\_

\_\_\_\_\_  
Company Name/Address\_\_\_\_\_  
Signature\_\_\_\_\_  
Date\_\_\_\_\_  
Name (Printed)**BUILDING CONTRACTOR / KROGER OWNER REPRESENTATIVE**

I acknowledge acceptance of the building pad certified above.

\_\_\_\_\_  
Company Name/Address\_\_\_\_\_  
Signature\_\_\_\_\_  
Date\_\_\_\_\_  
Name (Printed)

END OF SECTION 31 20 00

