

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Aggregates: General

Page 1

PART 1 - GENERAL

- 1.1 Related Work
- .1 Section 32 11 02 - Granular Base
 - .2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.
- 1.2 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 4 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* 4 weeks in advance of proposed change to allow sampling and testing, and provide material test results to *Departmental Representative* for review.
 - .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.
- 1.3 Production Sampling
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Aggregate will be subject to continual sampling by Contractor during production.

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Aggregates: General

Page 2

- .3 Provide *Departmental Representative* with ready access to source and processed material for purpose of sampling and testing.
- .4 Install sampling facilities at discharge end of production conveyor, to allow Department Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Department Representative to permit full cross section sampling.
- .5 Pay cost of sampling and testing of aggregates to meet specified requirements.

1.4 Measurement for
Payment

- .1 No measurement for payment will be made under this section.

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 (to ASTM D4791) are those whose greatest dimension exceeds four times their least dimension.
- .3 Fine aggregates satisfying requirements of applicable section shall be one, or a blend of following:
 - .1 Natural sand
 - .2 Manufactured sand
 - .3 Screening 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 or slag

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Aggregates: General

Page 3

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- .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.

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 Where clearing is required, leave a screen of trees between cleared area and roadways as per the Guidelines.
- .3 Clear, grub and strip an area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
- .4 When operating in stratified deposits use excavation equipment and methods that will produce a uniform, homogeneous aggregate.
- .5 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.
- .6 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 if required to obtain gradation requirements specified. Use approved methods and equipment.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Aggregates: General

Page 4

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| | .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 <i>Departmental Representative</i> . | | | | | | |
| 3.3 | <u>Handling</u> | .1 Handle and transport aggregates to avoid segregation, contamination and degradation. | | | | | | |
| 3.4 | <u>Stockpiling</u> | .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Department Representative. Do not stockpile on completed pavement surfaces. Stockpile aggregates on stabilized, clean and well drained surfaces. | | | | | | |
| | .2 | 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. | | | | | | |
| | .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: <table border="0"><tr><td>.1</td><td>Max 1.5 m for coarse aggregate and base course materials.</td></tr><tr><td>.2</td><td>Max 1.5 m for fine aggregate and subbase materials.</td></tr><tr><td>.3</td><td>Max 1.5 m for other materials.</td></tr></table> | .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. |
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| .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. | | | | | | |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Aggregates: General

Page 5

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- .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 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.5 Aggregate StockpileClean-up

- .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 Department Representative.

3.6 Source Abandonment

- .1 For temporary or permanent abandonment of aggregate source, rehabilitate source to condition meeting requirements of the Guidelines.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Sitework, Demolition and Removals

Page 1

PART 1 - GENERAL

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| 1.1 <u>Description of Work</u> | This Section includes but is not limited to the following: <ul style="list-style-type: none">.1 All normal removals as required to complete the work. All items to be verified by a site visit prior to submission of a tender. All available plans of the existing structure are available for viewing at the Project Manager's office, 2nd floor, 1713 Bedford Row, Halifax, N.S..2 Any derricks, gas lines or buildings to be removed by others unless otherwise indicated. |
| 1.2 <u>Related Work</u> | <ul style="list-style-type: none">.1 Refer to other specification sections for related information..2 Refer to Section 01 33 00 for Shop Drawing/Submission requirements. |
| 1.3 <u>Submissions</u> | <ul style="list-style-type: none">.1 Methodology:<ul style="list-style-type: none">.1 When requested provide methodology for carrying out the work.2 Provide submission in accordance with Section 01 33 00. |
| 1.4 <u>Protection</u> | <ul style="list-style-type: none">.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 <i>Departmental Representative</i> and at no additional cost to <i>Departmental Representative</i>..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 |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Sitework, Demolition and Removals

Page 2

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
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Sitework, Demolition and Removals

Page 3

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.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 1

PART 1 - GENERAL

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|--------------------------------|---|----|---|----|---|----|--|
| 1.1 <u>Description</u> | .1 This section specifies requirements for excavating and backfilling for all underground lines, including drainage works, culverts, culvert extensions, etc. | | | | | | |
| 1.2 <u>Reference Standards</u> | <table border="0"><tr><td style="vertical-align: top; padding-right: 20px;">.1</td><td>ASTM C117-17. Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.2</td><td>ASTM C136-14. Method for Sieve Analysis of Fine and Coarse Aggregates.</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.3</td><td>ASTM D698. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).</td></tr></table> | .1 | ASTM C117-17. Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing. | .2 | ASTM C136-14. Method for Sieve Analysis of Fine and Coarse Aggregates. | .3 | ASTM D698. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ³). |
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| .3 | ASTM D698. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ³). | | | | | | |
| 1.3 <u>Related Work</u> | <table border="0"><tr><td style="vertical-align: top; padding-right: 20px;">.1</td><td>Section 31 23 13 - Rough Grading</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.2</td><td>Section 31 24 13 - Roadway Embankments</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.3</td><td>Section 33 42 13 - Storm Pipe Culverts (Storm and Sanitary)</td></tr></table> | .1 | Section 31 23 13 - Rough Grading | .2 | Section 31 24 13 - Roadway Embankments | .3 | Section 33 42 13 - Storm Pipe Culverts (Storm and Sanitary) |
| .1 | Section 31 23 13 - Rough Grading | | | | | | |
| .2 | Section 31 24 13 - Roadway Embankments | | | | | | |
| .3 | Section 33 42 13 - Storm Pipe Culverts (Storm and Sanitary) | | | | | | |
| 1.4 <u>Definitions</u> | <table border="0"><tr><td style="vertical-align: top; padding-right: 20px;">.1</td><td>Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1.5 m³.</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.2</td><td>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.</td></tr><tr><td style="vertical-align: top; padding-right: 20px;">.3</td><td>Selected Backfill: excavated on-site material suitable for grading work.</td></tr></table> | .1 | Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1.5 m ³ . | .2 | 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. | .3 | Selected Backfill: excavated on-site material suitable for grading work. |
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| .3 | Selected Backfill: excavated on-site material suitable for grading work. | | | | | | |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 2

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- 1.5 Protection of Existing Features
- .1 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. 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 buildings and surface features:
 - .1 Protect existing buildings and 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 Section 01 35 29 Health and Safety Requirements and applicable local regulations to protect existing features.
 - .2 Provide shoring and bracing as required to prevent movement, failure or settlement, to safeguard and maintain integrity of structures, utilities, earth, benchmarks, services and adjacent grades.
 - .3 Engage services of qualified Professional Engineer registered in the Province of New Brunswick to inspect and approve shoring equipment required for work.
- 1.7 Samples
- .1 At least 4 weeks prior to commencing work, inform *Departmental Representative* of proposed source of fill materials and provide access for sampling.
- 1.8 Measurement for Payment
- .1 Work performed under this Section will be incidental to work involved in other sections of this specification, and/or
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 3

included in the lump sum in accordance with Section 01 29 00.

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Granular Sub-Base material in accordance with **Section 32 11 16**.
 - .2 Granular Base material in accordance with **Section 32 11 02**.
 - .3 Armour Stone material in accordance with **Section 35 31 23**

PART 3 - EXECUTION

- 3.1 Site Preparation
- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
 - .2 Ensure clearing and grubbing on side slopes is complete prior to excavation for embankment widening.
- 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 Conduct dewatering operations in accordance with Section 01 35 44 - Environmental Protection Procedures.
 - .2 Keep excavations free of water while work is in progress.
 - .3 Protect open excavations against flooding and damage due to surface run-off.
 - .4 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 4

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- 3.4 Excavation
- .1 Excavate to lines, grades, elevations and dimensions indicated or as directed by *Departmental Representative*.
 - .2 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with New Brunswick Department of Environment regulations.
 - .3 Do not obstruct flow of surface drainage or natural watercourses.
 - .4 Stockpile suitable excavated materials required for backfill in approved location.
 - .5 Remove rubble and other obstructions encountered during excavation.
 - .6 For trench excavation, unless otherwise authorized by Department Representative in writing, do not excavate more than 30 metres of trench in advance of installation operations and do not leave open more than 10 metres at end of days operation.
 - .7 Obtain excavation permit prior to starting any on-site excavations.
- 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 Earth bottoms of excavations to be solid undisturbed soil, level, free from loose, soft or organic matter.
 - .3 Remove unsuitable material from trench bottom to extent and depth as directed by Department Representative.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 5

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- .4 Where required due to unauthorized over excavation, correct as follows:
- .1 Fill under bearing surfaces and footings with approved structure fill compacted to 100% Standard Proctor Dry Density.
 - .2 Fill under other areas compacted to a minimum of 95% Maximum Dry Density.
- 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 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .5 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 225 mm.
 - .6 Where earth pressures are liable to develop permit concrete to cure for minimum 28 days to withstand earth and compaction pressures. Do not install earth or backfill until concrete has cured completely.
 - .7 Place backfill materials of earth fill around structure in uniform layers not exceeding 200 mm compacted thickness up to
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001****Excavating and Backfilling**

Page 6

finish grade. Compact each layer replacing succeeded layer.

- .8 Place protective material layer under, around and over minor installations until 600 mm of cover is provided. Dumping material directly on installations will not be permitted.
- .9 Where new services cross under existing services, compact bedding for existing service pipe to 150 mm below bottom of pipe and provide a cast-in-place cradle for length of unsupported pipe.
- .10 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.
 - .1 Within trenches: For pipes, cables, ducts, fittings and appurtenances, install bedding as follows: Provide min. 150 mm corestone of bedding sand under pipes, cables, ducts, fittings and appurtenances. Compact to 95% of Maximum Dry Density. Side fill to top of utility or service manually with beddings and in uniform lifts not exceeding 150 mm. Hand tamp only.
 - .2 Backfill: provide min. 300 mm protective hand-placed backfill cover over bedding cover. Compact to 95% of Maximum Dry Density. For remainder of trench backfill to underside of sub-base course or of surface restoration in lifts not to exceed 200 mm. Compact to 95% of Maximum Dry Density.
- .11 Notify Department Representative 24 hours prior to backfilling of trenches.

**3.8 Inspection and
Testing**

- .1 The Contractor shall submit gradation curves for proposed materials to demonstrate
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Excavating and Backfilling

Page 7

compliance with specifications. Pay all costs for gradation curves.

- .2 Testing of materials and compaction will be carried out by testing laboratory designated by Department Representative. Frequency of tests will be determined by Department Representative.
- .3 Department Representative will pay costs for initial inspection and testing. Refer to Section 01 45 00 - Testing and Quality Control.
- .4 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Department Representative may require to verify acceptability of corrected work.

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*.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Rough Grading

Page 1

PART 1 - GENERAL

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|-----|--------------------------------|----|---|
| 1.1 | <u>Related Work</u> | .1 | Section 01 35 44 - Environmental Protection |
| | | .2 | Section 31 23 10 - Excavation and Backfilling |
| | | .3 | Section 31 24 13 - Roadway Embankments |
| 1.2 | <u>Site Conditions</u> | .1 | Establish location of all services before commencing work |
| 1.3 | <u>Scheduling</u> | .1 | Schedule all construction with Department Representative. |
| 1.4 | <u>Protection</u> | .1 | Prevent damage to fencing, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage. |
| 1.5 | <u>Measurement for Payment</u> | .1 | Work performed under this Section will be incidental to work involved in other sections of this specification. |

PART 2 - PRODUCTS

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| 2.1 | <u>Materials</u> | .1 | Fill Material: |
| | | .1 | Selected Backfill: common material from site excavation, free from stumps, trees, roots, sod, organics, rocks, boulders, and masonry larger than 150 mm in any dimension, and any other deleterious materials. |
| | | .2 | Premium Borrow: well-graded material from Contractor's own sources meeting the NBDTI specification for select borrow free from lumps of clay and other deleterious material with a maximum particle size of 100 mm, and a maximum of 20% of the material passing the 4.75 mm sieve shall pass the 75 µm sieve. |

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Rough Grading

Page 2

- .2 Obtain Department Representative's approval of excavated or graded material used as fill for grading work. Protect approved material from contamination.

PART 3 - EXECUTION3.1 Removal of Topsoil

- .1 Do not handle wet or frozen topsoil.
- .2 Remove topsoil from areas to be excavated or regraded. Strip topsoil when dry enough to prevent contamination with sub grade material.

3.2 Grading

- .1 Grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Grade as noted.
- .3 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .4 All areas within the limits of the contract (i.e. paved areas, building, etc.) shall be proof-rolled with a 25t loaded truck. The Contractor shall, however, take extreme care to not damage existing underground services. Make good any damage at Contractor's cost.

3.3 Testing

- .1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

3.4 Surplus Material

- .1 Remove surplus material from site.
- .2 Remove material unsuitable for fill or grading from site as directed by Department Representative.

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Roadway Embankments

Page 1

PART 1 - GENERAL

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| 1.1 <u>Related Work</u> | .1 Refer to other Specification Sections for related information. |
| | .2 Refer to Section 01 33 00 for Shop Drawing/Submission requirements. |
| 1.2 <u>Traffic Provisions</u> | .1 Provide and maintain roadways, walkways and detours, for vehicular and pedestrian traffic and access to fire hydrants, alarms and emergency telephones. |
| 1.3 <u>Definitions:</u> | .1 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding. |
| | .2 Waste material: material unsuitable for use in embankment or surplus to requirements. |
| | .3 Borrow material: material obtained from areas off site required for construction of embankments or for other portions of work. |
| | .4 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation. |
| | .5 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing. |
| | .6 Subgrade elevation: elevation immediately below pavement structure. |
| 1.3 <u>Measurement for Payment</u> | .1 All classes of Nominal Clear Stone will be measured in accordance with Section 01 29 00 . |

PART 2 - PRODUCTS

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| 2.1 <u>Materials</u> | .1 Embankment materials to approval of Department Representative. |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Roadway Embankments

Page 2

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- .2 Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps, boulders larger than 150 mm or any other deleterious materials.
 - .3 Borrow material: Obtain from sources off site and to Department Representative's acceptance.
 - .4 Riprap: to NBDTI specification Table 608-1.

PART 3 - EXECUTION

- 3.1 Compaction Equipment .1 Compaction equipment must be capable of obtaining required densities in materials on project.
 - 3.2 Water Distributors .1 Apply water with equipment capable of uniform distribution.
 - 3.3 Embankments
 - .1 Remove topsoil and rootmat.
 - .2 Pulverize existing pavement to sub-grade elevation, as directed.
 - .3 Do not place material which is frozen nor place material on frozen surfaces.
 - .4 Maintain a crowned surface during construction to ensure ready runoff of surface water. Do not place material in free standing water.
 - .5 With material containing less than 25% by volume of stone or rock fragments larger than 100 mm:
 - .1 Place and compact to full width in uniform layers not exceeding 200 mm loose thickness. Department Representative may authorize thicker lifts if specified compaction can be achieved.
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Roadway Embankments

Page 3

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| | .2 | Compact to a density of not less than 95% corrected maximum dry density in accordance with ASTM D698. |
| | .3 | Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required. |
| 3.4 <u>Excavations</u> | .1 | Remove topsoil and rootmat. |
| | .2 | Excavate fill or bedrock to subgrade level. |
| 3.5 <u>Subgrade Compaction</u> | .1 | After grading has been completed, scarify and mix subgrade surface to required depth of subgrade compaction. |
| | .2 | Remove unsuitable materials found during work. Replace with material approved by Department Representative. |
| | .3 | Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required. |
| 3.6 <u>Finishing and Tolerances</u> | .1 | Shape and compact surfaces to within 30 mm of design elevations but not uniformly high or low. |
| | .2 | Do scarifying, grading, compacting or other methods of work as necessary to provide thoroughly compacted roadbed shaped to grades and cross sections as indicated or as directed by Department Representative. |
| | .3 | Finish edges and slopes of common material to neat condition, true to line and grade. |
| | .1 | Remove isolated boulders exposed in cut slopes and fill resulting cavities. |
| | .2 | Hand finish slopes that cannot be finished satisfactorily by machine. |
| 3.7 <u>Maintenance</u> | .1 | Maintain finished surfaces in condition conforming to this section until acceptance. |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Reshaping Roadway Subgrade

Page 1

PART 1 - GENERAL

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| 1.1 <u>Related Work</u> | .1 Refer to other Specification Sections for related information. |
| | .2 Refer to Section 01 33 00 for Shop Drawing/Submission requirements. |
| | .3 Section 31 24 13 - Roadway Embankments |
| 1.2 <u>References Standards</u> | .1 ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kNm/m3. |
| 1.3 <u>Definitions</u> | .1 Reshaping subgrade: scarifying, pulverizing, blading, reshaping and recompacting existing subgrade surface. |
| 1.4 <u>Measurement for Payment</u> | .1 Measurement for items of this section will not be made. Work of this section is to be considered incidental to this contract. |

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

- | | |
|--------------------------------------|---|
| 3.1 <u>Pulverizing and Reshaping</u> | .1 Pulverize and break down scarified material to 75 mm maximum soil clod size, except that stones larger than this size may be left intact as directed by Department Representative. |
| | .2 Blade and trim pulverized material to elevation and cross section dimensions as indicated. |
| | .3 Where deficiency of material exists, add and blend additional subgrade material as directed by Department Representative. |
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Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Reshaping Roadway Subgrade

Page 2

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- | | | |
|----------------------------|----|---|
| | .4 | Re-use excess material in areas of material deficiency as directed by Department Representative. |
| 3.2 <u>Compacting</u> | .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 | If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to value not greater than 2% moisture above optimum value for compaction in accordance with ASTM D698. |
| 3.3 <u>Site Tolerances</u> | .1 | Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated. |
| 3.4 <u>Protection</u> | .1 | Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until Department Representative acceptance. |
-

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Geotextile Fabric

Page 1

PART 1 - GENERAL**1.1 Related Work**

- .1 Refer to other Specification Sections for related information.
- .2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.
- .3 Section 32 11 25 - Clear Stone
- .4 Section 33 05 14 - Catch Basins
- .5 Section 33 42 13 - Pipe Culverts

1.2 References Standards

- .1 All current standards at the time of initial advertisement of tender apply.
 - .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permeability.
 - .2 ASTM D4595, Standard Test Method for Tensile Properties of Geotextile by Wide-Width Strip Method.
 - .3 ASTM D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-M89, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-142.1-2003, Methods of Testing Geotextiles and Complete Geomembranes - Complete Set.
 - .1 No. 2, Methods of Testing Geotextiles and Geomembranes - Mass per Unit Area.
 - .2 No. 3, Methods of Testing Geotextiles and Geomembranes - Thickness of Geotextiles.
 - .3 No. 6.1, Methods of Testing Geotextiles and Geomembranes -
-

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Geotextile Fabric

Page 2

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
Geotextiles and Geomembranes -
Filtration Opening Size.

1.3 Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions,
printed product literature and data
sheets for geotextiles and include
product characteristics, performance
criteria, physical size, finish and
limitations.

.3 Test and Evaluation Reports:

.1 Submit copies of mill test data and
certificate at least 4 weeks prior to
start of Work.

1.4 Delivery, Storage
And Handling

.1 Deliver, store and handle materials in
accordance with manufacturer's written
instructions.

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

1.5 Measurement for
Payment

.1 Measurement for items of this section will
not be made. Work of this section is to be
considered incidental to Pipe culvert and
catch basin unit prices.

PART 2 - MATERIALS2.1 Material

.1 Geotextile: woven synthetic fibre fabric,
supplied in rolls.

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Geotextile Fabric

Page 3

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- .1 Width: 3.81 m minimum.
 - .2 Composed of: UV protected material.
 - .2 Physical properties:
 - .1 Grab tensile strength and elongation: to CAN/CGSB-148.1, No. 7.3.
 - .1 Breaking force: minimum 1100 N, wet condition.
 - .2 Elongation at break: maximum 15%.
 - .2 Mullen burst strength: to CAN/CGSB-4.2, No. 11.2, minimum 3.0 MPa, wet condition.
 - .3 Bursting strength: use values specified in CAN/CGSB-148.1, No. 6.1, wet condition.
 - .3 Hydraulic properties:
 - .1 Apparent opening size (AOS): to ASTM D4751, 50 μm (minimum) 150 μm (maximum).
 - .2 Hydraulic Conductivity, 0.01 cm/sec.
 - .3 Permeability: to CAN/CGSB-4.2 No. 11.1-9.

PART 3 - EXECUTION3.1 Installation

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with security pins.
 - .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases. Stop geotextile 100 mm below finished surface.
 - .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
 - .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
 - .5 Protect installed geotextile material from displacement, damage or deterioration
-

Marshalling Yard Improvements**Saint John Ferry Terminal****Saint John, New Brunswick****Project No. R.090690.001**

Geotextile Fabric

Page 4

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|---|-------------------------------|---|------------------|-----------------|---------|------------|-------------------|---------------------------|----------------|--------------------------|-----------|--------------------------|-------|----------------------------|---------|----------------------------|--------------------|---------------------------|---|-------------------------------|-------------------------------------|------------|
| | | before, during and after placement of material layers. | | | | | | | | | | | | | | | | | | | | |
| | .6 | After installation, cover with overlying layer within 4 hours of placement. | | | | | | | | | | | | | | | | | | | | |
| | .7 | Replace damaged or deteriorated geotextile to approval of Design Departmental Representative. | | | | | | | | | | | | | | | | | | | | |
| 3.2 | <u>Cleaning</u> | .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner. Recycle material if at all possible. | | | | | | | | | | | | | | | | | | | | |
| 3.3 | <u>Protection</u> | .1 Vehicular traffic not permitted directly on geotextile. | | | | | | | | | | | | | | | | | | | | |
| 3.4 | <u>Quality Control</u> | .1 The Contractor shall supply documentation from the manufacturer that the supplied material meets all specified as follows: <table><tr><td><u>Test Type</u></td><td><u>Standard</u></td></tr><tr><td>Opening</td><td>ASTM D4751</td></tr><tr><td>Bursting Strength</td><td>CAN/CGSB-4.2, No. 11.2</td></tr><tr><td>Mass/Unit Area</td><td>CAN/CGSB-148.1, No. 2</td></tr><tr><td>Thickness</td><td>CAN/CGSB-148.1, No. 3</td></tr><tr><td>Burst</td><td>CAN/CGSB-148.1, No. 6.1</td></tr><tr><td>Tensile</td><td>CAN/CGSB-148.1, No. 7.3</td></tr><tr><td>Filtration Opening</td><td>CAN/CGSB-148.1, No. 10</td></tr><tr><td>Grab Tensile Strength and Elongation</td><td>CAN/CGSB-148.1, ASTM D4595</td></tr><tr><td>Permeability and Water Flow Rate</td><td>ASTM D4491</td></tr></table> | <u>Test Type</u> | <u>Standard</u> | Opening | ASTM D4751 | Bursting Strength | CAN/CGSB-4.2, No. 11.2 | Mass/Unit Area | CAN/CGSB-148.1, No. 2 | Thickness | CAN/CGSB-148.1, No. 3 | Burst | CAN/CGSB-148.1, No. 6.1 | Tensile | CAN/CGSB-148.1, No. 7.3 | Filtration Opening | CAN/CGSB-148.1, No. 10 | Grab Tensile Strength and Elongation | CAN/CGSB-148.1, ASTM D4595 | Permeability and Water Flow Rate | ASTM D4491 |
| <u>Test Type</u> | <u>Standard</u> | | | | | | | | | | | | | | | | | | | | | |
| Opening | ASTM D4751 | | | | | | | | | | | | | | | | | | | | | |
| Bursting Strength | CAN/CGSB-4.2, No. 11.2 | | | | | | | | | | | | | | | | | | | | | |
| Mass/Unit Area | CAN/CGSB-148.1, No. 2 | | | | | | | | | | | | | | | | | | | | | |
| Thickness | CAN/CGSB-148.1, No. 3 | | | | | | | | | | | | | | | | | | | | | |
| Burst | CAN/CGSB-148.1, No. 6.1 | | | | | | | | | | | | | | | | | | | | | |
| Tensile | CAN/CGSB-148.1, No. 7.3 | | | | | | | | | | | | | | | | | | | | | |
| Filtration Opening | CAN/CGSB-148.1, No. 10 | | | | | | | | | | | | | | | | | | | | | |
| Grab Tensile Strength and Elongation | CAN/CGSB-148.1, ASTM D4595 | | | | | | | | | | | | | | | | | | | | | |
| Permeability and Water Flow Rate | ASTM D4491 | | | | | | | | | | | | | | | | | | | | | |