

**SECTION 31 20 00
EARTH MOVING**

SPEC WRITER NOTES: Use this section only
for NCA projects. Delete text between
// _____ // not applicable to project.
Edit remaining text to suit project.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Site preparation.
 2. Excavation.
 3. // Underpinning //.
 4. Filling and backfilling.
 5. Grading.
 6. Soil Disposal.
 7. Clean Up.

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. Finish Grading: Section 32 90 00, PLANTING.
- C. // Site preparation: Section 31 23 19, DEWATERING //.
- D. // Foundation system requirements: Section 31 23 23.33, FLOWABLE FILL //.

1.3 ROCK EXCAVATION MEASUREMENT AND PAYMENT

SPEC WRITER NOTES: This section only
applies when using Classified Excavation.

- A. Measurement: Cross section and measure uncovered and separated materials, and compute quantities by Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond following limits:
1. 600 mm (24 inches) from outside face concrete work when forms are required, except footings.

2. 300 mm (12 inches) from outside perimeter formed footings.
 3. 150 mm (6 inches) below bottom pipe and maximum pipe diameter plus 600 mm (24 inches) in width trenches width.
 4. Outside concrete work dimension when no forms are required (trenches, conduits, and similar items not requiring forms).
- B. // Payment: Do not show quantities of separate payment made for rock excavation. Adjust contract price and time overruns or underruns according to GENERAL CONDITIONS Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT as applicable //.
- C. // Payment for Differing Site Conditions: When rock excavation, as classified, is encountered, adjust contract price and time according to GENERAL CONDITIONS Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT 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 unstable material, including silts; and inorganic materials, including silts, too wet to be stable and any material with liquid limit and plasticity index exceeding 40 and 15 respectively. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent optimum moisture content without going over at time of compaction, as defined by ASTM // D 698 // D 1557 // AASHTO // T 99 // T 180.
 2. Existing Subgrade (Except Footing Subgrade): Same materials as 1.2.A.1, not capable of direct support of slabs, pavement, and similar items with possible exception of improvement by compaction, proof-rolling, or similar methods.
 3. Existing Subgrade (Footings Only): Same as paragraph 1, but no fill or backfill. When materials differ from // reference borings and // design requirements, excavate to acceptable strata subject to Contracting Officer's Representative's (COR) approval.
- B. Building Earthwork: Earthwork operations required in area enclosed by line located 1500 mm (5 feet) outside of principal building perimeter. Also includes earthwork required for auxiliary structures and buildings.
- C. Trench Earthwork: Trenchwork required for utility lines.

- D. Site Earthwork: Earthwork operations required in area outside of line located 1500 mm (5 feet) of principal building perimeter and within new construction area with exceptions noted above.
- E. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by laboratory test procedure. Percentage of maximum density is obtained through use of data provided from results of field test procedures presented in ASTM D1557.
- F. Fill: Satisfactory soil materials used to raise existing grades. In the Construction Documents, the term "fill" means fill or backfill.
- G. Backfill: Soil materials or controlled low strength material used to fill an excavation.
- H. Unauthorized Excavation: Removal of materials beyond indicated sub-grade elevations or indicated lines and dimensions without written authorization by the COR. No payment will be made for unauthorized excavation or remedial work required to correct unauthorized excavation.
- I. Authorized Additional Excavation: Removal of additional material authorized by the COR based on the determination by the Government's soils testing agency that unsuitable bearing materials are encountered at required sub-grade elevations. Removal of unsuitable material and its replacement will be paid on basis of Conditions of Contract relative to changes in work.
- J. Subgrade: The undisturbed earth or the compacted soil layer immediately below granular sub-base, drainage fill, or topsoil materials.
- K. Structure: Buildings, foundations, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- L. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- M. Drainage course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- N. Bedding course: Layer placed over excavated sub-grade in trench before laying pipe. Bedding course shall extend up to the spring line of the pipe.
- O. Sub-base Course: Layer placed between the sub-grade and base course for asphalt paving or layer placed between the sub-grade and a concrete pavement or walk.

- P. Utilities include on-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- Q. Debris: Debris includes all materials located within the designated work area not covered in the other definitions and shall include but not be limited to items like vehicles, equipment, appliances, building materials or remains thereof, tires, any solid or liquid chemicals, or products stored or found in containers or spilled on the ground.
- R. Contaminated soils: Soil that contains contaminants as defined and determined by the COR or the Government's testing agency.
- S. 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 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 except that material not defined as Rock.
- C. Rock Excavation:

SPEC WRITER NOTES: Requirements for track
mounted power excavators varies. Discuss
with soils consultant and modify as
necessary.

- 1. Trenches and Pits: Removal and disposal of solid, homogenous, interlocking crystalline material, firmly cemented, laminated, or foliated masses or conglomerate deposits, cannot be excavated with late-model, track-mounted hydraulic excavator; equipped with 1050 mm (42 inch) wide, short-tip-radius rock bucket; rated at minimum 103 kW (138 hp.) flywheel power with bucket-curling force of minimum 125 kN (28,090 lbf.) and stick-crowd force of minimum 84.5 kN (19,000 lbf.); measured according to SAE J-1179. Trenches in excess

of 3000 mm (10 feet) wide and pits in excess of 9000 mm (30 feet) in either length or width are classified as open excavation.

2. Open Excavation: Removal and disposal of solid, homogenous, interlocking crystalline material firmly cemented, laminated, or foliated masses or conglomerate deposits that cannot be dislodged and excavated with a late-model, track-mounted loader; rated at minimum 157 kW (210 hp.) flywheel power and developing a minimum of 216 kN (48,510 lbf.) breakout force; measured according to SAE J-732.
3. Other types of materials classified as rock are unstratified masses, conglomerated deposits and boulders of rock material exceeding 0.76 cubic meter (1 cubic yard) for open excavation, or 0.57 cubic meter (3/4 cubic yard) for footing and trench excavation that cannot be removed by rock excavating equipment equivalent to the above in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted.

SPEC WRITER NOTES: Requirements for
blasting, when allowed shall be listed
under a separate specification section.

4. Blasting: Removal and disposal of solid, homogenous, interlocking crystalline material firmly cemented, laminated, or foliated masses or conglomerate deposits that cannot be removed with conventional methods may // may not // be performed by blasting.
5. Definitions of rock and guidelines for equipment are presented for general information purposes only. Use the information presented in the Geotechnical Engineering Report to evaluate the extent and competency of the rock and to determine both quantity estimations and removal equipment and efforts.

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. T99-15 - Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop.

2. T180-15 - 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. D448-12 - Sizes of Aggregate for Road and Bridge Construction.
2. D698-12 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft. lbf/cu. ft. (600 kN m/cu. m.)).
3. D1556-07 - Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. D1557-12 - Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2700 kN m/cu. m.)).
5. D2167-15 - Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. D2487-12 - Soil for Engineering Purposes (Unified Soil Classification System).
7. D2922-12 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
8. D2940-15 - Graded Aggregate Material for Bases or Subbases for Highways or Airports.

E. Society of Automotive Engineers (SAE):

1. J732-12 - Specification Definitions - Loaders.
2. J1179-08 - Hydraulic Excavator and Backhoe Digging Forces.

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 elevation.
3. Blasting Plan: Determine blasting plan requirements. Obtain approval from all required local, state, and federal and forward to Architect/Engineer for review. Prepare and submit comprehensive blasting plan as follows:
 - a. Preblast survey.
 - b. Preblast meeting.
 - c. Test blast.
 - d. Typical controlled blasts showing perimeter control methods.
 - e. Changes in approved blasting plan, 21 days before planned blasting operations.

- C. Submit scale plan daily showing location, limits, and depths of excavated area.

SPEC WRITER NOTES: Use only when there is
a VA retained testing laboratory.

- D. Samples:

1. Soil samples.

- E. Test Reports: Certify // each product complies // products comply // with specifications.

1. Rock Excavation Report:

a. Excavation method.

b. Labor.

c. Equipment.

d. Land Surveyor's or Architect/Engineer's name and official registration stamp.

2. Subbase Materials: ASTM D 2940.

3. Soil Materials: For each on-site or borrow soil material proposed for fill, backfill, engineered fill, or structural fill:

a. Classification: ASTM D2487.

b. Laboratory Compaction Curve: ASTM // D 698 // D 1557 // AASHTO // T 99. // T 180 //.

- F. Certificates: Certify // each product complies // products comply // with specifications.

1. Rock quantities excavated.

- G. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer // with project experience list //.

2. Fabricator // with project experience list //.

3. Installer // with project experience list //.

- H. Delegated Design Drawings and Calculations: Signed and sealed by responsible design professional.

1. Show location and magnitude of loads applied to building structural frame.

2. Identify deviations from details shown on drawings.

1.8 QUALITY ASSURANCE

- A. // Manufacturer, Fabricator, Installer // Qualifications:

1. Regularly // manufactures // fabricates // installs // specified products.

2. // Manufactured // Fabricated // Installed // specified products with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //
- B. Installer Qualifications: // Product manufacturer. // Manufacturer authorized representative //.
 1. Regularly installs specified products.
 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //
- C. Welders and Welding Procedures Qualifications: // AWS D1.1/D1.1M. // AWS D1.2/D1.2M // AWS D1.3/D1.3M. //
- D. Delegated Design:
- E. Preconstruction Testing:
 1. Engage independent testing laboratory to perform tests and submit reports.
 - a. Deliver samples to laboratory in number and quantity required for testing.
 2. // Product //:
 - a. Test // property // according to // test standard //.
- F. Mockups:

1.9 FIELD CONDITIONS

- A. Existing Conditions: Document site features in the vicinity of structures with pre-excavation photographs and videotape, including surface finishes, cracks, or other structural blemishes that might misconstrued as damage caused by earthwork operations.

1.10 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS**2.1 SYSTEM PERFORMANCE**

- A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.
 - 1. Minor deviations to details shown on drawings to accommodate manufacturer's standard products may be accepted by COR when deviations do not affect design concept and specified performance.
- B. Design the following:
 - 1. Temporary support of excavation system.
 - 2. // Underpinning //.

2.2 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. General: Provide borrow soil material when sufficient satisfactory soil materials are not available from excavations.
- B. Fills: ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP, SM, SC, and ML, or any combination of these groups; free of rock or gravel larger than 75 mm (3 inches) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Dry Density: 1760 kg/cubic meter (110 pcf) minimum.
 - 2. Plasticity Index: 15 maximum.
 - 3. Liquid Limit: 40 maximum.
- C. Engineered Fill: Naturally or artificially graded mixture; ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP, SM, SC, and ML, or any combination of these groups, or approved by the Architect/Engineer, or material with at least 90 percent passing a 37.5-mm (1 1/2 inch) sieve and maximum 12 percent passing a 75- μ m (No. 200) sieve, per ASTM D2940.
- D. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; with 100 percent passing a 25 mm (1 inch) sieve and maximum 8 percent passing a 75- μ m (No. 200) sieve.
- E. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size

57; with 100 percent passing a 37.5 mm (1 1/2 inch) sieve and 0 to 5 percent passing a 2.36 mm (No. 8) sieve.

F. Granular Fill:

1. Under Concrete Slab: Crushed stone or gravel graded from 25 mm (1 inch) to 4.75 mm (No. 4), ASTM D2940.
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), ASTM D2940.

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 limits of earthwork operations as indicated on Drawings.
2. Remove trees, shrubs, fences, foundations, incidental structures, paving, debris, trash, and other obstructions.
3. // Remove materials from Cemetery Property //.

B. Grubbing:

1. Remove stumps and roots 75 mm (3 inch) and larger diameter.
2. Leave undisturbed sound stumps, roots up to 75 mm (3 inch) diameter, and nonperishable solid objects minimum 900 mm (3 feet) below subgrade or finished embankment.
3. Do not leave material within 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 (7.5 feet) of utility lines, when approved in advance by COR.
2. Remove materials from Cemetery Property.

3. Dig trees and shrubs with a ball of earth and burlap indicated to be relocated, according to "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 semiannually 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 existing trees and shrubs. Trim, clean, and paint damage existing trees and shrubs including 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 farthest extension of their limbs.

D. Stripping Topsoil:

1. Strip topsoil within limits of earthwork operations.
2. Stockpile and protect topsoil as directed by COR.
3. Eliminate foreign materials larger than 0.014 cubic meter (1/2 cubic foot) in volume, from soil when stockpiled. Retain topsoil on station.
4. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading.
5. Do not do topsoil work on wet soil.
6. Test soil for chemicals, pesticides and fertilizers when topsoil is removed from formerly utilized 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 300 mm (12 inches) both sides of widest part of trench excavation. Provide parallel final score lines, unless otherwise indicated on Drawings.
3. Remove material from Cemetery Property.

F. Lines and Grades: Establish by Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS.

1. Grades: Conform to elevations indicated on Drawings, within the tolerances herein specified.
 - a. Establish grades free from irregular surface changes.
 - b. Comply with compaction requirements and grade cross sections, lines, and elevations indicated on Drawings. Establish grade based on interpolation of elevations between spot grades when indicated on Drawings, while maintaining appropriate transition at structures and paving and uninterrupted drainage flow into inlets.
2. Locations of existing // and proposed // elevations indicated on Drawings //, except spot elevations, // are approximate. // from site survey that measured spot elevations and subsequently generated existing contours and spot elevations. // Proposed spot elevations and contour lines have been developed utilizing the existing conditions survey and developed contour lines and may be approximate. // Notify COR of any differences between existing elevations indicated on Drawings and those encountered on site by Architect/Engineer. Notify COR of any differences between existing or constructed grades, as compared to those indicated on the Drawings.
3. Subsequent to establishment of lines and grades, provide additional cut and fill required for site grading to conform to elevations indicated on Drawings.
4. Finish grading specified in Section 32 90 00, PLANTING.

G. Disposal:

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

3.2 EXCAVATION

A. Shoring, Sheet piling and Bracing: Shore, brace, or slope, its angle of repose banks of excavations or to an angle acceptable by the COR, to protect workmen, banks, adjacent paving, structures, and utilities.

1. Begin construction of excavation system support after review by COR.

2. Extend shoring and bracing minimum 1500 mm (5 feet) below bottom of excavation. Shore excavations carried below elevations of adjacent existing foundations.
3. When foundation bearing material is disturbed by excavation, improper shoring or removal of existing or temporary shoring, placing of backfill, and similar operations, // underpin existing foundation // install concrete fill support // comply with Section 31 23 23.33, FLOWABLE FILL, // under disturbed foundations, as directed by COR. Do not remove shoring until permanent work IS inspected and approved by COR.

SPEC WRITER NOTES:

1. Use Section 31 23 19, "DEWATERING" in lieu of "Excavation Drainage" below in the following conditions:
2. When extreme subsurface water condition is anticipated.
3. When potential subsurface water condition, in conjunction with the available disposal location for water from the dewatering operation, could result in sediment laden water being discharged from the site, use "DEWATERING" section including appropriate sedimentation removal facilities.

B. Excavation Drainage:

1. Operate pumping equipment // , and provide other materials, means and equipment // to keep excavation free from water and subgrade dry, firm, and undisturbed until permanent work is approved by COR.
2. // Obtain approval from COR before placement of permanent work on subgrades //.

C. Subgrade Protection:

1. Protect subgrades from softening, undermining, washout, or damage by rain or water accumulation.
2. Reroute surface water runoff from excavated areas a. Do not use excavated trenches as temporary drainage ditches.
3. Remove disturbed material to firm undisturbed material after water is brought under control, when subgrade for foundations is disturbed by water.
4. Replace disturbed subgrade in trenches with concrete or material approved by COR.

SPEC WRITER NOTES: Modify the following paragraph as required for specific project.

- D. Blasting: Blasting of materials classified as rock is permitted only when authorized by COR. Comply with all federal, state, and local requirements.
- E. Perform blasting with explosives of quantity and power, fired in sequence and locations not to injure personnel, damage or crack adjacent structure, property, or existing work or other portions of new work. // Blasting is not acceptable //.
- F. Proofrolling:
1. Proofroll exposed subgrade with fully loaded dump truck to check for pockets of soft material.
 2. Proofroll subgrade at least two complete passes, one pass in a direction perpendicular to first one. Remove areas that deflect, rut, or pump excessively during proof rolling, or fail to consolidate after successive passes to suitable soils. Replace with compacted fill. Maintain subgrade until succeeding operation has been accomplished.
- G. Building Earthwork:
1. Excavate foundation excavations to solid undisturbed subgrade.
 2. Remove loose or soft materials to a 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.
 5. Slope grades to direct water away from excavations and to prevent ponding.
- H. 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 mechanical support is indicated on Drawings.
 - d. Length of open trench in advance of piping laying not be greater than authorized by 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) maximum diameter.
 - b) Pipe Larger than 300 mm (12 inches): Four-thirds pipe diameter 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 required 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 pipe to 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 bed where rock or rocky materials are excavated.

SPEC WRITER NOTES:

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

I. Site Earthwork:

1. General: Earth excavation includes pavement excavation and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; including soil, boulders, and other materials not classified as rock or unauthorized excavation. Perform excavation as indicated on Drawings and as follows:
 - a. Excavate to elevations and dimensions indicated on Drawings within a tolerance of plus or minus 25 mm (1 inch).
 - b. Extend excavations of sufficient distance from structures for placing and removing concrete formwork, installing services and

other construction, and inspections. Comply with OSHA requirements.

- c. Remove and replace unsuitable subgrade materials as determined by COR.
 - d. // Obtain material samples for soil classification, under the direction of the COR, for testing by an independent testing laboratory to determine suitability //.
 - e. // VA Testing Laboratory will perform soil testing //.
 - f. When unsuitable material is encountered and removed, contract price and time will be adjusted according to Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL REQUIREMENTS as applicable. Adjustments will be based on volume in cut section only.
2. Site Grading:
- a. Provide a smooth transition between adjacent existing grades and new grades.
 - b. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
 - c. Slope grades to direct water away from buildings and to prevent ponds from forming, where not designed. Finish subgrades to required elevations within the following tolerances:

SPEC WRITER NOTES:

- 1. Revise subparagraphs below to suit project conditions.
- 2. Tolerances should be adjusted based on the location of the surface improvements to insure thickness of finish treatments are maintained and finish grades meet adjoining surfaces and provide drainage as indicated. Some tolerances may have to be adjusted to indicate zero plus tolerance rather than plus or minus.

- 1) Lawn or Unpaved Areas: Plus or minus 25 mm (1 inch).
 - 2) Walks: Plus or minus 25 mm (1 inch).
 - 3) Pavements: Plus or minus 13 mm (1/2 inch).
- d. Grading Inside Building Lines: Finish subgrade to a tolerance of 13 mm (1/2 inch) when tested with 3000 mm (10 foot) straightedge.

SPEC WRITER NOTES: Verify the need for underpinning with Structural Engineer in existing construction.

3.3 // UNDERPINNING //

- A. Install underpinning of as indicated on Structural Drawings or where excavation undermines existing foundations. Install as follows:
1. Make general excavation for new construction, where new foundations are below existing, and to elevation of new foundations (or sized stone subbase), maintaining a 45 degree sloped berm.
 2. Underpinning Pits: Excavate 1200 mm (4 feet) wide pits to depth indicated on Drawings, skipping three sections at any one time, to maintain wall support.
 3. Underpin intervening sections one at a time; do not underpin adjacent section until concrete have reached 20 MPa (2500 psi) strength and have been dry packed with non-shrink grout to obtain positive bearing. Sheet and brace underpinning pits when soil will not stand on a vertical cut during this operation, or required for safety of workmen. Repack voids behind sheeting to prevent sloughing that will cause settlement of existing foundations. Guard against objectionable movement or settlement and preserve integrity of existing structures.
 4. Tip elevation of underpinning pits, minimum 900 mm (3 feet) below adjacent excavation elevation.
 5. Subgrades at tip of underpinning pit shall be clean, dry, and free of debris and observed by the COR before concrete placement.
 6. Concrete free fall maximum 3000 mm (10 feet) into the pit.

3.4 FILLING AND BACKFILLING

- A. General: Fill or backfill when all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation. Use excavated and borrow for fill and backfill, as applicable. Supply borrow materials. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, foundation drainage, and pipes in contact with backfill have been installed, and work inspected and approved by COR.

SPEC WRITER NOTES: Revise depth of layers
in paragraph below to suit Project.

- B. Placing: Place materials in horizontal layers maximum 200 mm (8 inches) in loose depth for material compacted by heavy compaction equipment, and maximum 100 mm (4 inches) in loose depth for material compacted by hand-operated tampers and then compacted. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along full length each structure. Do not place material on muddy, frozen, or with frost surfaces.
- C. Compaction: Compact with approved tamping rollers, sheepsfoot rollers, pneumatic tired rollers, steel wheeled rollers, vibrator compactors, or other equipment (hand or mechanized) well to suit soil compacted. Do not operate mechanized vibratory compaction equipment within 3000 mm (10 feet) of new or existing building walls without prior approval of COR. Moisten or aerate material as necessary to provide moisture content that will readily facilitate obtaining specified compaction with equipment used. Compact soil to minimum the following percentages of maximum dry density, according to ASTM D698 or ASTM D1557 as specified below:
1. Fills, Embankments, and Backfill.
 - a. Under Proposed Structures, Building Slabs, Steps, and Paved Areas: Scarify and recompact top 300 mm (12 inches) of existing subgrade and each layer of backfill or fill material according to // AASHTO // T99 // T180 // Method A // T 191 // T 310 // // ASTM D698 // D1557 // Method A // D 1556 // D 2167 // 95 percent.
 - b. Curbs, Curbs and Gutters: // AASHTO // T99 // T180 // Method A // T 191 // T 310 // // ASTM D698 // D1557 // Method A // D 1556 // D 2167 // // 95 percent //.
 - c. Under Sidewalks: Scarify and recompact top 150 mm (6 inches) below subgrade and compact each layer of backfill or fill material according to // AASHTO // T99 // T180 // Method A // T 191 // T 310 // // ASTM D698 // D1557 // Method A // D 1556 // D 2167 // // 95 percent.
 - d. Landscaped Areas Top 400 mm (16 inches): // AASHTO // T99 // T180 // Method A // T 191 // T 310 // // ASTM D698 // D1557 // Method A // D 1556 // D 2167 // D 2922 // 85 percent.

e. Landscaped Areas Below 400 mm (16 inches) of Finished Grade:
 // AASHTO // T99 // T180 // Method A // T 191 // T 310 // //
 ASTM D698 // D1557 // Method A // D 1556 // D 2167 // D 2922 //
 90 percent.

2. Natural Ground (Cut or Existing):

- a. Under Building Slabs, Steps and Paved Areas, Top 150 mm
 (6 inches): // AASHTO // T99 // T180 // Method A // T 191 // T
 310 // // ASTM D698 // D1557 // Method A // D 1556 // D 2167 //
 D 2922 // 95 percent.
- b. Curbs, Curbs and Gutters, Top 150 mm (6 inches): // AASHTO //
 T99 // T180 // Method A // T 191 // T 310 // // ASTM D698 //
 D1557 // Method A // D 1556 // D 2167 // D 2922 // 95 percent.
- c. Under Sidewalks, Top 150 mm (6 inches): // AASHTO // T99 // T180
 // Method A // T 191 // T 310 // // ASTM D698 // D1557 // Method
 A // D 1556 // D 2167 // D 2922 // 95 percent.

3.5 GRADING

- A. General: Uniformly grade areas within limits specified below, including adjacent transition areas. Smooth the 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 pipe spaces or other unfinished areas, fill low spots and level off with coarse sand or fine gravel.
- C. Slope backfill outside building away from building walls with minimum distance of 1800 mm (6 feet).
- D. Finish grade earth floors in pipe basements as indicated on Drawings, to level, uniform slope and leave clean.
- E. Finished grade minimum 150 mm (6 inches) below bottom line of window or other building wall openings unless greater depth is indicated on Drawings.
- F. Place crushed stone or gravel fill under concrete slabs on grade, tamped and leveled, 150 mm (6 inches) thick, unless otherwise indicated on Drawings.
- G. Finish subgrade in condition acceptable to COR at least one day in advance of paving operations. Maintain finished subgrade in 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.

H. Tolerances:

1. Subgrade and Base Course Final Grade for Paved Areas: Plus or minus 6 mm (0.25 inches) of indicated grades.

SPEC WRITER NOTES: Modify the following paragraphs based on site conditions, known history of site utilization and geotechnical investigation, and soil borings.

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 off 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 of 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 all debris, rubbish, and excess material from Cemetery Property.

- - - E N D - - -