

This specification outlines the general requirements for earthworkexcavation and backfilling for site grading.

PART 1 REFERENCES

This specification refers to the following standards, specifications, or publications:

ASTM International

D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))

Canadian Standards Association (CSA)

A23.1/A23.2 Concrete Materials and Methods of Concrete
Construction/Test Methods and Standard Practices for
Concrete

A3000 Cementitious Materials Compendium

PART 2 GENERAL

2.1 SUBMITTALS

.1 Samples: submit to designated testing agency, 23 kg sample of backfill for fill material proposed for use, no later than one (1) week before backfilling or filling work.

2.12.2 EXISTING CONDITIONS AMINATION

.1 Examine all Contract Documentsdrawings and specifications to ascertain the extent of the work. Visit the site to ascertain special conditions which might affect the work of this specification.

.2 Before commencing work verify the location of all buried services on and adjacent to the site.

.3 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.4 Remove obsolete buried services within 2 m of foundations. Cap cut-offs.

2.3 PROTECTION

.1 Protect and or transplant existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, surface or underground utility

lines which are to remain as directed by the Owner. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 3 PRODUCTS

3.1 MATERIALS

- .1 Embankment materials require approval by the Owner.
- .2 Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps or any objectionable matter and have not more than 10 % passing 0.075 mm sieve nor particles larger than 250 mm or 150 mm within 300 mm of sub-grade.
- .3 Common Material to be obtained from sources indicated or approved by the Owner.

PART 4 EXECUTION

4.1 PREPARATION

.1 Temporary erosion and sedimentation control:

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, Contract Documents, and site-specific erosion and sedimentation control plan, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in place conditions:

- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Owner's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

4.2 CLEARING AND GRUBBING

- .1 In accordance with Section 02111 – Clearing and Grubbing.
- .2 Remove vegetation and brush from targeted areas by non-chemical means and dispose of stripped vegetation in accordance with Section 02111 – Clearing and Grubbing.

4.14.3 STRIPPING AND PRESERVATION OF TOPSOIL

- .1 At the direction of the Owner:
 - .1 Remove vegetation and brush from targeted areas by non-chemical means and dispose of stripped vegetation in accordance with Section 02111 – Clearing and Grubbing.
 - .1 Remove topsoil before any construction procedures commence to avoid compaction of topsoil.
 - .2 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
 - .3 Handle topsoil only when it is dry and warm.
 - .4 Strip topsoil to depths as directed by the Owner. Avoid mixing topsoil with subsoil.
 - .5 Pile topsoil by mechanical hoe in berms in locations as directed by the Owner. Stockpile height shall not exceed 2.0 m.
 - .6 Dispose of unused topsoil as directed by the Owner.
 - .6.7 Protect stockpiles from contamination, compaction, and erosion.
 - .7.8 Topsoil that has been piled for long term storage will be covered with trefoil or grass to maintain agricultural potential of soil.

4.2 COMPACTION EQUIPMENT

- .1 Compaction equipment must be capable of obtaining required densities in materials on project.

4.3 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution. Water used for this purpose shall be fresh water.

4.4 EXCAVATION

- .1 Shore and brace excavations, protect slopes and banks and perform all work in accordance with Provincial and Municipal regulations whichever is more stringent.
- .2 Perform blasting in accordance with Provincial and Municipal regulations and Section 02202 – Rock Removal.
 - .1 Repair damage to approval of Owner.
 - .2 No blasting will be permitted within 3.0 m of any building and where damage would result.
- .3 Excavate as required to carry out work.
 - .1 Do not disturb soil or rock below bearing surfaces.
 - .2 Notify the Owner when excavations are complete.
 - .3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
 - .4 Excavation taken below depths shown without Owner written authorization to be filled with concrete of same strength as for footings at Contractor's expense.
- .4 Excavate for slabs and paving to subgrade levels.
 - .1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.
- .2.5 Excavate areas designated on drawings to design lines, grades and cross-sections. The excavation tolerance in OM shall be ± 30 mm and in rock - 150 mm.
- .3.6 Remove materials that are unsuitable to the lines and grades as designated by the Owner and dispose of as directed.
- .4.7 Suitable material not used immediately in the work shall be stockpiled in areas designated by the Owner at no additional cost to the Owner for subsequent use in the work.
- .5.8 Maintain crowns and cross slopes to provide good surface drainage.
- .6.9 Excavate to elevations and dimensions indicated or required for construction of work plus space required to erect forms.
- .7.10 Make excavation to clean lines to minimize quantity of fill material required.
- .8.11 Earth bottoms of excavations to be dry undisturbed soil, level, free from loose or organic matter.
- .9.12 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.

.10.13 When complete, have the Owner inspect excavations to verify soil bearing capacity, depths and dimensions.

.11.14 Correct unauthorized excavation at no extra cost as follows:

- .1 Fill under bearing surfaces and footings with concrete as specified for footings.
- .2 Fill under other areas with fill compacted to minimum of 95 % of the maximum dry density in accordance with ASTM D698.

.12.15 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

4.5 EXCAVATION REQUIRED BY OTHERS

- .1 ~~Excavation for mechanical and electrical work is included in this Section and shall be carried out in accordance with provisions specified herein and indicated.~~
- .2 ~~Excavate trenches to lines and grades shown to a minimum of 75 mm below pipe invert. Provide recesses for bell and spigot pipe to ensure bearing will occur along barrel of pipe.~~
- .3 ~~Cut trenches 300 mm wider than maximum pipe diameter. Trim and shape trench bottoms and leave free of irregularities, lumps or projections.~~

4.64.5 STOCKPILING

- .1 Stockpile fill materials in areas designated by the Owner. Stockpile granular material in manner to prevent segregation. Protect stockpiled fill material from freezing.
- .2 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

4.6 FIELD QUALITY CONTROL

- .1 Testing of materials and compaction of backfill and fill will be carried out in Services by testing laboratory designated by the Owner and in accordance with Section 01400 – Quality Control & Testing Laboratory
- .2 Not later than one (1) week minimum before backfilling or filling, submit to the Owner, samples of backfill as described in the Submittals subsection of this Section.
- .3 Do not begin backfilling or filling operations until material has been approved for use by the Owner.

.4 Not later than 48 hours before backfilling or filling with approved material, notify the Owner to allow compaction tests to be carried out by designated testing agency.

4.7 BACKFILLING

.1 Do not commence backfilling until areas of work to be backfilled have been inspected and approved by the Owner.

.2 Areas to be backfilled to be free from construction debris, snow, ice, standing water and frozen ground.

.3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect lateral supports such as bracing or shoring to counteract unbalance and leave in place until removal is approved by the Owner.

.4 Compaction of subgrade: prior to placing fill compact existing subgrade under walks, paving, and slabs on grade to same compaction as fill.

.1 Fill excavated areas with selected subgrade material or gravel and sand compacted as specified for fill.

.2 Remove "soft" material and fill with approved material until specified compaction can be obtained.

.2 Prior to placing fill under slabs on grade, compact existing sub-grade to obtain same compaction as specified for fill. Remove "soft" material and fill with approved material until specified compaction can be obtained.

.3.1 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance and leave in place until removal is approved by the Owner.

.4.5 Backfill simultaneously each side of walls and other structures to equalize soil pressures.

.5.6 Place backfill, fill and base course material and compact fill materials in continuous horizontal layers not exceeding 150300 mm lifts loose depth. Use methods to prevent disturbing or damaging buried services. Make good any damage. Compact each layer of material to specific density as indicated.

.6.7 Maintain optimum moisture content to enable compaction to attain specified density.

.7.8 In roads, parking lot and under concrete structures place fill materials in 500 mm lifts and compact to minimum 95 % corrected maximum dry density in accordance with ASTM D698.

.9 In other areas of site compact to density of existing soil.

.10 In trenches:

- .1 Up to 300 mm above pipe or conduit: sand placed by hand.
- .2 Over 300 mm above pipe or conduit: native material approved by Owner.
- .11 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.
- .12 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.
- .13 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.
- .8.14 Underground tanks: use sand to bottom of granular base courses or to bottom of topsoil, as applicable.

4.8 MAINTENANCE

- .1 Maintain roadway surface until next course of material is placed or until project or that portion thereof is accepted.

4.9 INSPECTION AND TESTING

- .1 Sieve Analysis: proposed fill materials will be tested to confirm suitability for intended use and conformity with specifications.
- .2 Density Test will be conducted on compacted fill to ASTM D698 for Standard Proctor Density.

4.10 PREPARATION OF GRADE

- .1 Verify that grades are correct and notify the Owner if discrepancies occur. Do not begin work until instructed by the Owner.
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil with scrapers establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

4.11 GRADING

- .1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by the Owner.
 - .1 Grade to be gradual between finished spot elevations shown on drawings.

- .2 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .3 Rough grade to following depths below finish grades: as indicated
- .4 Slope rough grade away from building 1:50 minimum or as indicated.
- .5 Grade ditches to depth required for maximum run-off or as indicated.
- .6 Prior to placing fill over existing ground, scarify surface to depth of 150 mm minimum before placing fill over existing ground. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .7 Unless otherwise indicated, compact filled and disturbed areas to maximum dry density to ASTM D 698 and corrected as specified in Section 02501 – Corrected Maximum Dry Density, as follows:
 - .1 Minimum 85 % under landscaped areas.
 - .2 Minimum 95 % under paved and walk areas.
- .8 Do not disturb soil within branch spread of trees or shrubs to remain.

4.12 PLACING OF TOPSOIL

- .1 Place topsoil only after the Owner has accepted subgrade.
- .2 Spread topsoil during dry conditions by mechanical hoe in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.
- .3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .4 Cultivate soil following spreading procedures.

4.13 TESTING

- .1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by ULC. Costs of tests will be paid in accordance with Section 01400 - Quality Control & Testing Laboratory Services.

4.104.14 WASTE MATERIAL

- .1 Dispose of waste material not required for backfill, grading or landscaping, at an approved dump site.

4.15 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01710 – Reinstatement and Cleaning.

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section - 01710 - Reinstatement and Cleaning.

PART 5 PAYMENT

5.1 MEASUREMENT FOR PAYMENT

- .1 Excavated materials will be measured in cubic metres from cross sections taken in areas of excavation.
- .2 Mass Rock Excavation
 - .1 When depth indicated on the Drawings or directed by the Owner is less than 300 mm below original rock surface, depth excavated for measurement purposes will be taken as 300 mm.
 - .2 Volume of excavated boulders and rock fragments in excess of 0.5 m³ will be determined by measuring three maximum mutually perpendicular dimensions.
- .3 Mass Common excavation:
 - .1 In areas of excavation provided by the Owner, initial cross
 - .2 Topsoil and waste material will be measured for payment as common excavation in its original location.
- .4.1 No measurement will be made for:
 - .1 Unnecessary excavation beyond lines established.
 - .2 Extra handling of windrowed materials blended on embankment slopes.
 - .3 Stockpiling of topsoil or protection of stockpiles.
- .5 Payment for excavation includes placing of excavated material at another location on site or disposal of waste material off site.
- .6.1 Mass Imported Common Backfill including compaction to be measured in cubic metres in place to specified paylines.
- .7.2 When benching is required to key new fill slopes to existing slopes, no measurement or payment shall be made with respect to quantities excavated during this operation.

5.2 BASIS OF PAYMENT

- .1 All costs associated with the work outlined in this specification shall be deemed to be included in the appropriate unit and lump sum prices quoted

as outlined in Measurement for Payment subsection of this section and as included in the MERX Schedule of Quantities and Prices.

- .2 Payment for excavation and borrow material will include placing and compacting in embankments elsewhere on the project, as well as legal disposal of all waste material.
- .3 Clearing and grubbing will be measured in accordance with Section 02111 – Clearing & Grubbing.
- .4 Supply, Placing, and Spreading of imported topsoil will be measured in accordance with Section 02104 – Landscaping, Seeding, Sodding & Tree Preservation.
- .5 Excavation, trenching and backfilling for all service utilities will be measured in accordance with Section 02223 – Excavating, Trenching and Backfilling, unless otherwise specified.
- .4.6 Stripping and Placing and spreading of on-site and/or imported topsoil will be paid in accordance with 02224 – Roadway Embankment by the square metre to the specified depth.
- .7 Mass excavation of rock and common material will be measured in accordance with Section 02224 – Roadway Excavation, Embankment & Compaction.
- .5.8 Mass Imported borrow Common b Backfill including compaction to be measured in accordance with Section 02224 – Roadway Excavation, Embankment & Compaction in cubic metres in place to specified paylines.