SECTION 31 20 00 – earth moving

1. General
   1. SUMMARY
      1. Section Includes:
         1. Excavating and filling for rough grading the Site.
         2. Preparing subgrades for [slabs-on-grade] [walks] [pavements] [turf and grasses] [and] [plants].
         3. Excavating and backfilling for buildings and structures.
         4. Drainage course for concrete slabs-on-grade.
         5. Subbase course for concrete [walks] [pavements].
         6. Subbase course [ and base course] for asphalt paving.
         7. Subsurface drainage backfills for walls and trenches.
         8. Excavating and backfilling trenches for utilities and pits for buried utility structures.
      2. Related Requirements:
         1. Section 07 13 26 – Self-Adhering Sheet Waterproofing.
         2. Section 07 16 16 – Crystalline Waterproofing.
         3. Section 07 21 00 – Thermal Insulation.
         4. Section 31 10 00 – Site Clearing, for site stripping, grubbing, stripping [ and stockpiling] topsoil, and removal of above- and below-grade improvements and utilities.
         5. Section 31 50 00 – Excavation Support and Protection, for shoring, bracing, and sheet piling of excavations.
   2. UNIT PRICES

Retain this article if unit prices are required for rock excavation or if authorized additional excavation is anticipated.

* + 1. Work of this Section is affected by unit prices for earth moving specified in Section 01 22 00 – Unit Prices.
    2. Quantity allowances for earth moving are included in Section 01 21 00 – Allowances.

Retain "Rock Measurement" Paragraph below for classified excavation. Measurements are examples only; revise dimensions to suit Project conditions and office standards. Consider separate unit prices for open rock excavation and trench rock excavation.

* + 1. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
       1. [24 inches (600 mm)] <Insert dimension> outside of concrete forms other than at footings.
       2. [12 inches (300 mm)] <Insert dimension> outside of concrete forms at footings.
       3. [6 inches (150 mm)] <Insert dimension> outside of minimum required dimensions of concrete cast against grade.
       4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
       5. [6 inches (150 mm)] <Insert dimension> beneath bottom of concrete slabs-on-grade.
       6. [6 inches (150 mm)] <Insert dimension> beneath pipe in trenches, and the greater of [24 inches (600 mm)] <Insert dimension> wider than pipe or [42 inches (1065 mm)] <Insert dimension> wide.
  1. DEFINITIONS

Retain definitions remaining after this Section has been edited. Revise to suit office or local earth-moving practices.

* + 1. Backfill: Soil material or controlled low-strength 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.
    2. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
    3. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
    4. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

Consider revising "Drainage Course" Paragraph below and throughout this Section to suit Project or office standard. See Evaluations.

* + 1. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
    2. 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 Consultant. Authorized additional excavation and replacement material will be paid for according to Contract provisions for [unit prices] [changes in the Work].
       2. Bulk Excavation: Excavation more than [10 feet (3 m)] <Insert dimension> in width and more than [30 feet (9 m)] <Insert dimension> in length.
       3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Consultant. Unauthorized excavation, as well as remedial work directed by Consultant, shall be without additional compensation.
    3. Fill: Soil materials used to raise existing grades.

Retain one of two "Rock" paragraphs below for classified excavation. See Evaluations.

Retain first "Rock" Paragraph below if performance of Contractor's equipment is used to define the term "rock."

* + 1. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed [1 cu. yd. (0.76 cu. m)] <Insert volume> for bulk excavation or [3/4 cu. yd. (0.57 cu. m)] <Insert volume> for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

Retain "Equipment for Footing, Trench, and Pit Excavation" Subparagraph below for confined excavation. Revise size and performance ratings of equipment to suit Project; ratings are based on Caterpillar's Model No. 320CL or Model No. 320DL.

* + - 1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom.

Retain "Equipment for Bulk Excavation" Subparagraph below for mass or bulk excavation. Revise size and performance ratings of equipment to suit Project; ratings are based on Caterpillar's Model No. 973C.

* + - 1. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket.

Retain "Rock" Paragraph below if standard penetration values are used to define the term "rock." Revise number of blows or penetration resistance to suit office practice. No correlation is intended between equipment- and geotechnical-based definitions of "rock"; both are arbitrary values chosen to standardize criteria for defining "rock."

* + 1. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material [3/4 cu. yd. (0.57 cu. m)] <Insert volume> or more in volume that exceed a standard penetration resistance of [100 blows/2 inches (97 blows/50 mm)] <Insert value> when tested by a geotechnical testing agency, according to ASTM D1586.
    2. 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.
    3. 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.
    4. 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.
    5. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
  1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a pre-excavation conference.

* + 1. Preinstallation Conference: Conduct pre-excavation conference at Project site.

Retain subparagraph below if additional requirements are necessary; include information about conference.

* + - 1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
         1. Personnel and equipment needed to make progress and avoid delays.
         2. Coordination of Work with utility locator service.
         3. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
         4. Extent of trenching by hand or with air spade.
         5. Field quality control.

If needed, insert list of conference participants not mentioned in Section 013100 "Project Management and Coordination."

* 1. ACTION submittals
     1. Product Data: For each type of the following manufactured products required:
        1. Geotextiles.
        2. Controlled low-strength material, including design mixture.
        3. Geofoam.
        4. Warning tapes.
     2. Samples for Verification: For the following products, in sizes indicated below:
        1. Geotextile: 12 by 12 inches (300 by 300 mm).
        2. Warning Tape: 12 inches (300 mm) long; of each color.
  2. INFORMATIONAL SUBMITTALS

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 01 40 00 – Quality Requirements and as supplemented in "Quality Assurance" Article.

* + 1. Qualification Data: For qualified testing agency.

Retain "Material Test Reports" Paragraph below for material test reports that are Contractor's responsibility.

* + 1. Material Test Reports: For each [on-site] [and] [borrow] soil material proposed for fill and backfill as follows:

Retain both subparagraphs below for borrow soil material. Delete if using only on-site soil material and geotechnical report is sufficient.

* + - 1. Classification according to ASTM D2487.
      2. Laboratory compaction curve according to [ASTM D698] [ASTM D1557].

Retain one or both of first two paragraphs below if explosives are permitted. Retain second paragraph only if seismic survey is required with blasting.

* + 1. Blasting plan [ approved by authorities having jurisdiction].
    2. Seismic survey report from seismic survey agency.
    3. Pre-excavation 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. QUALITY ASSURANCE

Retain "Blasting" Paragraph below if explosives are permitted.

* + 1. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:
       1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
       2. Seismographic monitoring during blasting operations.

Retain "Seismic Survey Agency" Paragraph below if rock is anticipated, explosives are permitted, and independent oversight is required. Revise reporting requirements to suit Project.

* + 1. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
       1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
       2. Seismographic monitoring during blasting operations.

Retain "Geotechnical Testing Agency Qualifications" Paragraph below if Contractor selects agency for rock-definition testing. Qualification requirements are in addition to those specified in Section 01 40 00 – Quality Requirements.

* + 1. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.
  1. FIELD CONDITIONS
     1. 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.

Retain "Improvements on Adjoining Property" Paragraph below to suit Project, coordinate with Owner.

* + 1. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
       1. Do not proceed with work on adjoining property until directed by Consultant.

Retain "Utility Locator Service" Paragraph below if required and not specified in Section 31 10 00 – Site Clearing; revise to suit Project. First option is a generic term that is known in various states by different names listed in the other options. See Evaluations.

* + 1. Underground Services:
       1. Notify public utilities or municipal authorities in advance of planned excavations adjacent to their services. Take care not to damage or displace encountered known and unknown services. When such services are encountered, immediately notify Consultant, and protect, brace, and support active services. Where repairs become necessary, use the following procedure:
       2. Known Services:
          1. Repair at no expense to Owner.
       3. Unknown Services:
          1. Forward complete breakdown of estimated cost of such work. Proceed immediately with repairs upon receipt of written approval of cost of such repair work.
       4. In the case of damage to an essential service, notify Consultant immediately and repair service under Consultant's direction. Inform Consultant of services encountered which require adjustment, relocation or abandonment and arrange for disconnection and capping of pipe.
    2. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in [Section 015000 "Temporary Facilities and Controls"] [and] [Section 311000 "Site Clearing"] are in place.
    3. Levels:
       1. Existing grade levels shown on drawings are furnished in good faith for the guidance of the Contractor. Check and verify levels at site.
       2. Should the actual grade levels of the site be other than shown, no claims will be entertained unless notification is made in writing to the Consultant.
       3. Do not proceed with the work until Consultant's approval is received. Allow Consultant sufficient time to inspect such claim.

Retain first paragraph below if protection zones and protection-zone fencing are required.

* + 1. Do not commence earth-moving operations until plant-protection measures specified in Section 01 56 39 – Temporary Tree and Plant Protection are in place.

Retain three paragraphs below if tree- or plant-protection zones are required.

* + 1. The following practices are prohibited within protection zones:

Revise subparagraphs below to suit Project.

* + - 1. Storage of construction materials, debris, or excavated material.
      2. Parking vehicles or equipment.
      3. Foot traffic.
      4. Erection of sheds or structures.
      5. Impoundment of water.
      6. Excavation or other digging unless otherwise indicated.
      7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
    1. Do not direct vehicle or equipment exhaust towards protection zones.
    2. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
  1. STORAGE, DELIVERY, HANDLING AND PROTECTION
     1. Stockpile materials in designated areas. Stockpile topsoil and each type of fill material separately to prevent integration. Stockpile granular materials so as to prevent segregation.
     2. Keep surrounding roads free of soil deposits from material hauling trucks. Load trucks carefully to prevent spillage and wind drift.
     3. To protect neighbourhood from wind-blown sand and dust, sprinkle with water entire excavated area and stockpiled excavated materials when required.
     4. Protect adjacent property from damage which may occur from any cause in the performance of the work of this Section.
     5. Do not interfere with use of adjacent buildings.
     6. Take precautions against movement, settlement or collapse of sidewalks, public services adjoining property and be liable for all damage to same.
     7. Before commencing work verify location of survey monuments in the areas in which the work is to be executed. Should any of the monuments be disturbed due to the work be responsible for the expenditures incurred in restoring the monuments.
     8. Take precautions against movement or settlement of existing building. Provide and place bracing and shoring necessary for the safety and support of the structure and execute the work in a manner to prevent movement, settlement, damage or injury caused thereby or resulting therefrom.
     9. Shoring and Trench Timbering:
        1. In addition to requirements of local authorities, carry out in accordance with requirements of the Occupational Health and Safety Act, RSO 1990 C.0.1 and regulations for construction projects, and all other applicable regulations of the Ontario Ministry of Labour. In addition, follow recommendations of the Construction Safety Association brochure, "Shoring and Timbering in Trenches, latest edition", wherever applicable.
     10. Shoring and Bracing:
         1. Erect and maintain necessary shoring and bracing for excavations in a manner that will properly retain banks of excavations and prevent cave-in. Shoring to be erected in a manner that will allow all other work to be carried out while shoring is still in place. Shoring installation shall be entirely clear of footings, foundations, walls, or other such work so that it may be removed entirely or in sections when it is no longer required or when directed without causing any damage or injury to structural work that has been completed.

1. Products
   1. soil materials
      1. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
      2. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; 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.
      3. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; 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.
      4. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; 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.
      5. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; 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.
      6. Drainage Course: Narrowly graded mixture of [washed ]crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and zero to 5 percent passing a No. 8 (2.36-mm) sieve.
      7. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and zero to 5 percent passing a No. 4 (4.75-mm) sieve.
      8. Sand: ASTM C33/C33M; fine aggregate.
      9. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
   2. geotextiles

Retain "Subsurface Drainage Geotextile" Paragraph below if nonwoven geotextile is used in subsurface drainage applications. Delete paragraph if only factory-fabricated drainage panels are used and specified in waterproofing Sections.

Performance requirements in AASHTO M 288 have been widely adopted by geotextile manufacturers and are repeated below. The geotechnical report may also include geotextile recommendations. See Evaluations for list of geotextile manufacturers.

* + 1. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

Retain one of two "Survivability" subparagraphs below. Survivability rates a geotextile's ability to withstand installation stresses and is measured by grab, seam, tear, and puncture strength.

Retain first "Survivability" Subparagraph if AASHTO M 288 survivability classification is required. Survivability is divided into three classes by AASHTO M 288. Class 2 is the default class recommended by AASHTO M 288 for subsurface drainage applications. Revise to Class 1 if higher strength is required or Class 3 if lower strength is permitted.

* + - 1. Survivability: Class 2; AASHTO M 288.

Strength values in "Survivability" Subparagraph below correspond to AASHTO M 288 Survivability Class 2 for subsurface drainage applications. Revise if other strength values are required.

* + - 1. Survivability: As follows:
         1. Grab Tensile Strength: 157 lbf (700 N); ASTM D4632.
         2. Sewn Seam Strength: 142 lbf (630 N); ASTM D4632.
         3. Tear Strength: 56 lbf (250 N); ASTM D4533.
         4. Puncture Strength: 56 lbf (250 N); ASTM D4833.

AASHTO M 288 bases selection of apparent opening size for subsurface drainage geotextiles on percentages of backfill soils passing a No. 200 (0.075-mm) sieve. First option in "Apparent Opening Size" Subparagraph below corresponds to less than 15 percent; second, to 15 to 50 percent; and third, to greater than 50 percent for Class 2 geotextiles.

* + - 1. Apparent Opening Size: [No. 40 (0.425-mm)] [No. 60 (0.250-mm)] [No. 70 (0.212-mm)] sieve, maximum; ASTM D4751.

AASHTO M 288 bases selection of permittivity for subsurface drainage geotextiles on percentages of backfill soils passing a No. 200 (0.075-mm) sieve. First option in "Permittivity" Subparagraph below corresponds to less than 15 percent; second, to 15 to 50 percent; and third, to greater than 50 percent for Class 2 geotextiles.

* + - 1. Permittivity: [0.5] [0.2] [0.1] per second, minimum; ASTM D4491.

Requirement in "UV Stability" Subparagraph below corresponds to default value in AASHTO M 288 for Class 2 subsurface drainage geotextiles.

* + - 1. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

Retain "Separation Geotextile" Paragraph below if a separation geotextile is required. A typical use is to separate subgrade from granular soil materials, such as subbase course, base course, or engineered fill. The geotechnical report may also include geotextile recommendations. See Evaluations for list of geotextile manufacturers.

* + 1. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

Retain one of two "Survivability" subparagraphs below. Survivability rates a geotextile's ability to withstand installation stresses and is measured by grab, seam, tear, and puncture strength.

Retain first "Survivability" if AASHTO M 288 survivability classification is required. Survivability is divided into three classes by AASHTO M 288. Class 2 is the default class recommended by AASHTO M 288 for separation geotextile applications.

* + - 1. Survivability: Class 2; AASHTO M 288.

Strength values in "Survivability" Subparagraph below correspond to AASHTO M 288 Survivability Class 2 for separation geotextile applications. Revise if other strength values are required.

* + - 1. Survivability: As follows:
         1. Grab Tensile Strength: 247 lbf (1100 N); ASTM D4632.
         2. Sewn Seam Strength: 222 lbf (990 N); ASTM D4632.
         3. Tear Strength: 90 lbf (400 N); ASTM D4533.
         4. Puncture Strength: 90 lbf (400 N); ASTM D4833.

Requirements in "Apparent Opening Size," "Permittivity," and "UV Stability" subparagraphs below correspond to default values in AASHTO M 288 for Class 2 separation geotextiles.

* + - 1. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D4751.
      2. Permittivity: 0.02 per second, minimum; ASTM D4491.
      3. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.
  1. ACCESSORIES

Retain one or both of "Warning Tape" and "Detectable Warning Tape" paragraphs in this article to suit Project. Use of warning tapes may be mandatory for underground hazardous utilities.

* + 1. 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; colored as follows:

Revise colors below to comply with local practice or requirements of authorities having jurisdiction.

* + - 1. Red: Electric.
      2. Yellow: Gas, oil, steam, and dangerous materials.
      3. Orange: Telephone and other communications.
      4. Blue: Water systems.
      5. Green: Sewer systems.
    1. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

Revise colors below to comply with local practice or requirements of authorities having jurisdiction.

* + - 1. Red: Electric.
      2. Yellow: Gas, oil, steam, and dangerous materials.
      3. Orange: Telephone and other communications.
      4. Blue: Water systems.
      5. Green: Sewer systems.

1. Execution
   1. preparation
      1. 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.
      2. Protect and maintain erosion and sedimentation controls during earth-moving operations.
      3. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
   2. DEWATERING
      1. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
      2. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
      3. 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.
      4. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.
   3. EXPLOSIVES

Retain one of two "Explosives" paragraphs below. Retain second paragraph if explosives are permitted.

* + 1. Explosives: Do not use explosives.
    2. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.
       1. Perform blasting without damaging adjacent structures, property, or site improvements.
       2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.
  1. EXCAVATION, GENERAL

Retain "Unclassified Excavation" or "Classified Excavation" Paragraph below. Retain first paragraph if excavation is unclassified and no changes in the Contract Sum or the Contract Time will be authorized for rock excavation. Retain second paragraph if excavation is classified and adjustments in the Contract Sum and, if applicable, the Contract Time will be authorized for rock excavation. See Evaluations.

* + 1. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified 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 lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

Measurements in subparagraphs below are examples only; revise to suit Project conditions and office standards.

* + - * 1. [24 inches (600 mm)] <Insert dimension> outside of concrete forms other than at footings.
        2. [12 inches (300 mm)] <Insert dimension> outside of concrete forms at footings.
        3. [6 inches (150 mm)] <Insert dimension> outside of minimum required dimensions of concrete cast against grade.
        4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
        5. [6 inches (150 mm)] <Insert dimension> beneath bottom of concrete slabs-on-grade.
        6. [6 inches (150 mm)] <Insert dimension> beneath pipe in trenches and the greater of [24 inches (600 mm)] <Insert dimension> wider than pipe or [42 inches (1065 mm)] <Insert dimension> wide.
    1. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Consultant. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

Revise description in first subparagraph below if removal of surface features and underground utility structures is specified in Section 02 41 16 – Structure Demolition or Section 31 10 00 – Site Clearing.

* + - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
         1. Intermittent drilling: blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
      2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

Measurements in subparagraphs below are examples only; revise to suit Project conditions and office standards and coordinate with rock measurement for unit prices, if any.

* + - * 1. [24 inches (600 mm)] <Insert dimension> outside of concrete forms other than at footings.
        2. [12 inches (300 mm)] <Insert dimension> outside of concrete forms at footings.
        3. [6 inches (150 mm)] <Insert dimension> outside of minimum required dimensions of concrete cast against grade.
        4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
        5. [6 inches (150 mm)] <Insert dimension> beneath bottom of concrete slabs-on-grade.
        6. [6 inches (150 mm)] <Insert dimension> beneath pipe in trenches and the greater of [24 inches (600 mm)] <Insert dimension> wider than pipe or [42 inches (1065 mm)] <Insert dimension> wide.
  1. excavation for structures

Revise tolerances in this article to suit office practice if applicable.

* + 1. 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.

Revise "Excavations for Footings and Foundations" Subparagraph below if footings and foundations are placed on engineered fill.

* + - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

Retain "Pile Foundations" Subparagraph below if required.

* + - 1. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
      2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

Retain "Excavations at Edges of Tree- and Plant-Protection Zones" Paragraph below if required.

* + 1. Excavations at Edges of Tree- and Plant-Protection Zones:
       1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
       2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."
  1. EXCAVATION FOR WALKS AND PAVEMENTS
     1. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
  2. EXCAVATION FOR UTILITY TRENCHES

Coordinate this article with utility Sections in other Divisions.

* + 1. Excavate trenches to indicated gradients, lines, depths, and elevations.
       1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
    2. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

Revise "Clearance" Subparagraph below to suit Project.

* + - 1. Clearance: 12 inches (300 mm) each side of pipe or conduit, unless otherwise indicated on the Engineers Drawings.

Retain one of two "Trench Bottoms" paragraphs below. Retain first paragraph if a bedding course is not required under pipe and conduit; retain second paragraph if a bedding course is required. Revise to suit Project conditions, requirements of authorities having jurisdiction, type of pipe or conduit, and manufacturer's installation requirements.

* + 1. Trench Bottoms: Excavate and shape trench bottoms to 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.
       1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
       2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
       3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
       4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
    2. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
       1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

Retain "Trenches in Tree- and Plant-Protection Zones" Paragraph below if required.

* + 1. Trenches in Tree- and Plant-Protection Zones:
       1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
       2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
       3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."
  1. SUBGRADE INSPECTION
     1. Notify Consultant when excavations have reached required subgrade.
     2. If Consultant determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

Revise locations for proof-rolling in first paragraph below if required; revise type of vehicle and minimum weight to suit Project. Proof-rolling can be used for wide areas, not trenches.

* + 1. Proof-roll subgrade [below the building slabs and pavements] <Insert locations> with a pneumatic-tired [and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes)] <Insert requirement> to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
       1. Completely proof-roll subgrade in one direction[, repeating proof-rolling in direction perpendicular to first direction]. Limit vehicle speed to 3 mph (5 km/h).
       2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Consultant, and replace with compacted backfill or fill as directed.
    2. Authorized additional excavation and replacement material will be paid for according to Contract provisions for [unit prices] [changes in the Work].
    3. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Consultant, without additional compensation.
  1. UNAUTHORIZED EXCAVATION

Revise this article to suit Project.

* + 1. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Consultant.
       1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Consultant.
  1. storage of soil materials
     1. Stockpiles borrow soil materials and excavate 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. Do not store within drip line of remaining trees.
  2. BACKFILL
     1. Place and compact backfill in excavations promptly, but not before completing the following:

Revise subparagraphs below to suit Project.

* + - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
      2. Surveying locations of underground utilities for Record Documents.
      3. Testing and inspecting underground utilities.
      4. Removing concrete formwork.
      5. Removing trash and debris.
      6. Removing temporary shoring, bracing, and sheeting.
      7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
    1. Places backfill on subgrades free of mud, frost, snow, or ice.
  1. UTILITY TRENCH BACKFILL
     1. Places backfill on subgrades free of mud, frost, snow, or ice.
     2. 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.

Revise dimensions or extent of concrete backfill in "Trenches under Footings" and "Trenches under Roadways" paragraphs below to suit Project.

* + 1. Trenches under Footings: Backfill trenches excavated under footings and within [18 inches (450 mm)] <Insert dimension> of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
    2. Trenches under Roadways: Provide [4-inch- (100-mm-)] <Insert dimension> thick, concrete-base slab support for piping or conduit less than [30 inches (750 mm)] <Insert dimension> below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of [4 inches (100 mm)] <Insert dimension> of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 03 30 00 – Cast-In-Place Concrete.
    3. Backfill voids with satisfactory soil while removing shoring and bracing.
    4. Initial Backfill:

Retain "Soil Backfill" or "Controlled Low-Strength Material" Subparagraph below. Retain first subparagraph if specifying soil material as initial backfill; retain second subparagraph if controlled low-strength material is permitted or required as initial backfill.

* + - 1. Soil Backfill: Place and compact initial backfill of [subbase material] [satisfactory soil], free of particles larger than [1 inch (25 mm)] <Insert dimension> in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
         1. Carefully compact initial backfills under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
      2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.
    1. Final Backfill:

Retain "Soil Backfill" Subparagraph below if satisfactory soil material is required as final backfill.

* + - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

Retain "Controlled Low-Strength Material" Subparagraph below if controlled low-strength material is permitted or required as final backfill.

* + - 1. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

Revise tape depths in "Warning Tape" Paragraph below to suit office practice if applicable.

* + 1. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.
  1. SOIL FILL
     1. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontals so fill material will bond with existing material.
     2. Place and compact fill material in layers to required elevations as follows:

Revise soil materials in subparagraphs below to suit Project. Other soil materials, such as a drainage course or subbase or base courses, may still be required over fill.

* + - 1. Under grass and planted areas, use satisfactory soil material.
      2. Under walks and pavements, use satisfactory soil material.
      3. Under steps and ramps, use engineered fill.
      4. Under building slabs, use engineered fill.

Retain subparagraph below if backfill or fill beneath footings and foundations is required. Coordinate material selection with geotechnical engineer's written recommendations.

* + - 1. Under footings and foundations, use engineered fill.
    1. Place soil fill on subgrades free of mud, frost, snow, or ice.
  1. SOIL MOISTURE CONTROL

Revise percentages in this article according to geotechnical engineer's written recommendations.

* + 1. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
       1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

In subparagraph below, replace the term "unit weight" with "density" if preferred.

* + 1. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
  1. COMPACTION OF SOIL BACKFILLS AND FILLS

Revise depth of layers in first paragraph below to suit Project.

* + 1. Places 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.
    2. Places backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

Retain one option in paragraph below based on ASTM laboratory-test method required. Replace the term "unit weight" with "density" if preferred.

* + 1. Compact soil materials to not less than the following percentages of maximum dry unit weight according to [ASTM D698] [ASTM D1557]:

Retain applicable subparagraphs below. Percentages of maximum dry unit weight are examples only; revise to suit Project. Delete scarifying and recompacting existing subgrade when proof-rolling will suffice.

* + - 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.
  1. GRADING
     1. 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.
        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.
     2. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

Revise "Turf or Unpaved Areas," "Walks," and "Pavements" subparagraphs below to suit Project.

* + - 1. Turf or Unpaved Areas: Plus, or minus [1 inch (25 mm)] <Insert dimension>.
      2. Walks: Plus, or minus [1 inch (25 mm)] <Insert dimension>.
      3. Pavements: Plus, or minus [1/2 inch (13 mm)] <Insert dimension>.
    1. Grading inside Building Lines: Finish subgrade to a tolerance of [1/2 inch (13 mm)] <Insert dimension> when tested with a 10-foot (3-m) straightedge.
  1. SUBSURFACE DRAINAGE

Retain "Subdrainage Pipe," "Subsurface Drain," and "Drainage Backfill" paragraphs below to suit Project; revise to coordinate with Drawings.

Retain "Subsurface Drain" Paragraph below if nonwoven geotextile is used in subsurface drainage applications. Delete if only factory-fabricated drainage panels are used and specified in waterproofing Sections.

* + 1. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

Retain one of two options in subparagraph below if compaction of filter material is required. In first option, revise percentage if required. Replace the term "unit weight" with "density" if preferred.

* + - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.

Retain "Drainage Backfill" Paragraph below if using free-draining granular backfill against walls

* + 1. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

Retain one of two options in first subparagraph below if compaction of filter material is required. In first option, revise percentage if required. Replace the term "unit weight" with "density" if preferred.

* + - 1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698.

Revise subparagraph below according to geotechnical engineer's written recommendations or delete if no special impervious fill cap is required.

* + - 1. Place and compact impervious fill over drainage backfill in 6 inch (150 mm) thick compacted layers to final subgrade.
  1. SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

Revise this article to suit Project and for installations of subbase and base courses other than under pavements and walks.

* + 1. Place subbase course [ and base course] on subgrades free of mud, frost, snow, or ice.
    2. On prepared subgrade, place subbase course [ and base course] under pavements and walks as follows:

Retain first two subparagraphs below if applicable.

* + - 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
      2. Place base course material over subbase course under hot-mix asphalt pavement.

Retain option in four subparagraphs below if retaining "and base course" option in paragraphs above.

* + - 1. Shape subbase course [ and base course] to required crown elevations and cross-slope grades.
      2. Place subbase course [ and base course] 6 inches (150 mm) or less in compacted thickness in a single layer.
      3. 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.

In subparagraph below, replace the term "unit weight" with "density" if preferred.

* + - 1. 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 D698.

Retain "Pavement Shoulders" Paragraph below if required; revise to suit Project. Replace the term "unit weight" with "density" if preferred.

* + 1. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D698.
  1. DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

Revise this article to suit Project and for installations of "drainage courses" other than under pavements and walks.

* + 1. Place drainage course on subgrades free of mud, frost, snow, or ice.
    2. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

Retain applicable subparagraphs below.

* + - 1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
      2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
      3. 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.

Revise percentage of compaction in subparagraph below and change compaction test from ASTM D698 to ASTM D4254 or ASTM D1557 if required. Replace the term "unit weight" with "density" if preferred. See Evaluations.

* + - 1. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.
  1. FIELD QUALITY CONTROL

Retain "Special Inspections" Paragraph below if special inspections are required by code and revise to suit requirements of authorities having jurisdiction. Special inspection may not be necessary for fill less than 12 inches (305 mm) deep or outside of foundation or pavement limits; verify with building code and authorities having jurisdiction.

* + 1. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
       1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
       2. Determine that fill material classification and maximum lift thickness comply with requirements.
       3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
    2. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

Requirements in remaining paragraphs below, if retained, may actually exceed code-required special inspections. Retain first paragraph below if applicable; revise to suit Project.

* + 1. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

Retain "Footing Subgrade" Paragraph below if applicable; revise to suit Project. If retaining, add other field tests, such as California bearing ratio of subgrades, subbases, and bases for paving, if required.

* + 1. 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 Consultant.

Revise first paragraph below to suit Project.

* + 1. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:

Frequencies of testing in "Paved and Building Slab Areas," "Foundation Wall Backfill," and "Trench Backfill" subparagraphs below are examples only; revise to suit Project.

* + - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab but in no case fewer than three tests.
      2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length but no fewer than two tests.
      3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length but no fewer than two tests.
    1. 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 materials to depth required; recompact and retest until specified compaction is obtained.
  1. PROTECTION
     1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
     2. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
        1. Scarify or remove and replace soil material to depth as directed by Consultant; reshape and recompact.
     3. 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.
  2. DISPOSAL OF SURPLUS AND WASTE MATERIALS

Retain one of two paragraphs below.

* + 1. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
    2. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Consultant.
       1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION