PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 43 – Environmental Procedures.

.3 Section 31 23 10 – Excavation, Trenching and Backfilling.

.4 Section 31 24 13 – Excavation, Embankment and Compaction.

.5 Section 32 11 23 – Fill Materials

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
  .1 ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
  .2 ASTM D 5744-07 Standard Test Method for Laboratory Weathering of Solid Materials Using a Humidity Cell.

1.3 SUBMISSIONS AND SAMPLES

.1 Sampling and testing of aggregates required to confirm compliance with the specifications is the responsibility of Contractor.

.2 Inform Departmental Representative at least two (2) weeks prior to commencing Work and prior to changing proposed source(s) of fill materials and provide access to the Departmental Representative for inspection and/or sampling.

.3 Departmental Representative may, at his/her discretion, carry out confirmatory testing of aggregates. Submit 70 kg samples of aggregates in accordance with Section 01 33 00 - Submittal Procedures, if requested by Departmental Representative. Samples may be requested by the Departmental Representative from the borrow area, production line, stockpiles or in-situ after placement. The cost of sampling and repairing areas from in-situ after placement sampling shall be borne by

Contractor.

.4 Pay the cost of testing of aggregates by Departmental Representative which fail to meet specified requirements.

.5 Submit laboratory test results confirming all materials are non-acid rock drainage (ARD) generating.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Waste Management Plan Section 01 35 43 - Environmental Procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aggregate quality of Type 1 and Type 2 granulars, riprap, and clear stone: 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 Clear stone, Type 1, and Type 2 granulars shall be produced from crushed or fractured bedrock fragments with 100% fractured faces or crushed from cobbles or boulders greater than 300 mm diameter and shall not deteriorate when exposed to air and water and shall be resistant to deterioration by cycles of wetting, drying, freezing, and thawing.

.3 For Type 1 and Type 2 granular fill, particles shall be flat and elongated, coarse aggregate: to ASTM D 4791.
.1 Greatest dimension not to exceed two times least dimension.

.4 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.

.5 Coarse aggregates for Type 1 and Type 2 granular fill satisfying requirements of applicable section to be crushed rock.

Part 3 - Execution

3.1 PREPARATION

1. Handling

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

.2 Stockpiling

.1 Stockpile aggregates on site in locations as directed.

.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 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 fine aggregate and sub-base materials.

.3 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. No payment will be made to the contractor for unused aggregates and the stockpiles shall be measured jointly by the Contractor and the Departmental Representative to determine any adjustments to be made to the total quantity of aggregates. Unused aggregate shall be removed from the site by the Contractor after measurement.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 30 - Health and Safety for Contaminated Sites.

.3 Section 01 35 43 - Environmental Procedures.

.4 Section 32 11 23 – Fill Materials.

1.2 MEASUREMENT PROCEDURES:

.1 Excavated materials will be measured in cubic metres of material excavated, transported and placed in accordance with the drawings and specifications.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM C 117-03, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 136-01, Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
- .3 ASTM D 422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D 698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).
- .5 ASTM D 1557-[02e1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ^{3}) (2,700 kN-m/m ^{3}).
- .6 ASTM D 4318-00, 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-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
.2 CAN/CSA-A23.1/A23.2-00 (August 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.4 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.5 Appendix A - *Edwards Pond Enhancements - Detailed Design, Design Study: Geotechnical Investigation for Outlet Control Structure*, Draft Report Prepared by Stantec Consulting, October 2010.

.6 Appendix B - *Borehole and Sediment Sampling Program, Edwards Pond, Former Princess Mine Site, Sydney Mines, Nova Scotia,* letter report prepared by Jacques Whitford, October 2007.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Co-ordinate submittal requirements.

.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, location plan of relocated and abandoned services, as required.

1.5 QUALITY ASSURANCE

.1 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

1.6 EXISTING CONDITIONS

.1 Examine investigation reports, Appendix A, B, which are available for viewing at the Public Works and Government Services office at 308 George Street in Sydney.

.2 The test pit, borehole, monitoring well and test hole logs will not reveal all conditions that exist or can occur on the site. Should subsurface conditions be found to vary substantially from these records, immediately notify the Departmental Representative.

.3 Before commencing work, conduct with Departmental Representative, a condition survey of existing structures, service poles, roads, monitoring wells, culverts, survey bench marks and monuments which may be affected by work.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Materials: properties to Section 32 11 23 – Fill Materials.

PART 3 - EXECUTION

3.1 SITE PREPARATION

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

indicated.

.2 Complete clearing and grubbing as required.

3.2 STRIPPING OF TOPSOIL

.1 Not Used.

3.3 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 30 - Health and Safety Requirements and Health and Safety Act for the Province of Nova Scotia.

.2 Construct temporary Works to depths, heights and locations as indicated or approved by Departmental Representative.

3.4 DEWATERING AND HEAVE PREVENTION

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

.2 Submit for Departmental Representative review details of proposed dewatering methods.

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

.4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas and or licensed disposal facility 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.

.5 Provide settling basins, or other treatment facilities to remove suspended

solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.5 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 indicated and as directed by Departmental Representative.

.3 As directed by the Departmental Representative, remove and dispose of concrete, masonry, demolished foundations and rubble and other obstructions encountered during excavation.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 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 at end of day's operation.

.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 as directed by the Departmental Representative.

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

.10 Notify Departmental Representative when bottom of excavation is reached.

.11 Obtain Departmental Representative approval of completed excavation.

.12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

3.6 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum standard dry density obtained from ASTM D 698 standard.
- .1 Type 1 Granular Fill – compact to 98% corrected maximum dry density.
- .2 Type 2 Granular Fill – compact to 98% corrected maximum dry density.
- .3 Imported till – compact to 93% corrected maximum dry density, except under roadways and walk areas, which shall be compacted to 95% corrected maximum dry density.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Not Used.

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.

.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.

.1 Compact backfill to corrected maximum dry density to ASTM D698, as follows:

.1 93% for site fill areas.

.2 95% under roadways and walk areas.

3.9 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 11 - Cleaning, trim slopes, and correct defects as directed by Departmental Representative.

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

.3 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures

.2 Section 32 11 23 - Fill Materials.

1.2 SECTION INCLUDES

.1 This Section specifies the requirements for excavation and on-site disposal (fill placement) of Fill Material as required for:

- .1 Excavation, transportation, placement, grading, compaction of soil and mine waste impacted sediments within the limits of the work shown on the Drawings. Limits may be adjusted in the field based on visual observation by the Departmental Representative.
- .2 For the purpose of this Section, native soil underlying mine waste impacted sediments and excavated to the lines and grades indicated on the drawings is considered the same as Fill material.
- .3 Sediments impacted by mine waste and excavated in the course of the work will be segregated from non-impacted fill materials, transported to the centre base of the weir approach berms, placed, compacted and covered with clean materials.
- .4 Final grading and rolling of all fill surfaces.

1.3 MEASUREMENT PROCEDURES

.1 Payment for excavation and placement of Fill Material shall be based on the tendered unit price and in accordance with Section 01 22 16. The contractor shall be responsible to make its own measurement for payment and all information and calculations shall be submitted with their request for progress payment for verification at the discretion of the Departmental Representative. Any survey information required for measurements shall be completed by a registered surveyor engaged by the contractor and all surveys shall be stamped and signed by the surveyor.

.2 The limits of applicable Fill Material excavations shall be defined for payment purposes by the neat lines regardless of the actual extent of excavation that may increase due to safety, stability or seepage control requirements.
Contractor shall carry out all necessary investigations with regard to safety and slope stability/seepage control requirements prior to bidding.

.3 Disposal of excavated Fill Material, which involves loading, hauling, dumping, spreading, adjusting moisture content and compacting to the neat lines, as required for reshaping of the surface, shall be paid for in accordance with Section 01 22 16 - Measurement and Payment.

.4 No separate payments will be made for:
- .1 Excavating beyond lines and grades shown on Drawings or established by Departmental Representative.
- .2 Ripping of material.
- .3 Scarifying or benching existing slopes or existing surfaces.
- .4 Removing and disposing of roots, stumps and other materials excavated.
- .5 Removing unsuitable material from the surface attributable to negligence.
- .6 Unauthorized borrow.
- .7 Watering, drying and compacting.
- .8 Over-build of Fill Material lifts to permit compaction to the neat lines, and subsequent removal and disposal of the overbuilt material.
- .9 Finishing.
- .10 Overhaul.
- .11 Dewatering, sediment and dust control required for conducting the Work.
- .12 Excavating test pits that may be requested by Departmental Representative to examine and/or sample for testing Fill Materials and/or soils.
- .13 Grading of excavated subgrade where required for efficient construction of Cover Materials.

1.4 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 117-95, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D 422-98, Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
.5 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).
.6 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Appendix A - *Edwards Pond Enhancements - Detailed Design, Design Study: Geotechnical Investigation for Outlet Control Structure*, Draft Report Prepared by Stantec Consulting, October 2010.

.3 Appendix B - *Borehole and Sediment Sampling Program, Edwards Pond, Former Princess Mine Site, Sydney Mines, Nova Scotia,* letter report prepared by Jacques Whitford, October 2007.

1.5 DEFINITIONS

.1 Excavation of Fill Material: excavation of materials of whatever nature as indicated on Drawings or specified by Departmental Representative, including weak or fractured bedrock or rock fragments which can be removed by means of heavy duty mechanical excavation equipment.

1.6 EXISTING CONDITIONS

.1 Examine subsurface investigation reports, Appendices A and B, which are available for viewing at the Public Works and Government Services office at 308 George Street in Sydney.

.2 The test pit, borehole, and monitoring well logs will not reveal all conditions that exist or can occur on the site.

Should subsurface conditions be found to vary substantially from these records, immediately notify the Departmental Representative.

.3 Before commencing work, conduct with Departmental Representative, a condition survey of existing structures, service poles, roads, monitoring wells, culverts, survey bench marks and monuments which may be affected by work.

.4 Refer to dewatering in Section 31 23 10 - Excavating, Trenching and Backfilling.

PART 2 - Products

2.1 Materials

.1 Fill Material used for shaping the surface shall not contain frozen lumps, weeds, sod, roots, logs, stumps or other material unsuitable for compaction or maintaining long-term stability of the area.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Ensure in pre-bidding examination of the site that the lines and grades of the existing site are accurately known.

.2 Determine location of all buried electrical services, water lines, and drains, which may be affected by the Work.

3.2 GRADING

.1 Grade, using cut-and-fill technique, final excavated surface/subgrade to smooth and gently sloping configuration, where required for proper and efficient placement of cover material. Compaction requirements for the storage piles subgrade will be determined in the field using a rolling pattern and compacted to satisfaction of Departmental Representative.

.2 Shape and roll/compact subgrade to specified compaction to minimize increased moisture content from precipitation; do not allow

traffic on prepared areas. Wet areas of the storage piles subgrade may require temporary drainage to be implemented prior to compaction and such temporary drainage is considered incidental to the price for grading.

.3 All areas of site subgrade receiving covers shall be proof-rolled using a vibratory Drum Roller (minimum 8 tonne) in the presence of the Departmental Representative to assess/identify soft areas.

3.3 WATER DISTRIBUTORS

.1 Apply water with equipment capable of uniform distribution.

3.4 EXCAVATION

.1 General:
- .1 Excavate to lines, grades, and coordinates indicated on the drawings and as established by the Departmental Representative.
- .2 Notify Departmental Representative when fill materials are encountered below expected depths.
- .3 Departmental Representative will examine, and may conduct testing to determine the actual extent and depth of excavation.
- .4 Departmental Representative may request excavating test pits in advance of site fills excavation to permit examination and/or sampling of fills. Contractor shall promptly excavate such test pits.

.2 Drainage:
- .1 During construction, maintain profiles, crowns and cross slopes to provide good surface drainage.
- .2 Provide ditches as work progresses to provide drainage.
- .3 Construct temporary ditches as required or as directed before excavating or placing fill to facilitate drainage and drying of material.

.3 Excavation by blasting will not be permitted.

3.5 FILL

.1 Break up, scarify, or bench existing surfaces, slopes or sloping sections to ensure proper bond between new materials and existing surfaces. Method used to be subject to prior review by Departmental Representative.

.2 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized by Departmental Representative.

.3 Maintain crowned surface of fill during construction to ensure ready run-off of surface water.

.4 Drain low areas before placing materials.

.5 Place and compact to full width in layers not exceeding 300 mm in loose thickness.

3.6 COMPACTION

.1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

.2 Compact each layer to minimum density as specified for the various material types and applications.

.3 Overbuild horizontally fill lifts if required to achieve specified compaction to the neat (finished) slope lines. Remove all loose material from the consolidated waste pile prior to cover construction.

3.7 FINISHING

.1 Shape entire surface to conform with design elevations and grades.

.2 Finish slopes true to lines, grades and drawings where applicable.

.3 Hand finish slopes that cannot be finished satisfactorily by machine.

.4 Run tractor tracks over slopes to leave tracks parallel to finished face or undertake a similar procedure.

3.8 PROTECTION

.1 Maintain finished surfaces in condition

conforming to this section until reviewed by Departmental Representative and placement of cover materials is undertaken.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 10 - Excavation, Trenching and Backfilling.

.2 Section 31 24 13 - Excavation, Embankment and Compaction.

1.2 MEASUREMENT PROCEDURES

.1 Reshaping of the roadway subgrade is considered incidental to the work and no measurements will be taken.

1.3 REFERENCES

All references latest edition.

.1 American Society for Testing and Materials International (ASTM).
.1 ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.4 DEFINITIONS

.1 Reshaping subgrade: scarifying, pulverizing, blading, reshaping and recompacting existing subgrade surface.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 SCARIFYING AND RESHAPING

.1 Scarify subgrade to full width as indicated and to minimum depth of 75 mm.

.2 Pulverize and break down scarified material to 50 mm maximum soil clod size, except that stones larger than this size may be left intact as directed by Departmental Representative.

.3 Blade and trim pulverized material to elevation and cross section dimensions as indicated.

.4 Where deficiency of material exists, add and blend additional subgrade material as directed by Departmental Representative.

.5 Re-use excess material in areas of material deficiency as directed by Departmental Representative.

3.2 COMPACTING

.1 Compact to density not less than 98% corrected maximum dry density in accordance with ASTM D698.

.2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.

.3 Apply water as necessary during compaction to obtain specified density.

.4 Wetting or drying of the fill shall be carried out as required to obtain the optimum moisture content for compaction in accordance with ASTM D 698.

3.3 SITE TOLERANCES

.1 Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated.

3.4 PROTECTION

.1 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until Departmental Representative’s acceptance.

3.5 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 24 13 – Excavation, Embankment and Compaction.

1.2 SECTION INCLUDES

.1 This section specifies requirements for supply of materials, labour, equipment testing and installing geotextiles. Materials and installation of geotextiles used to:

.1 Separate and prevent mixing of granular materials of different grading.

1.3 MEASUREMENT PROCEDURES

.1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.4 REFERENCES

All references latest edition:

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM D 4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D 4595, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D 4716, Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.4 ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.5 ASTM D 4873 Guide for Identification, Storage and Handling of Geotextiles.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.2, 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, Methods of Testing Geosynthetics - Mass per Unit Area.
- .2 No.3, Methods of Testing Geosynthetics - Thickness of Geotextiles.
- .3 No.6.1, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
- .4 No.7.3, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
- .5 No. 10, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

.3 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS 1860, Material Specification for Geotextiles.

1.5 SUBMITTALS

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

.2 Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work.
- .1 Minimum length of 2 m of roll width of geotextile.
- .2 Minimum of 1 m seam with at least 300 mm of geotextile on both sides of seam.

.3 Submit to Departmental Representative 2 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.

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 35 43 – Environmental Procedures.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

PART 2 - PRODUCTS

2.1 MATERIAL

The following geotextile fabric and related engineered synthetic products are to be supplied and installed as noted on the drawings:

.1 Non-Woven Geotextile Fabric:
- .1 Non-woven synthetic fibre fabric, supplied in rolls.
  - .1 Width: 4.5 m minimum.
  - .2 Length: 91.5 m minimum.
  - .3 Composed of: minimum 85% by mass of polypropylene.
- .2 Physical properties:
  - .1 Mass per unit area: to ASTM D5261, minimum 200 g/m².
  - .2 Tensile strength and elongation in any principal direction): to ASTM D 4632.
    - .1 Tensile strength: minimum 690 N, wet condition.
    - .2 Elongation at break: minimum 45%.
    - .3 Mullen burst strength: to ASTM D3786, minimum 1700 kPa.
  - .3 Hydraulic properties:
    - .1 Apparent opening size (AOS): to ASTM D 4751, .212 um.
    - .2 Permitivity: to ASTM D4491, 1.6 sec-1.
    - .3 Permeability: to ASTM D 4491, minimum 1.3 cm/sec.
    - .4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-Dipped galvanized with minimum zinc coating of 600 g/m2 to CAN/CSA G164.
    - .5 Factory seams: sewn in accordance with manufacturer's recommendations.
    - .6 Thread for sewn seams: equal or better resistance to chemical and biological

degradation than geotextile.

PART 3 - EXECUTION

3.1 GEOTEXTILE INSTALLATION

.1 Place geotextile material by unrolling onto graded surface approved by Departmental Representative in orientation, manner and locations indicated and retain in position with securing pins.

.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 strips 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 300 mm interval at mid point 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 24 13- Excavation, Embankment and Compaction.

.11 For installation of erosion control blanket provide one soil staple per 3 m^2 of blanket area or as per manufacturers recommendation, whichever is more stringent requirement.

3.3 CLEANING

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

3.4 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.