

Part 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 05 16 – Aggregate Materials
- .2 Section 32 11 16.01 – Granular Sub-base
- .3 Section 32 11 23 – Aggregate base course

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C127-12, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .3 ASTM D1557-12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - .4 ASTM D4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 DEFINITIONS

- .1 Corrected maximum dry density is defined as:
 - .1 $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .2 Where: D = corrected maximum dry density kg/m³.
 - .1 F1 = fraction (decimal) of total field sample passing 4.75 mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on 4.75 mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing 4.75 mm sieve determined in accordance with Method A of ASTM D1557.
 - .4 D2 = bulk density, kg/m³, of material retained on 4.75 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
- .2 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry or wet method as directed by Departmental Representative.

Part 2 – PRODUCTS

- .1 Not used.

Part 3 – EXECUTION

- .1 Not used.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 11 16.01 – Granular Sub-base
- .2 Section 32 11 23 – Aggregate Base Courses
- .3 Section 32 12 16 – Asphalt paving

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Allow continual sampling by Departmental Representative during production.
- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
- .6 Provide water, electric power and propane to Departmental Representative laboratory trailer at production site.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular materials from landfill to local quarry as approved by Departmental Representative.

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, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed five times least dimension.

- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 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 at least 4 weeks prior to commencing production.
- .2 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .3 Advise Departmental Representative 4 weeks 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 PRÉPARATION

- .1 Aggregate source preparation
 - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials.
 - .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
 - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
 - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
 - .5 Trim off and dress slopes of waste material piles and leave site in neat condition.

- .2 Processing
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
 - .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
 - .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .3 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .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 h of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base course materials.
 - .2 Max 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 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 MEASUREMENT PROCEDURES

- .1 Common Excavation.
 - .1 Measure in cubic metres calculated from cross sections taken in areas of excavation.
 - .2 No measurement for payment will be made for stripping.
 - .3 Shaping of bottom of excavation, is paid in square metres of surface shaped.

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C117-13, Test Method for Materials Finer Than 75- Φ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 (1998), Method for Particle-Size Analysis of Soils.
 - .4 ASTM D4318-10, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Fill materials: Materials necessary for fill or other parts of Work, coming from areas located outside site to be leveled.
 - .1 Source of materials has to be approved by Departmental Representative.
 - .2 Fill materials shall not be frozen, contain stone with a diameter greater than 75 mm, ash, grass or any other damaging material.

Part 3 EXECUTION

3.1 LEVELING

- .1 Because the Work area during the first year is limited to granular sub-base and aggregate base course of the expansion of the apron, existing and new base course will not be at the same level. Contractor has to grade the area so that surface water can run-off without creating water accumulations. Contractor shall also put in place a temporary ramping between the aggregate base course expansion and the existing traffic area with a 5% maximal slope at the end of the first year.
- .2 Grading has to be done at the same rate as the existing pavement is removed.
- .3 Minimum slope of the Work area shall be according to plans or as approved by Departmental Representative.

3.2 PLACING FILL

- .1 Before taking material from borrow areas, completely use, in fill areas, suitable materials removed from excavation.
- .2 Do not place material which is frozen nor place material on frozen surfaces.
- .3 Maintain uniform surface during construction to ensure run-off of surface water.
- .4 Material containing less than 25% by volume of rock fragments larger than 100 mm maximum dimension:
 - .1 Place and compact to full width in uniform layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .2 Compact fill materials, in non-pavement areas, minimum 95 % of corrected maximum dry density.
- .5 Do not place stones and boulders exceeding 50 mm maximum dimension within 100 mm of finished surface in graded areas.

3.3 FINISHING AND TOLERANCES

- .1 Finish pavement subgrade within 25 mm of design elevations, but not uniformly high or low.
- .2 Finish graded area within 30 mm of design elevations, but not uniformly high or low.
- .3 Surfaces free from depressions exceeding 30 mm in 5 m.

3.4 MAINTENANCE

- .1 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

Part 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 – Excavation, trenching and backfilling.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Measurement Procedures
 - .1 Quantities will be taken from cross section showing original rock surface and actual grade line set by Departmental Representative, except that minimum depth of rock required to be excavated to be considered as 300 mm.

1.3 REFERENCES

- .1 Definitions
 - .1 Rock: any solid material in excess of 1 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 PPV: peak particle velocity.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Blasting Submittals: submit for approval, written proposal of operations for removal of rock by blasting to Departmental Representative and local authorities having jurisdiction.
 - .1 Indicate proposed method of carrying out work, types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and noise control. Include details on protective measures, time of blasting and other pertinent details.
 - .2 Submit records to Departmental Representative at end of each shift. Maintain complete and accurate record of drilling and blasting operations.
- .3 Qualification Statements:
 - .1 Retain licensed explosives expert to program and supervise blasting work, to interpret recommendations of pre-blasting report, and to determine precautions, preparation and operations techniques.
 - .2 Submit documentation verifying explosives expert's qualifications.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 – Construction/demolition waste management and disposal.

1.6 QUALITY ASSURANCE

- .1 Blasting Survey and Monitoring :
 - .1 Departmental Representative will visit property holders of adjacent buildings and structures to determine existing conditions and describe blasting and seismic recording operations.
 - .2 Seismographic monitoring will be conducted during entire progress of blasting operations.
- .2 Blasting and Vibration Control :
 - .1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.
 - .2 In general, vibration from blasting not exceed 25 mm/s at distance of 50 m,
 - .3 Blasting not permitted close to fresh concrete or grout poured within 24 hours.

Part 2 - PRODUCTS

2.1 MATERIALS

- .1 Not used.

Part 3 - EXECUTION

3.1 ROCK REMOVAL

- .1 Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.
- .2 Remove rock to alignments, profiles, and cross sections as indicated.
- .3 Explosive blasting is permitted with Departmental Representative's approval.
 - .1 Do blasting operations in accordance with requirements of authority having jurisdiction.
- .4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .5 Excavate rock to horizontal surfaces with slope not to exceed 1:4.
- .6 Cut trenches to widths as indicated.
- .7 Use pre-shearing, cushion blasting or other smooth wall drilling and blasting techniques unless specified otherwise or directed by Departmental Representative.
- .8 Remove boulders and fragments which may slide or roll into excavated areas.
- .9 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Rock Disposal :
 - .1 Dispose of removed rock off site as approved by Departmental Representative.

3.3 PROTECTION

- .1 Prevent damage to surroundings and injury to persons. Erect fencing, post guards, sound warnings and display signs when blasting to take place.

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft;) (600 kN-m/m;).
 - .5 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft;) (2,700 kN-m/m;).
 - .6 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .2 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.2 MEASUREMENT PROCEDURES

- .1 There shall be no measurements to be done for this section. All necessary costs for excavation, trenching and backfilling will be included in the item where these types of Work are required.

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 1.00 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 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

- .4 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

- .5 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.

Sieve designation	% Passing
2,00 mm	100
0,10 mm	45 - 100
0,02 mm	10 - 80
0,005 mm	0 - 45

- .2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

- .6 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 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 and heave prevention methods as described in PART 3 of this Section.

- .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.

- .4 Submit to Departmental Representative written notice when bottom of excavation is reached.

- .5 Submit to Departmental Representative testing results and report 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, clearance record from utility authority and location plan of relocated and abandoned services, as required.

- .4 Samples:

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Where Departmental Representative is employee of Contractor, submit proof that Work by Departmental Representative is included in Contractor's insurance coverage.
- .3 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Québec, Canada.
- .5 Keep design and supporting data on site.
- .6 Engage services of qualified professional Engineer who is registered or licensed in Province of Québec, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .7 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.
- .8 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/demolition waste management and disposal.
- .2 Divert excess aggregate materials from landfill to local quarry for reuse as directed by Departmental Representative.

1.7 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .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 applicable 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 careful test excavations.

- .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. 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, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, 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 MATÉRIALS

- .1 Fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table :

Sieve designation	% Passing
	Fill
75 mm	100
50 mm	---
37,5 mm	---
25 mm	---
19 mm	---
12,5 mm	---
9,5 mm	---
4,75 mm	---
2,00 mm	---
0,425 mm	0 - 30
0,180 mm	---
0,075 mm	0 - 8

- .2 Geotextiles: to Section 31 32 19.01 - Geotextiles.

Part 3 EXECUTION

3.1 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.
- .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 Protect existing features in accordance.
- .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 Departmental Representative 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.

3.4 STOCKPILING

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 DEWATERING AND HEAVE PROTECTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative 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 accordance with Section 01 35 43 - Environmental Procedures in approved 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.

3.6 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as directed by Departmental Representative.
- .3 Remove concrete, paving, demolished foundations and rubble and other obstructions encountered during excavation.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 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.
- .6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material in approved location.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

- .12 Notify Departmental Representative when bottom of excavation is reached.
- .13 Obtain Departmental Representative approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .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.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated.
- .2 Place bedding and surround material in unfrozen condition.

3.8 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 300 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 1 m.

- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .6 Place unshrinkable fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage system in backfill as directed by Departmental Representative.

3.9 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 11 - Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 – Excavating, trenching and backfilling.
- .2 Section 31 37 00 – Rip Rap

1.2 MEASUREMENT PROCEDURES

- .1 Measure geotextiles in square metres of surface covered by material for geotextiles used as separation between granular sub-base and infrastructure. No allowance will be made for seams and overlaps.
- .2 No measurements will be done for geotextiles used in rip-rap for culverts. The costs for these geotextiles will be included in the unit price of the pipe culverts.

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D4491-99a(2014), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .2 ASTM D4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .3 ASTM D4716-14, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .4 ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-M89(2013), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Submit to Departmental Representative copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, debris and rodents.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/demolition waste management and disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material for recycling in accordance with Waste Management Plan.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 PRODUCTS

2.1 MATERIAL

- .1 Geotextile: woven or non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 3,5 m minimum.
 - .2 Length: 50 m minimum.
 - .3 Composed of: minimum 85% by mass of polypropylene.
- .2 Use :
 - .1 Separation between granular sub-base and infrastructure : TEXEL 7609 or approved equivalent, by Departmental Representative.
 - .2 Rip rap: TEXEL 7612 or approved equivalent, by Departmental Representative

Part 3 EXECUTION

3.1 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 300 mm over previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

3.2 CLEANING

- .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Section 31 32 19.01 - Geotextiles.
- .3 Section 33 42 13 – Pipe culverts

1.2 MEASUREMENT PROCEDURES

- .1 Rip-rap payment will be included to culvert installation unit price.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate plastic, paper packaging, corrugated cardboard, in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Fold up metal banding, flatten and place in designated area for recycling.
- .5 Divert left over aggregate materials from landfill to local quarry for reuse as approved by Departmental Representative.
- .6 Divert left over geotextiles to local plastic recycling facility as approved by Departmental Representative.

Part 2 PRODUCTS

2.1 STONE

- .1 Hard, dense, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
 - .1 Hand placed rip-rap:
 - .1 Stones sizes from 100 mm to 200 mm.

2.2 GEOTEXTILE FILTER

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

Part 3 EXECUTION

3.1 PLACING

- .1 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .2 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.
- .3 Place rip-rap to thickness and details as indicated.
- .4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .5 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