PART 1 - GENERAL

1.1 Description of Work

This Section includes but is not limited to the the following:

.1 All normal sitework and removals as required to complete the work. All items to be verified by a site visit prior to submission of a tender.

1.2 Related Work

.1 Refer to other specification sections for related information.

.2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.

1.3 Submissions

.1 Methodology:
.1 When requested provide methodology for carrying out the work

.2 Provide submission in accordance with **Section 01 33 00.**

1.4 Protection

.1 Prevent movement, settlement or damage of adjacent structures. Provided bracing and shoring as required. In event of damage, immediately replace such items or make repairs to approval of *Departmental Representative* and at no additional cost to *Departmental Representative*.

.2 Prevent debris from going adrift and becoming a menace to navigation.

.3 All damage to existing structures, roadways, pipelines, electrical systems not specified for removal to be repaired at the Contractor's cost to the satisfaction of the *Departmental Representative*.

1.5 Measurement for Payment

.1 Sitework, demolition and removals will be measured in accordance with **Section 01 29 00.**

PART 2 - PRODUCTS Not applicable.

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site and verify with *Departmental Representative* items designated for removal and items to be preserved.

.2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

.3 Provide temporary power and lighting as shown on the plan or as required by the *Departmental Representative*.

.4 Existing fill and vent pipes, oil waste tanks and underground storage tanks to be protected from any damages. All repairs to damages as a result of Contractor's operations to be at his cost and to the satisfaction of the *Departmental Representative*.

3.2 Removal

.1 Remove items indicated.

.2 Do not disturb adjacent structures designated to remain in place.

.3 At end of each day's work, leave work in safe condition so no part is in danger of toppling or falling.

3.3 Disposal of Material

.1 Disposal of materials not designated for salvage or re-use in work, will be the contractor's responsibility, and must be disposed of off-site.

.2 The material to be disposed is to be transported and disposed of in an environmentally acceptable manner to the satisfaction of the *Departmental Representative*, and in accordance with any local, Municipal, Provincial and Federal restrictions and regulations.

3.4 Restoration

.1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

.2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work. Match condition of adjacent, undisturbed areas.

PART 1 - GENERAL

1.1 General

.1 The aggregate material will include but not be limited to ditch lining granular, drainage blanket, and interior cell drain material.

1.2 Related Work

.1 Refer to other Specification Sections for related information.

.2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.

1.3 Source Approval

.1 Source of materials to be incorporated into work or stockpiled requires acceptance.

.2 Inform *Departmental Representative* of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.

.3 If, in opinion of *Departmental Representative*, materials from the proposed source do not meet, or cannot reasonably be processed to meet specified requirements, procure an alternative source to demonstrate that materials from source in question can be processed to meet specified requirements.

.4 Should a change of material source be proposed during work, advise *Departmental Representative* 2 weeks in advance of proposed change to allow sampling and testing.

.5 Acceptance of material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

1.4 Production Sampling

.1 Aggregate will be subject to continual sampling during production.

.2 Inform *Departmental Representative* of proposed source of aggregates and provide access for sampling 2 weeks minimum before starting production.

1.5 Measurement for Payment

.1 This item will not be measured separately.

PART 2 - PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material or other deleterious substances.

.2 Flat and elongated particles of course aggregate: to ASTM D4791.
- .1 Greatest dimension to exceed four times least dimension.

.3 Fine aggregates satisfying requirements of applicable section shall be one, or a blend of following:
- .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag

.4 Coarse aggregates satisfying requirements of applicable section shall be one 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.

.5 Drainage blanket and interior cell drainage: crushed and screened rock. Gradation shall be dense uniform and as follows

.1 C4 Clear Stone (NSTIR Standard Spec)

ASTM SIEVE SIZE	% PASSING BY MASS
112 mm	100
80 mm	90 – 100
28 mm	0 - 10

.6 Interior cell drainage cap: crushed and screened rock. Gradation shall be dense uniform and as follows

.1 C2 Clear Stone (NSTIR Standard Spec)

ASTM SIEVE SIZE	% PASSING BY MASS
200 mm	100
150 mm	90 – 100
112 mm	0 - 10

.7 Ditch liner Type 2: crushed and screened rock or gravel. Gradation will be within the following limits (Type 2 NSTIR):

ASTM SIEVE SIZE	% PASSING BY MASS
80 mm	100
56 mm	70 - 100
28 mm	50 - 80
14 mm	35 - 65
5 mm	20 - 50
0.16 mm	3 - 10
0.08 mm	0 - 7

PART 3 - EXECUTION

3.1 Development of Aggregate Source

.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 as directed by the *Departmental Representative*.

.2 Clear, grub and strip an area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.3 When operating in stratified deposits use excavation equipment and methods that will produce a uniform, homogeneous aggregate.

.4 When excavation is completed, 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 a neat condition.

3.2 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregate as required to obtain gradation requirements specified. Use approved methods and equipment.

.3 Blending to increase percentage of crushed particles or decrease percentage of flat and elongated particles is permitted.

.4 Wash aggregates if required to meet specifications. Use only equipment accepted by *Departmental Representative*.

.5 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

3.3 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

3.4 Stockpiling

.1 Stockpiling aggregates on stabilized, clean and well drained surfaces.

.2 Except where stockpiled on acceptable 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 stockpile into work.

.3 Stockpile far enough apart to prevent intermixing.

.4 Reject intermixed or contaminated materials. Remove and dispose of rejected materials as directed within 48 hours of rejection.

.5 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 fine aggregate and subbase materials.
.3 Max 1.5 m for other materials.

.6 Complete each layer over entire stockpile area before beginning next layer.

.7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.8 Coning of piles or spilling of material over edges of pile will not be permitted.

.9 Do not use conveying stackers.

PART 1 - GENERAL

1.1 Description

.1 This section specifies requirements for excavating, trenching and backfilling.

1.2 Reference Standards

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
- .3 ASTM D422-632002, Standard Test Method for Particle-Size Analysis in Soils.
- .4 ASTM D698-12e1 (or latest edition), Standard Compaction Characteristics of Soil Using Standard Effort (600kN-m/m^3).
- .5 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 AASHTO T99-94 (or latest edition) Moisture-Density Relations of Soils Using a 5.5-lb. Rammer

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.4 Nova Scotia Transportation and Infrastructure Renewal

1.3 Related Work

.1 Refer to other Specification Sections for related information.

1.4 Definitions

.1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials such as asphalt which can be ripped and excavated with heavy construction equipment.

1.5 Protection of Existing Features

.1 Existing buried utilities and structures:

.1 Prior to commencing any excavation work, notify applicable owner or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.

.2 Existing surface features:

.1 Protect existing surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.

1.6 Shoring and Bracing

.1 Comply with applicable local regulations to protect existing features.

1.9 Measurement for Payment

.1 Work performed under this Section will be defined by section 01 29 00 Measure for Payment.

PART 3 - EXECUTION

3.1 Site Preparation

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 Stockpiling

.1 Stockpile fill materials in areas approved by *Departmental Representative*. Stockpile granular materials in manner to prevent segregation.

3.3 Dewatering

.1 Keep excavations free of water while work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water in a manner not detrimental to public and private property, or any

portion of work completed or under construction.

3.4 Excavation

.1 Excavate to lines, grades, elevations and dimensions indicted or as directed by *Departmental Representative*.

.2 Dispose of surplus and unsuitable excavated material on site at the discretion of the *Departmental Representative*.

.3 Do not obstruct flow of surface drainage or natural watercourses.

.4 Stockpile suitable excavated materials required for backfill in approved location.

3.5 Trench Bottom Preparation

.1 Where required due to removal of unsuitable material or unauthorized over-excavation bring bottom of excavation to design grade with approved material.

.2 Compact trench bottom to density at least equal to density of adjacent surrounding soil.

3.6 Pre-Installation Inspection

.1 Excavations require inspection and approval prior to commencement of installation operations.

3.7 Backfilling

.1 Do not proceed with backfilling operations until *Departmental Representative* has inspected and approved installations.

.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 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Place material by hand under, around, and over installations until 300 mm of cover is provided. Dumping material directly on installations will not be

permitted.

.5 Place backfill material in uniform layers not exceeding 150 mm in thickness up to subgrade elevation or top of trench. Compact each layer before placing succeeding layer.

.6 Compact common backfill materials:
.1 In non-pavement areas, to a density at least equal to density of adjacent, undisturbed soil.

.7 Compact granular backfill material to a minimum 95% of corrected maximum dry density, maximum density AASHTO T99-74 (or latest edition), Method C.

.8 Compact using approved mechanical tamping devices, or by hand tamping to achieve specified compaction.

3.8 Restoration

.1 Upon completion of work, remove surplus materials and debris and correct defects noted by *Departmental Representative*.

.2 Clean and reinstate areas affected by work as directed by *Departmental Representative.*

PART 3 – Execution

1. Grading

.1 Rough grade to levels, profiles, and contours as shown on drawings allowing for surface treatment as indicated.

.2 Grade ditches to depth required for maximum run-off as indicated and as directed.

.3 Proof roll filled and disturbed areas to confirm stability. Berms should be proof rolled with a heavy sheepsfoot compactor, and subsequently smooth-drum rolled prior to replacement of turf and topsoil to ensure there are no soft areas.

.4 Place material in berms in layers not to Exceed 600mm, proof roll each layer to the satisfaction of the *Departmental Representative.* Compact each layer before placement of the next layer.

.5 The contractor is advised that the *Departmental Representative* may make any adjustments to the final grades to allow for variations in the actual conditions encountered in the field. The final grades of the berms and soil disposal areas may only be varied from that shown on the Drawings with the authorization of the *Departmental Representative.*

.6 The Contractor is advised that soft areas may exist at the cell surfaces which may be caused by variations in the composition, density, grain size, or moisture content of the soil or till. The contractor shall improve all soft areas on the final surface of the cell, as identified by the *Departmental Representative.* Techniques to improve the soft area shall consist of mixing the soils or till with drier and or more granular till or soil, replacement of the soft area with the suitable fill, or other appropriate remedial measures, as approved by the *Departmental Representative.*

.7 Excavated soft material from the improved soft areas may be distributed within the cell berm material if it does not affect the construction and performance of the intent of the containment cell to the satisfaction of the *Departmental Representative.*

.8 Any debris (e.g. boulders, concrete pieces, wood etc) encountered during the construction of the cell shall be reported to the *Departmental Representative.* Such material will be disposed at the discretion of the *Departmental Representative.*

PART 1 – GENERAL

1. The Work

.1 The work includes all labour, equipment and materials to preform the work as shown on the drawings and as specified, which includes the drainage blanket and interior cell drainage.

2. Section Includes

.1 Materials and installation of polymeric geotextiles used in drainage blanket and interior cell drainage, the purpose of which is to:
.1 Separate and prevent mixing of granular materials of different grading.
.2 Act as hydraulic filters permitting passage of water while retaining soil strength of the granular structure.

3. Related Sections

.1 Section 31 23 10 Excavation and Backfilling.

4. References

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM D 4491-99a, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.2 ASTM D 4595-2005, or most recent, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
.3 ASTM D 4716-2008, or most recent, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
.4 ATSM D 4751-99a, or most recent, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standard Board (CGSB)
.1 CAN/CGSB-4 No. 11.2-M89 (April 1997 or most recent), Textile Test Methods –

Bursting Strength – Ball Burst Test (Extension of September 1998).
.2 CAN/CGSB-148.1, Method of Testing Geotextiles and Complete Geomembranes.
.1 No.2-M85, Method 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.

.5 Submittals

.1 Submit to Departmental Representative following samples at least 2 weeks prior to beginning work.
.1 Minimum length of 2m of roll width of geotextile.
.2 Minimum of 1m seam with at least 300mm of geotextile on both sides of seam.

.2 Submit to the *Departmental Representative* copies of mill test data and certificate of at least four (2) weeks prior to start of work, and in accordance with Section 01 33 00.

.6 Approval

.1 Obtain written approval of *Departmental Representative* for filter fabric before installation of material in work.

.7 Delivery, Storage and Handling

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

PART 2 – PRODUCTS

.1 Materials

.1 Geotextile: Fabric: nonwoven polyester and/or polypropylene fabric., supplied in rolls.
  .1 Width: 3.5m minimum
  .2 Length: 150m minimum
.2 Physical properties:
  .1 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
    .1 Breaking force: minimum 690N, wet condition.
    .2 Elongation at future: 70-100%.
  .2 Ball burst strength: to CAN/CGSB-4.2, No.11.2, minimum N, wet condition.
  .3 Bursting strength: to CAN/CGSB-148.1, No.6.1 minimum 1900kPa, wet condition.
.3 Factory seams: sewn in accordance with manufacturer’s recommendations.
.4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
.5 Synthetic fiber: rot proof, unaffected by action of oil or salt water and not subject to attack by insects or rodents.

PART 3 – EXECUTION

.1 Installation

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position. Fine grade area to be covered with filter fabric to a uniform surface area. Fill depressions with suitable material.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Overlap each successive strip of geotextile 600mm over previously laid strip.

.4 Join successive strips of geotextile by sewing.

.5 Anchor top and bottom of fabric at 1 metre intervals with 15mm diameter steel rods 600 mm in length.

.6 Protect installed geotextile material form displacement, damage or deterioration before, during and after placement of material layers.

.7 After installation, cover with overlapping layer within one (1) day of placement.

.8 Replace damaged or deteriorated geotextile to approval of *Departmental Representative.*

.9 Place and compact soil layers in accordance with Section 31 23 10 Excavation, Trenching and Backfilling and Section

.10 Care must be taken in placing Rip Rap or backfill material to prevent tearing of the geotextile when placed directly on the geotextile.

.11 No equipment shall be operated on the geotextile without permission from the *Departmental Representative.*

2. Cleaning

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

3. Protection

.1 Vehicular traffic not permitted directly on geotextile.