
Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Cleaning.
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

Part 2 Products

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed 5 times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Departmental Representative 4 weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION

- .1 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
- .2 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.
- .3 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
- .4 Stockpiling:
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
 - .2 Stockpile aggregates in sufficient quantities to meet project schedules.
 - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate.

Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Maximum 1.5 m for coarse aggregate and base course materials.
 - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
 - .3 Maximum 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- 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 01 74 11- Cleaning.
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.
- .7 Restrict public access to temporary or permanently abandoned stockpiles.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 74 11 – Cleaning.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

- .1 Canadian Environmental Protection Act (1999) and relevant regulations. Amended.
- .2 Provincial legislation - Water Resources Act (2002). Amended.
- .3 Provincial legislation - Endangered Species Act (2001). Amended.
- .4 Provincial legislation - Occupational Health and Safety Regulations (2012).
- .5 Canada Occupational Health and Safety Regulations (1986). Amended.

1.3 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of stumps, roots, boulders and rock fragments to not less than specified depth below existing ground surface.

1.4 STORAGE AND PROTECTION

- .1 Prevent damage to trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utilities, and other site appurtenances which are to remain.
 - .1 Repair damaged items to approval of Departmental Representative.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Soil Material for Fill:
 - .1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.
 - .2 Remove and store soil material for reuse.

Part 3 Execution

3.1 CONTROLS

- .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 areas.
 - .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.

3.2 PREPARATION

- .1 Inspect site and verify items designated to remain.
- .2 Locate and protect utilities: preserve in operating condition active utilities traversing site.
 - .1 Notify Departmental Representative immediately of damage to or when unknown existing utilities are encountered.
 - .2 When utilities which are to be removed are encountered within area of operations, notify Departmental Representative in ample time to minimize interruption of service.
- .3 Notify utility authorities before starting clearing.
- .4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

- .1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.
- .2 Clear by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.
- .3 Cut off branches overhanging area cleared.

3.4 CLOSE CUT CLEARING

- .1 Close cut clearing to ground level to within 100 mm of ground surface.
- .2 Perform close cut clearing by hand so that existing muskeg is not damaged.
- .3 Cut off branches overhanging area cleared.
- .4 Cut off unsound branches on trees designated to remain.

3.5 ISOLATED TREES

- .1 Cut off isolated trees at height of not more than 300 mm above ground surface.
- .2 Grub out isolated tree stumps.
- .3 Prune individual trees as indicated.
- .4 Trim trees designated to be left standing within cleared areas of dead branches 4 cm or more in diameter; and trim branches to heights as indicated.
- .5 Cut limbs and branches to be trimmed close to bole of tree or main branches.
- .6 Paint cuts more than 3 cm in diameter with approved tree wound paint.

3.6 UNDERBRUSH CLEARING

- .1 Clear underbrush from areas as indicated to ground level.

3.7 GRUBBING

- .1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 200 mm below ground surface.
- .3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m³.
- .4 Fill depressions made by grubbing with suitable material and to make new surface conform to existing adjacent surface of ground.

3.8 REMOVAL AND DISPOSAL

- .1 Chip, mulch and spread cleared and grubbed vegetative material on site outside of the fenced area.

3.9 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for stripping of topsoil to approval of Departmental Representative.

3.10 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 45 00 – Quality Control.
- .2 Section 01 74 11 – Cleaning.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM D698-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .2 Canadian Environmental Protection Act (1999) and relevant regulations. Amended.
- .3 Provincial legislation - Water Resources Act (2002). Amended.
- .4 Provincial legislation - Endangered Species Act (2001). Amended.
- .5 Provincial legislation - Occupational Health and Safety Regulations (2012).
- .6 Canada Occupational Health and Safety Regulations (1986). Amended.

1.3 EXISTING CONDITIONS

- .1 Not all services and known or shown. Those shown may not be accurate. Contractor shall exercise extreme caution while completing excavations. Contact the appropriate authority for the location of buried and overhead utilities.

Part 2 Products

2.1 MATERIALS

- .1 Rock Fill: 100 mm minus hard durable crushed rock as follows:

Sieve Designation	% Passing
150 mm	100
100 mm	70-90
50 mm	10 - 40

Part 3 Execution

3.1 CONTROLS

- .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 areas.

- .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.

3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated on drawings.
- .2 Slope rough grade away from above grade structures as indicated on drawings
- .3 Grade ditches to depth as required for maximum run-off as indicated on drawings.
- .4 Scarifying surface is NOT required. Rough grade by placing rock fill on existing grade.
- .5 Compact filled and disturbed areas to 75% relative density where rock fill is used.
- .6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 TESTING

- .1 Refer to Section 01 45 00 – Quality Control.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

- .1 Maintain access roads to prevent accumulation of construction related debris on roads during rough grading operations to the approval of the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 31 22 13 – Rough Grading.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63/2002, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
 - .5 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Newfoundland and Labrador Department of Transportation and Works (NLDTW) Specifications Book.
- .4 Canadian Environmental Protection Act (1999) and relevant regulations. Amended.
- .5 Provincial legislation - Water Resources Act (2002). Amended.
- .6 Provincial legislation - Endangered Species Act (2001). Amended.
- .7 Provincial legislation - Occupational Health and Safety Regulations (2012).
- .8 Canada Occupational Health and Safety Regulations (1986). Amended.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 1.0 m³ and which cannot be removed by means of heavy-duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

- .3 Topsoil:
- .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .1 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.
- .5 Borrow material: material obtained from locations outside area to be graded and required for construction of fill areas or for other portions of Work.
- .6 Unsuitable materials:
- .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.2.
 - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
 - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
 - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
 - .3 Submit to Departmental Representative written notice at least 3 days prior to excavation work.
 - .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
 - .5 Submit to Departmental Representative testing results as described in PART 3 of this Section.

.3 Preconstruction Submittals:

- .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
- .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field and location plan of relocated and abandoned services, as required.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer licensed in the Province of Newfoundland and Labrador.
- .4 Keep design and supporting data on site.
- .5 Engage services of qualified professional Engineer who is licensed in the Province of Newfoundland and Labrador in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning if required for Work.

1.6 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work, verify or establish location of buried services on and adjacent to site by approved methods. Location of services shown on plans are approximate only and not deemed accurate.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
 - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .5 Prior to beginning excavation Work, notify Departmental Representative and establish location and state of use of buried utilities and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.
 - .6 Confirm locations of buried utilities by approved methods.
 - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Costs for such Work to be paid by Departmental Representative.
 - .9 Record location of maintained, re-routed and abandoned underground lines.
 - .10 Confirm locations of recent excavations adjacent to area of excavation.

- .2 Existing buildings and surface features:
 - .1 Conduct, with Departmental Representative, a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Select (common) Fill: Common material from site which is free of stumps, trees, roots, organics, boulders and masonry larger than 100 mm in any dimension and other deleterious materials as approved by the Departmental Representative.
- .2 Pipe and Structure Bedding and Surround: Class A granular in accordance with NLDTW specifications.

Part 3 Execution

3.1 CONTROLS

- .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 areas.
 - .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.

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

- .3 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.
- .4 Protect buried services that are required to remain undisturbed.

3.4 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with the Provincial Health and Safety Act.
- .2 Construct temporary Works to depths, heights and locations as approved by Departmental Representative.
- .3 During backfill operation:
 - .1 Unless otherwise indicated or directed Departmental Representative, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site.

3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative's approval, the details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .6 Pump sediment laden water into vegetation a minimum of 30 meters from stream or wetland. Ensure no sediment laden water reaches sewers, watercourses, wetlands or drainage areas. If necessary, provide flocculation tanks, settling basins, geotubes or other treatment methods and facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses, wetlands or drainage areas.

3.6 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .5 For trench excavation, do not excavate more than 30 m of trench in advance of installation operations. All excavations shall be filled at end of work day prior to leaving site.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus and unsuitable excavated material in approved location.
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify Departmental Representative when bottom of excavation is reached.
- .12 Obtain Departmental Representative approval of completed excavation.
- .13 Remove unsuitable material from trench bottom and as directed by Departmental Representative.
- .14 Correct unauthorized over-excavation as follows:
 - .1 Fill under road areas with common compacted not less than 98 % of SPMDD.
- .15 Hand trim, make firm and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.7 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated on drawings or specified below.
 - .1 Fill under structures with common or Class A granular as indicated on the drawings and compact to not less than 98 % of SPMDD.

3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Hand place material in uniform layers not exceeding 150 mm compacted thickness as indicated on drawings.
- .2 Place bedding and surround material in unfrozen condition.

3.9 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 300 mm.

3.10 TESTING

- .1 Refer to Section 01 45 00 – Quality Control.

3.11 RESTORATION

- .1 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .2 Restore all disturbed areas to a condition equal to or better than existing conditions.
- .3 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 11 – Cleaning.
- .3 Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .4 Section 31 37 00 – Rip-Rap.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM D3786, Standard Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method
 - .3 ASTM D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Zenon Arc-Type Apparatus.
 - .4 ASTM D4491, Standard Test Method for water Permeability of Geotextiles by Permittivity.
 - .5 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - .6 ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - .7 ASTM D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - .8 ASTM D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:

- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect geotextiles from direct sunlight and UV rays.
- .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse by manufacturer of pallets, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIAL

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .2 Properties:
 - .1 Weight: Minimum 240 g/m² to ASTM D5261.
 - .2 Grab Tensile Strength: Minimum 800 N to ASTM D4632.
 - .3 Grab Elongation: 50 % to ASTM D4632.
 - .4 Tear Resistance: Minimum 333 N to ASTM D4533.
 - .5 Puncture Resistance: Minimum 467 N to ASTM D4833.
 - .6 Mullen Burst: Minimum 2412 N to ASTM D3786.
 - .7 Permittivity: Maximum 1.5 Sec⁻¹ to ASTM D4491.
 - .8 Water Flow Rate: 4047 l/min/m² to ASTM D4491.
 - .9 Apparent Opening Size (AOS): 0.180 mm to ASTM D4751.
 - .10 UV Stability: Minimum 70 % @ 500 hours to ASTM D4355.
- .3 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to ASTM A123M.
- .4 Factory seams: sewn in accordance with manufacturer's recommendations.
- .5 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Departmental Representative.

3.2 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Join successive strips of geotextile by sewing.
- .6 Pin successive strips of geotextile with securing pins at midpoint of lap.
- .7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .8 After installation, cover with overlying layer within 4 hours of placement.
- .9 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .10 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .11 Place and compact rip-rap in accordance with Section 31 37 00 - Rip-Rap.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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 01 74 11 - Cleaning.

3.4 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 32 19.01 - Geotextiles.

Part 2 Products

2.1 STONE

- .1 Hard, with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
- .1 150 mm common rip-rap, graded as follows:
- .1 None greater than: 225 mm
- .2 50% to 85%: 150 mm
- .3 100% greater than: 60 mm

Part 3 Execution

3.1 PLACING

- .1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .3 Place geotextile on prepared surface in accordance with Section 31 32 19.01- Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place rip-rap to thickness and details as indicated.
- .5 Place stones as noted on drawings to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .6 Hand placing:
- .1 Use larger stones for lower courses and as headers for subsequent courses.
- .2 Stagger vertical joints and fill voids with rock spalls or cobbles.
- .3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION