

**SECTION 31 20 11
EARTH MOVING (SHORT FORM)**

SPEC WRITER NOTES:

1. Use this section only for NCA projects. Delete text between // _____ // not applicable to project. Edit remaining text to suit project.
2. Use this section for small projects where earthwork is not extensive and site work restoration only is required.
3. Where materials are specified, substitute readily available materials meeting local State DOT standards, when possible. Contact local quarries regarding availability of local materials meeting State DOT standards.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork including excavation, fill, backfill, and lawn restoration.

1.2 RELATED REQUIREMENTS

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this section.

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. // Foundation System Requirements: FLOWABLE FILL, Section 31 23 23.33 //.

1.3 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION

- A. Measurement: Cross section and measure the uncovered and separated materials, and compute quantities by the Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond the following limits:
 1. 300 mm (12 inches) outside of the perimeter of formed footings.
 2. 600 mm (24 inches) outside the face of concrete work when forms are required, except for footings.
 3. 150 mm (6 inches) below the bottom of pipe and maximum the pipe diameter plus 600 mm (24 inches) in width for pipe trenches.

4. Outside dimensions of concrete work when no forms are required (trenches, conduits, and similar items not requiring forms).
- B. // Payment: No separate payment shall be made for rock excavation quantities shown. The contract price and time will be adjusted for overruns or underruns according to Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable //.
- C. // Payment for Differing Site Conditions: When rock excavation, as classified, is encountered, the contract price and time will be adjusted according to Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL REQUIREMENTS as applicable //.

1.4 DEFINITIONS

- A. Unsuitable Materials:
1. Fills: Topsoil, frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
 2. Existing Subgrade (except footings): Same materials as above paragraph, not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proof rolling, or similar methods of improvement.
 3. Existing Subgrade (footings only): Same as Paragraph 1, but no fill or backfill. If materials differ from // reference borings and // design requirements, excavate to acceptable strata subject to Contracting Officer's Representative's (COR) approval.
- B. Earthwork: Earthwork operations required within the new construction area. Also includes earthwork required for auxiliary structures and buildings and sewer and other trench work throughout the job site.
- C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in // AASHTO // T99 // T180 // Method A. // ASTM // D698 // D1557 // Method A //.
- D. The term fill means fill or backfill.
- E. Topsoil: Fertile, friable, natural topsoil of loamy character and characteristic of locality, capable of growing healthy horticultural crops of grasses.

1.5 CLASSIFICATION OF EXCAVATION

- A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

SPEC WRITER NOTES: Retain Unclassified excavation above or classified excavation below.

- B. Classified Excavation: Removal and disposal of all material not defined as rock.
- C. Rock Excavation:
1. Solid ledge rock (igneous, metamorphic, and sedimentary rock).
 2. Bedded or conglomerate deposits, cemented to present characteristics of solid rock which cannot be excavated without blasting; or the use of modern power excavator (shovel, backhoe, or similar power excavators) minimum 0.75 m³ (1 cubic yard) capacity, properly used, having adequate power and in good running condition.
 3. Boulders or other detached stones each having a volume of 0.4 cubic meter (1/2 cubic yard) or more.

1.6 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Nursery and Landscape Association (ANLA):
1. 2004 - American Standard for Nursery Stock.
- C. American Association of State Highway and Transportation Officials (AASHTO):
1. T99-01 (R2004) - Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop.
 2. T180-01 (2004) - Moisture-Density Relations of Soils Using a 4.54-kg [10 lb] Rammer and a 457 mm (18 inch) Drop.
- D. ASTM International (ASTM):
1. D698-07 - Laboratory Compaction Characteristics of Soil Using Standard Effort.
 2. D1557-07 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
- E. Standard Specifications of (Insert name of local state) State Department of Transportation, latest revision.

1.7 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Plot plan showing elevations.
- C. Test Reports: Certify // each product complies // products comply // with specifications.
 - 1. Rock Excavation Report:
 - 2. Certification of rock quantities excavated.
 - a. Excavation method.
 - b. Labor.
 - c. Equipment.
 - 3. Land Surveyor's or Civil Engineer's name and official registration stamp.

SPEC WRITER NOTES: Use only when there is
a VA Retained Testing Laboratory.

- D. Samples:
- E. Soil Samples: Provide proposed off site or on site fill material to COR, suitable for laboratory tests.

1.8 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, // color, // production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

PART 2 - PRODUCTS

2.1 MATERIALS

SPEC WRITER NOTES: Make material
requirements agree with applicable
requirements specified in the referenced
Applicable Publications. Update and
specify only which applies to the
project.

- A. Fills: Materials approved from on site and off site sources.
 - 1. Dry Density: 1760 kg/m3 (110 pcf) minimum.

2. Plasticity Index: 6 maximum.
3. Liquid Limit: 30 maximum.

B. Granular Fill:

1. Under Concrete Slab: Crushed stone or gravel graded from 25 mm (1 inch) to 4.75 mm (No. 4).
2. Bedding for Sanitary and Storm Sewer Pipe, crushed stone or gravel graded from 13 mm (1/2 inch) to 4.75 mm (No. 4).

SPEC WRITER NOTES: Make the following sections match the areas shown on Drawings. Clearly show which areas are to be restored utilizing fertilizer and seed, or sod. Provide detail on Drawings with thickness and condition of materials to be applied and whether straw is to be applied over the seed.

- C. Fertilizer: 5 percent nitrogen, 10 percent phosphorus, and 5 percent potash.
- D. Seed: Grass mixture comparable to existing turf.
- E. Sod: Comparable species with existing turf, without broken pads and torn or uneven ends. Use State Certified or State Approved sod when available.
 1. Thickness of Cut: 19 mm to 32 mm (3/4 inch to 1 1/4 inches) excluding top growth.

PART 3 - EXECUTION

3.1 SITE PREPARATION

SPEC WRITER NOTES:
1. Make the following sections match the areas shown on Drawings. Note any visible areas of trash, debris, previously dumped or stored materials to be removed according to these sections on Drawings.
2. Do not estimate quantity or volume of materials to be removed when being handled as part of the lump sum price for the Work.

A. Clearing:

1. Clear within the limits of earthwork operations as described or designated by the COR.
2. Remove trees, shrubs, fences, foundations, incidental structures, paving, debris, trash and any other obstructions.

3. Remove materials from the Cemetery Property.

B. Grubbing:

1. Remove stumps and roots 75 mm (3 inches) and larger diameter.
2. Leave undisturbed sound stumps, roots up to 75 mm (3 inches) diameter, and nonperishable solid objects minimum 900 mm (3 feet) below subgrade or finished embankment.
3. Do not leave material within the burial profile up to 2400 mm (8 feet) below finished grade.

C. Trees and Shrubs:

1. Remove trees and shrubs, not shown for removal, within 4500 mm (15 feet) of new construction and 2250 mm (7'-6") of utility lines when approved in advance by the COR.
2. Remove materials from the Cemetery Property.
3. Transplant trees and shrubs with a ball of earth and burlap according to the latest issue of the, "American Standard for Nursery Stock", of the American Association of Nurserymen, Inc.
4. Transplant trees and shrubs to a permanent or temporary position within two hours after digging.
5. Maintain trees and shrubs held in temporary locations by watering as necessary and feeding liquid fertilizer semi-annually with a minimum analysis of 5 percent nitrogen, 10 percent phosphorus and 5 percent potash.
6. Maintain plants moved to permanent positions as specified for plants in temporary locations until substantial completion.
7. Protect from damage, existing trees and shrubs. Trim, clean, and paint existing trees and shrubs including the roots, according to standard industry horticultural practice for the geographic area and plant species.
8. Do not store building materials closer to trees and shrubs to remain than the farthest extension of limbs.

D. Stripping Topsoil: Unless otherwise indicated on the drawings, extend limits of earthwork operations anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, within the limits of earthwork operations as specified above, unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Stockpile topsoil and protect as directed by the COR. Eliminate foreign

material larger than 0.014 cubic meter (1/2 cubic foot) in volume, from soil when stockpiled. Retain topsoil on station. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading. Do not excavate wet topsoil.

SPEC WRITER NOTES:

1. Modify specifications for topsoil, whether on site or imported to the site, to contain the minimum organic content and constituents identified in geotechnical report. When there no recommendations, follow specifications adopted by the closest State Department of Transportation (DOT) for topsoil. When onsite topsoil does not meet minimum requirements of geotechnical report or DOT standards, whichever is greater, then soil shall either be amended to meet the requirements, or topsoil shall be imported that does meet the requirements.

2. Edit specifications or add notes on drawings requiring analysis of topsoil and plans for achieving the stated constituents and characteristics for the topsoil are submitted to the COR for review and approval.

1. Test soil for chemicals, pesticides and fertilizers when topsoil is removed from formerly utilized as farmland, to verify suitability for use in new lawn areas.

E. Concrete Slabs and Paving:

1. Score deeply or saw cut existing concrete slabs and paving to be removed in a neat, straight cut, sections where excavation or trenching occurs.
2. Extend pavement section, minimum of 300 mm (12 inches) on both sides of widest part of trench excavation. Provide parallel final score lines unless otherwise indicated on Drawings.
3. Remove material from the Cemetery Property.

F. Disposal:

1. Remove materials from site and disposed of at legally approved site.
2. Comply with applicable Federal, State and local regulations. Do not burn materials on site.

3.2 EXCAVATION

- A. Shoring, Sheet piling and Bracing: Shore, brace, or slope to an angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with OSHA requirements.
1. Extend shoring and bracing to bottom of the excavation. Shore excavations carried below the elevations of adjacent existing foundations.
 2. Provide concrete fill support when bearing of foundation is disturbed by excavation, improper shoring or removal of shoring, placing of backfill, and similar operations, // in compliance with Specification Section 31 23 23.33, FLOWABLE FILL, // under disturbed foundations, as directed by COR. Do not remove shoring until permanent work in excavation has been inspected and approved by COR.
- B. Excavation Drainage:
1. Operate pumping equipment // , and install other materials, means and equipment // to keep excavations free from water and subgrades dry, firm, and undisturbed until permanent work is received by COR.
 2. // Obtain approval from COR before placement of permanent work on subgrades //.
 3. // Remove disturbed material to firm undisturbed material after water is brought under control, when subgrade for foundations is disturbed by water. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. // When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, coordinate with COR to consider use of flowable fill //.
- SPEC WRITER NOTES: Modify the following paragraph as required for the specific project.
- C. Blasting: // Blasting is permitted only when authorized by COR according to applicable provisions of 29 CFR 1926. // Blasting is not acceptable //.
- D. Building Earthwork:
1. Excavate foundation excavations to solid undisturbed subgrade.
 2. Remove loose or soft material to solid bottom.
 3. Fill excess cut under footings or foundations with 25 MPa (3000 psi) concrete, poured separately from the footings.
 4. Do not tamp earth for backfilling in footing bottoms.

E. Trench Earthwork:

1. Utility Trenches (Except Sanitary and Storm Sewer):
 - a. Excavate to width required for sheeting and bracing and proper performance of Work.
 - b. Grade bottom of trenches with bell-holes, scooped-out to provide uniform bearing.
 - c. Support piping on undisturbed earth unless a mechanical support is indicated on Drawings.
 - d. The length of open trench in advance of pipe laying shall not be greater than is authorized by the COR.
2. Sanitary and storm sewer trenches:
 - a. Trench Width:
 - 1) Below Point 150 mm (6 inches) Above Top of Pipe:
 - a) Pipe up to 300 mm (12 inches): 600 mm (24 inches) diameter.
 - b) Pipe Larger than 300 mm (12 inches): 4/3 diameter of pipe plus 200 mm (8 inches).
 - 2) Trench Width Above 150 mm (6 inches): Pipe size as required for sheeting and bracing and proper performance of the Work.
 - b. Bed Bottom Quadrant of Pipe:
 - 1) Undisturbed Soil: Bell holes no larger than necessary for jointing. Backfill with clean earth, placed and tamped by hand, maximum 300 mm (12 inches) above top of pipe.
 - 2) Granular Fill: Depth of fill minimum 75 mm (3 inches) plus one-sixth of pipe diameter below the pipe of 300 mm (12 inches) above top of pipe. Place and tamp fill material by hand.
 - c. Place and compact excess backfill using acceptable excavated materials. Do not use unsuitable materials.
 - d. Use granular fill for bedding where rock or rocky materials are excavated.

SPEC WRITER NOTES: Modify the following section to clarify the determination of unsuitable material by the COR or the Geotechnical Engineer from the VA Testing Laboratory. Coordinate the determination with the work performed by Testing Laboratory as specified in Section 01 45 29, TESTING LABORATORY SERVICES.

F. Site Earthwork:

1. Perform excavation as indicated on Drawings and as follows:
 - a. Remove and replace unsuitable subgrade materials, as determined by the COR.
 - b. // Obtain material samples for soil classification, under COR's direction, for testing by an approved testing laboratory to determine suitability //.
 - c. // Testing of the soil shall be performed by the VA Testing Laboratory //.
 - d. When unsuitable material is encountered and removed, the contract price and time will be adjusted according to Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL REQUIREMENTS as applicable. Adjustments to be based on cubic meters (cubic yard) in cut section only.
2. Finished subgrade elevation as follows:

SPEC WRITER NOTES: Modify the following statements to correspond with the common practice for the project area and ensure information is consistent with Drawing details.

- a. Pavement Areas: Bottom of pavement or base course as applicable.
- b. Planting and Lawn Areas: 100 mm (4 inches) below finished grade, unless otherwise specified or indicated on the Drawings.

3.3 FILLING AND BACKFILLING

- A. General: Fill or backfill when all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation. Proof-roll exposed subgrades with a fully loaded dump truck. Use excavated materials or borrow for fill and backfill, as applicable. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, and pipes in contact

with backfill have been installed, and work inspected and approved by COR.

- B. Proofrolling Existing Subgrade: Proof roll with fully loaded dump truck. Make a minimum of one pass in each direction. Remove unstable uncompactable material and replace with granular fill material completed to mix requirements specified.
- C. Placing: Place material in horizontal layers not exceeding 200 mm (8 inches) loose depth and then compacted. Do not place material muddy, frozen, or with frost surfaces.

SPEC WRITER NOTES:

1. Modify the following paragraph as required to specify the compaction test method to be followed and the required test method.
2. Recommend calling local testing laboratories to find out the common test method for the soils in the project area.
3. Adjustment of the required percentage of compaction shown below may be appropriate for areas not receiving engineered or structural fill.
4. Follow recommendations from the geotechnical report or have tests made for the existing in place soil densities as a comparison. Use the recommendations from the geotechnical report of the site conditions wherever possible.

- D. Compaction: Use approved equipment (hand or mechanical) to suit type of material compacted. Do not operate mechanized vibratory compaction equipment within 3000 mm (10 feet) of new or existing building walls without prior approval of the COR. Moisten or aerate material necessary to provide moisture content that will readily facilitate obtaining specified compaction with equipment used. Compact each layer // until there is no evidence of further compaction // minimum 95 percent of maximum density determined according to the following test method // AASHTO // T99 // T180 // Method A // ASTM // D698 // D1557 Method A //.

3.4 GRADING

- A. General: Uniformly grade areas within limits specified, including adjacent transition areas. Smooth finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between points and existing finished grades. Provide smooth transition between abrupt changes in slope.

- B. Cut rough or sloping rock to level beds for foundations. In unfinished areas, fill low spots and level off with coarse sand or fine gravel.
- C. Slope backfill outside the building away from building walls with minimum distance of 1800 mm (6 feet).
- D. Finished grade 150 mm (6 inches) below bottom line of windows or other building wall openings unless greater depth is shown.
- E. Place crushed stone or gravel fill under concrete slabs on grade, tamped, and leveled, 150 mm (6 inches) thick, unless otherwise indicated on Drawings.

SPEC WRITER NOTES: Delete scarify,
compact, and grade when proof-rolling
will suffice.

- F. Finish subgrade in condition acceptable to the COR at least one day in advance of paving operations. Maintain finished subgrade in a smooth and compacted condition until succeeding operation has been accomplished. Scarify, compact, and grade subgrade before further construction when approved compacted subgrade is disturbed by subsequent operations or adverse weather.
- G. Tolerances:
 1. Subgrade and Base Course Final Grades for Paved Areas: Plus or minus 6 mm (0.25 inches) of indicated grades.

3.5 LAWN AREAS

- A. General: Harrow and till new or existing lawn areas to remain, 100 mm (4 inches) deep. Establish existing or design grades by dragging or similar operations. Do not do earthwork on wet soil. Obtain plant bed approval from COR before seeding or sodding operation begins.

SPEC WRITER NOTES: Adjust minimum
thickness of topsoil per geotechnical
report recommendations, or the common
practice for the area, or the
recommendations of the State Department
of Transportation, whichever is greater.

- B. Finished Grading: Begin after rough grading has settled. Scarify subgrade surface areas 100 mm (4 inches) deep. Apply topsoil smooth, even surface, and true grades minimum 100 mm (4 inches). Shape top and bottom of banks to form reverse curves in section; make junctions with undisturbed areas to conform to existing topography.

- C. Fertilizing: Mix fertilizer into the soil 100 mm (4 inches) deep at a rate of 12 kg/100 m² (25 pounds per 1000 square feet).
- D. Seeding: Apply seed at a rate of 2 kg/100 sq.m (4 pounds per 1000 square feet). Rake seed lightly. Roll area not to exceed 225 kg/m (150 pounds per foot) of roller width.
- E. Sodding: Water topsoil lightly before laying sod. Tightly butt sod strips at the ends and stagger in a running bond fashion. Place sod strips running across slope from bottom to top. Secure sodded slopes by pegging or other approved methods. Roll sodded area not to exceed 225 kg/m (150 pounds per foot) of the roller width.
- F. Watering: Upon completion in any one section, water thoroughly new sod pad and soil to a sufficient depth. COR will be responsible for sod after installation and acceptance.

3.6 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL

- A. // Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of Cemetery property //.
- B. // Disposal: Transport surplus satisfactory soil to designated storage areas on Cemetery property. Stockpile or spread soil as directed by COR //.
- 1. // Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose off Cemetery property //.

3.7 CLEANING

- A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Clean site, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the Cemetery Property.

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