
TOPSOIL AND FINISH GRADING

1.0 GENERAL

1.1 REFERENCE STANDARDS

- 1.1.1 Canadian Landscape Standard, First Edition
 - 1. Section 4: Grading and Drainage
 - 2. Section 6: Growing Medium
- 1.1.2 Canadian National Master Construction Specifications (NMS)

1.2 MATERIAL SUPPLIED BY CONTRACTOR/DEVELOPER

- 1.2.1 Contractor / Developer will supply topsoil delivered to job site.

1.3 RELATED WORK

- 1. Preparation to subgrade and excavation for planting beds.
- 2. Clearing of brush, weeds and grasses prior to topsoil stripping.

1.4 QUALITY ASSURANCE

- 1.4.1 Contractor: experienced and knowledgeable in landscape work of contract.
- 1.4.2 Site Supervisor: competent, experienced and knowledgeable to direct and supervise all staff and work of contract. Supervisor shall possess a Landscape Journeyman Gardener certification or other similar qualification acceptable to the Engineer.
- 1.4.3 Staffing: experienced, competent and trained landscape personnel who will perform all tasks and services in a knowledgeable and professional manner. Workers shall act safely and professionally at all times while working on site. Contractor shall not assign any worker that the Engineer deems incompetent, careless, insubordinate, or otherwise objectionable to work on site.
- 1.4.4 Contractor shall be responsible for ensuring that contract specifications are being adhered to. Failure of the Engineer to immediately reject unsatisfactory workmanship or to notify the Contractor of their deviation from the specification shall not relieve the Contractor of their responsibility to repair and/or replace unsatisfactory work.
- 1.4.5 Contractor shall obtain approvals as required by contract for suppliers, sub-contractors, and materials.
- 1.4.6 Contractor shall advise Engineer, in writing, of any conditions or defects encountered on site before or during construction upon which the work of this section depends and which may adversely affect its performance.
- 1.4.7 Do not commence work until adverse conditions or defects have been evaluated by the Engineer and corrective measures taken.
- 1.4.8 Commencement of work shall imply acceptance of existing conditions and no claims for damages or extras resulting from such conditions or defects will be accepted later, except where such conditions could not have been known prior to commencing work.

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- 1.4.9 Recommendations: provide a report based on the soil and compost analyses, and with reference to the contract documents, prepared by an accredited and approved professional Agrologist.
1. Report suitability of soil for lawn and woody plant growth.
 2. State all aspects of the soil analysis that indicate the soil does not conform to referenced standards
 3. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory soil for lawns and other plantings indicated or specified.
 4. Take into account and adjust recommendations for soil depths indicated and amendments already specified.

1.5 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- 1.5.1 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 sediment and erosion control plan, specific to site, that complies with the latest version of the Government of Alberta, Erosion and Sediment Control Manual.
- 1.5.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- 1.5.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

1.6 SUBMITTALS

- 1.6.1 Provide an Erosion and Sediment control plan for the City and Consultant review and approval prior to commencement of any work.
- 1.6.2 Provide submittals and wait for Engineer's and acceptance, prior to placement of any materials on site.
- 1.6.3 Original copy of each soil analysis report and Agrologist's recommendations indicating recommended amendments for approval before delivering any topsoil to site.
- 1.6.4 Resubmit samples of soil amended as recommended by report for verification of compliance with specified requirements.
- 1.6.5 Submit one copy of all new soil reports to Engineer until approval.
- 1.6.6 Submit product data for each type of product indicated.
- 1.6.7 Submit product certificates for soil amendments and fertilizers, signed by product manufacturer.

2.0 PRODUCTS

2.1 TOPSOIL

- 2.1.1 Where one type of soil particulate is not found, specify topsoil texture based on local horticultural authority recommendations and availability of required particulate material.

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Identify soil requirements for special turf and plant material applications.

Repeat and adjust 2.1.1 if different topsoil mixtures are required for special turfs and planting beds.

- 2.1.2 Topsoil for seeded areas: mixture of mineral particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.
 - 1. Soil texture based on The Canadian System of Soil Classification, to consist of 20% to 50% sand and contain 2% to 10% organic matter by weight.
- 2.1.3 Fertility: major soil nutrients present in following ratios:
 - 1. Nitrogen (N): 20 to 40 microgram of available N per gram of topsoil.
 - 2. Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.
 - 3. Potassium (K): 80 to 120 micrograms of potash per gram of topsoil.
 - 4. Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to 2.3 support germination and/or establishment of intended vegetation.
 - 5. PH value: 6.5 to 8.0.
 - 6. Contain nontoxic elements or growth inhibiting materials.
 - 7. Free from: Debris and stones over 50 mm diameter.
 - 8. Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - 9. Consistence: friable when moist.

2.2 SOIL AMENDMENTS

- 2.2.1 Specify quality of material for required soil amendments. Include additional soil amendments for special turf and plant material requirements.
 - 1. Peat Moss:
 - a) Derived from partially decomposed species of Sphagnum Mosses.
 - b) Elastic and homogeneous, brown in colour.
 - c) Free of wood and deleterious material which could prohibit growth.
 - d) Shredded particle minimum size: 5 mm.
 - 2. Sand:
 - a) Hard, granular sharp coarse sand, washed, and free of gravel and very fine material, free of impurities, chemical or organic matter. Reasonable care in the selection of material in a pit shall be used to produce a uniform product.
 - i. Sand gradation: uniform (well graded), and within the following limits:

2.5mm	(no. 8)	100%
1.25mm	(no.16)	90-100%
0.8mm	(no.20)	80-90%
0.0315mm	(no.50)	80-60%
0.16mm	(no.100)	2-10%
0.063mm	(no.200)	1% maximum

- 3. Compost: conforming to CCME Guidelines, Category A requirements, including:
 - a) Trace elements
 - b) Foreign matter (also conforming to CAN/BNQ 0413-M95, Type A)
 - c) Pathogenic organism content

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4. Limestone:
 - a) Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
 - b) Graduation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.124 mm sieve.
5. Fertilizer:
 - a) Complete, commercial with 35% soluble nitrogen

3.0 EXECUTION

3.1 GENERAL

- 3.1.1 Minimize creation of dust and disturbance of neighbours during all construction phases that work with topsoil.
- 3.1.2 Protect existing work:
 1. Exercise caution against injury to, or defacement of, existing conditions. Repair or replace all items and site features damaged from installation operations to original or better condition at Contractor's own expense.
 2. Locate utility lines before commencement of work and protect from damage.
- 3.1.3 Pre-installation Site Meeting: Conduct Meeting at Project site to address quality of materials, inspection schedule and samples including, but not limited to, the following:
 1. Protection of existing trees and facilities.
 2. Landscape materials and installation procedures.
 3. Layout and stacking of tree trenches and shrub beds prior to excavation.
 4. Verification of required subgrade depths to accommodate topsoil depths at sod, shrub beds and tree trench locations prior to installation of topsoil.

3.2 STRIPPING OF TOPSOIL

- 3.2.1 Use 3.1 when site to be stripped of topsoil prior to site excavation or grading operations.
 1. Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 2. Commence topsoil stripping of areas as indicated/as directed by the Engineer after area has been cleared of brush/weeds and grasses, and removed from site.
 3. Strip topsoil to depths as indicated/directed by Engineer. Avoid mixing topsoil with subsoil.
 4. Stockpile stripped and imported topsoil in locations indicated in the drawings or as directed by Engineer/Consultant.
 - a) Stockpile height not to exceed 3 m unless approved by the Engineer.
 - b) Never leave side slopes that are greater than the angle of repose unattended.
 - c) Prevent stockpiled topsoil from being intermingled with other onsite materials. Contaminated topsoil is not acceptable for use.
 5. Dispose of unused topsoil in location indicated/directed by Engineer off site.
 6. Protect stockpiles from contamination and compaction.

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3.3 PREPARATION OF SUBGRADE

- 3.3.1 Use 3.2 for subgrade which is to receive topsoil and existing grades to be seeded, sodded or planted on directly. Refer to 3.4 for application of soil amendments to existing grades.
- 3.3.2 All Areas to receive topsoil:
1. Verify that grades are correct. If discrepancies occur, notify Engineer and do not commence work until instructed by Engineer.
 2. Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
 3. Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.
- 3.3.3 Areas with grades between 0 – 32%
1. Cultivate entire area which is to receive topsoil to depth of 150 mm or to a depth that mitigates sub-grade compaction.
 2. Cultivate those areas where equipment used for hauling and spreading has compacted soil. Compacted subgrade will not be accepted.
 3. Maximum Acceptable Compaction is 85% S.P.D.
- 3.3.4 Areas graded with slopes of 33% or Greater:
1. Refer to Section 3.4 for rough grade elevations.
 2. Cultivate compacted sub-grade in one pass perpendicular to direction of slope to 100mm depth. Compacted subgrade will not be accepted.
Or
 3. Cultivate and track sub-grade perpendicular and parallel to direction of slope with heavy tracked equipment.
Or
 4. Cultivate and re-compact sub-grade with Sheepsfoot roller.
 5. Sheepsfoot roller drum requirements:
 - a) A metal roller, drum or shell with offset tamping feet projecting a minimum of 100mm (4") from the surface of the roller, drum or shell.
 - b) The cross-section area of each tamping foot, measured perpendicular to the axis of the tamping foot shall be a minimum of 26 to 39 cm² (4 to 6" square)
 - c) Tamping feet spaced 150 to 200mm (6 – 8"), measured diagonally center to center.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- 3.4.1 Place topsoil after Engineer has accepted subgrade.
- 3.4.2 Spread topsoil in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.
- 3.4.3 Place topsoil in dry weather on loose, friable, and graded subgrade surface. Do not spread topsoil when ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the Work, as determined by the Consultant.

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- 3.4.4 Fine grade and loosen topsoil. Eliminate rough spots and low areas to ensure positive drainage away from fences and walkways. Prepare a loose friable bed by means of cultivation and subsequent raking. Maintain levels, profiles and contours of subgrade.
- 3.4.5 Keep topsoil 25mm below finish grade for sodded areas adjacent to walkways, curbs, edging materials, other hard surfaces and crown of adjacent existing turf. Elsewhere, bring topsoil up to finished grade.
- 3.4.6 Do not cover catch basins, valve covers or manholes. Cut smooth falls to catch basin rim, finish flush. Provide smooth transitions at top and bottom of slopes.
- 3.4.7 Spread topsoil as indicated to following minimum depths after settlement and 80% compaction:
 - 1. 150 mm for seeded areas
50mm depth over slopes 33% or greater
 - 2. 135 mm for sodded areas
35mm depth over slopes 33% or greater
 - 3. 300 mm for flower beds
 - 4. 600 mm for shrub beds
 - 5. 1500 mm for trees
- 3.4.8 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 SOIL AMENDMENTS

- 3.5.1 Incorporate soil amendment well into full depth of topsoil. Rototill (or other approved mechanical incorporation) amendment into soil in perpendicular directions. Rototill entire area numerous times in one direction and then numerous times at right angles to initial direction, ensuring no surface debris, stones in excess of 20mm diameter, soil clods, vegetation, roots, grass or weeds, litter or other foreign debris are present upon completion of disking.

3.6 FINISH GRADING

- 3.6.1 Finish grade to be within 25mm of design grades. Contractor may be required to provide a finish grade AutoCAD surface for the consultant to review. All costs associated with the survey and surface preparation shall be borne by the Contractor.
- 3.6.2 Contractor to remove and dispose of all rocks that exceed 25mm at the finish grade.
- 3.6.3 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- 3.6.4 Consolidate topsoil to required bulk density using equipment approved by the Engineer. Leave surfaces smooth, uniform and firm against deep foot printing.

3.7 PROTECTION OF GRADED AREAS

- 3.7.1 Protect newly graded areas from traffic and erosion. Keep site clean.
- 3.7.2 Repair and reestablish grades in settled, eroded and rutted areas.

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3.8 CLEAN UP

- 3.8.1 Dispose of materials not required where directed by Engineer off site.
- 3.8.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by the City of Lethbridge.
- 3.8.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.
- 3.8.4 Restore stockpile sites acceptable to Engineer.
- 3.8.5 Keep roadway, walkway, and surrounding areas free of soil and debris as a result of work done under this section at the end of each working day or as directed by the Owner.
- 3.8.6 Dispose of surplus soil not required for fine grading and landscaping off site.
- 3.8.7 Restore stockpile sites on site to "rake clean" condition acceptable to the Owner.

4.0 MEASUREMENT AND PAYMENT

- 4.1 Payments will be based on unit price bid. Payment shall include the supply and installation of all materials shown on the drawings, and all materials incidental to the completion of the work, and shall include all costs for the maintenance and warranty of the system.
- 4.2 Progress claims submitted by the contractor shall be based on the unit prices submitted or the percentage of work completed in the tender form for the work completed at date of claim and approved by the engineer and owner prior to payment.
- 4.3 No payment shall be made for materials delivered and stored onsite that have not been properly installed and tested.
- 4.4 The unit prices for supply shall include supplying, delivering, loading, unloading and all allowances for handling, storage, breakage and waste. Payment will be made only for material actually installed and tested in the work.

END OF SECTION