PART 1 – GENERAL

1.1 RELATED SECTIONS

.1 Section 310099 – Earthworks for Minor Works

.2 Section 312313 – Rough Grading.

1.2 BASIS OF PAYMENT

.1 Measurement Procedures:

.1 Item L-002: River Stone. Measure supply and installation of River Stone at locations indicated on drawings, including excavation, geotextile and edge restraints square meters. Payment of the unit price bid (sq. meters) will be for full compensation for all labour, materials and equipment to do the work.

.2 Stone Dust. Supply and installation of Stone Dust at locations indicated on drawings include excavation and crushed stone. The lump sum price bid will be for full compensation for all labour, materials and equipment to do the work.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 136-14, Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C 117-13, Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM E 11-15, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves.

.4 ASTM D 4318-10e1, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.5 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))

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

.1 ASTM D4491M-15, 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 D4716M-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.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.2-M89(R2013), 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.

.5 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.

.6 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS 1860-March 1998 (rev. 2012), Material Specification for Geotextiles.

1.4 SUBMITTALS

.1 Submit at least 15 days prior to beginning work two (2) samples of 25 mm diameter river stones and of the stone dust.

.2 Submit a technical sheet containing the following data concerning the sampling and testing of materials:
- .1 Stone grain size analysis;
- .2 Technical data sheets of Geotextile and Aluminium edging
- .3 Technical data sheet for the Organic Binding Agent.

1.5 PROTECTION

.1 Prevent any damage to buildings, landscaping, curbs, sidewalks, trees, fences, roads and adjacent property. Make good any damage.

.2 Provide access to building at all times. Coordinate paving schedule to minimize interference with normal use of premises.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Infrastructures, below grade, and crushed stone or gravel base must be assembled according to present specifications and civil engineering specifications.

.2 25 mm diameter river stone.

.3 Straight aluminium edging including stakes as specified in Landscape architecture drawings. Straight aluminium edging must be 5 mm thick and 100 mm height. Stakes must be 300 mm and restrained inside the edging.

.4 Non-woven, mechanically bonded geotextile with following properties:

Physical and mechanical properties		
Properties	**Prescription**	**Testing methods**
Tensile strength	min. 530 N	CAN/CGSB-148.1, No 7.3
Elongation at break	min. 55 %	CAN/CGSB-148.1, No 7.3
Trapezoid tear	min. 235 N	CAN/CGSB-4.2, No 12.2
Mullen burst	min. 1550 kPa	CAN/CGSB-4.2, No 11.1
Permeability	min. 0,9 mm/s	CAN/CGSB-148.1, No 4
Opening	max. 100 Fm	CAN/CGSB-148.1, No 10
Thickness	min. 1,1 mm	CAN/CGSB-148.1, No 3

.5 Accessories: Securing pins compliant with standard CAN/CSA-G40.21, nuance 300W, hot dipped galvanized, with a minimum 600 g/m2, in accordance with CAN/CSA G164 standard.

.6 Granite stone dust with a gradation ranging between 0 mm to 5.0 mm in size. Colour beige. The colours will be approved upon presentation of samples.

Gradation 0 - 5,0 mm CSA

Sieve Size	**% Passing**
10 mm	100
5 mm	75 to 100
160 um	4 to 25
80 um	0 to10
Max. petrographic number	200
Durability, max. loss %	20
Plasticity of fine particules / fraction passing thourgh the 80mm sieve / Max. liquid limit	25
Plasticity index, max	6

.7 Do not deliver or install material when there is frost, when the ground is humid or muddy. Material must be supplied according to optimal humidity conditions for compaction determined with AASHTO T99 (ASTM D 698). Do not supply or install materials that have a humidity level that is too high (above those which are deemed optimal for compaction according to AASHTO T 99 (ASTM D 698)).

.8 Under all circumstances protect ground and materials from excess water and erosion. Protect stored materials from heavy rain and of water after compaction, allow enough time for drainage and drying of the surface in order to obtain the optimal humidity level required for compaction.

.9 Organic binding agent, non toxic, with no odor, incolor. Agent must come in a concentrated powder format.

PART 3 -EXECUTION

3.1 MEMBRANE INSTALLATION

.1 Geotextile membranes must be carried out according to what is described on drawings with following requirements.

.2 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with place.

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

.4 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

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

.6 Join successive strips of geotextile by sewing.

.7 Pin successive strips of geotextile with securing pins as indicated by manufacturer.

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

.9 After installation, cover with overlying layer within 4 h of placement

.10 Replace damaged or deteriorated geotextile to approval of Departmental Representative..

.11 Make sure geotextile ends protrude 150 mm along the perimeter as well as along openings. These can be cut to meet finished grade when work is completed.

.12 Install a temporary weight on membrane during installation.

3.2 PROTECTION MEASURES

.1 Vehicular traffic not permitted directly on geotextile.

3.3 CONDITIONS EXAM AND COORDINATION

.1 Contractor must verify on site-condition and levels prior to initiating work, and must report any anomaly to the Departmental Representative.

.2 Contractor must get approval for the implantation of the crushed stone surfaces by the Departmental Representative before proceeding with work.

3.4 RIVER STONE INSTALLATION

.1 When excavation is completed, verify ground levels and report any anomaly to Departmental Representative and await instructions before resuming work.

.2 Place river stone to meet finished grade.

3.5 STONE DUST INSTALLATION

.1 When the excavation work is completed, verify all levels and inform Departmental Representative of any abnormality. Wait for Department Representative's instruction before continuing the work.

.2 Stone dust surfaces must be at the same level as adjacent surfaces.

.3 Install limestone curbs around the stone dust surfaces.

.4 Install granular base according to specifications.

.5 Once granular base is installed, layout the stone dust. Mix the stone dust with the bonding agent before installation, following supplier's specifications. Compact stone dust to 95% P.M.

.6 Wet the stone dust surface with water as specified by supplier.

3.6 ACCEPTATION

.1 River Stone and stone dust surfaces surface must be uniform.

***** END OF SECTION *****