

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
	.2	Section 01 35 43 - Environmental Procedures.
<u>1.2 Measurement Procedures</u>	.1	Excavation of Harbour Bottom will be measured as Cubic Metres Truck Measure (CMTM) and will include harbour bottom excavation, construction of disposal site, and site grading upon completion.
	.2	Granular backfill, ballast material, R5 and R25 clear, random rip-rap, granular base, will not be measured for payment, but should be included the item that granulars are associated with.
<u>1.3 References</u>	.1	Canadian General Standards Board (CGSB) .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
	.2	American Society for Testing and Materials (ASTM) .1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
<u>1.4 Submittals</u>	.1	Samples: .1 Submit samples in accordance with Section 01 33 00. .2 Inform Departmental Representative at least 4 weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.
<u>1.5 Protection of Existing Features</u>	.1	Existing buried utilities and structures: .1 Maintain and protect from damage, water, electric, and other utilities and structures encountered.

1.5 Protection of Existing Features
(Cont'd)

- .1 (Cont'd)
.2 Where utility lines or structures exist in area of excavation, obtain direction of the Departmental Representative before removing or re-routing. Costs for such Work to be paid by the Departmental Representative.
.3 Record location of maintained, re-routed and abandoned underground lines.

PART 2 - PRODUCTS

2.1 Materials .1

New Granular materials: to be manufactured from hard, durable, quarry material of an approved quality. The material will be free from frost, snow stumps, weeds, sod, roots, logs, silt, organic material, garbage, or any other waste materials and must be capable of being compacted to degree as specified herein and meeting approval of the Departmental Representative. Slate, sandstone or shale rock will not be accepted. Specific gravity not less than 2.65 when tested to ASTM C127-12 (AASHTO T85-14).

.1 Gradation to meet NBDOT 'R5' Random Rip-Rap limits as follows:

<u>ASTM Sieve size</u>	<u>% passing</u>
220 mm	100
190 mm	70 - 90
150 mm	40 - 55
70 mm	0 - 15

.2 Gradation to meet NBDOT 'R25' Random Rip-Rap limits as follows:

<u>ASTM Sieve size</u>	<u>% passing</u>
380 mm	100
330 mm	70 - 90
260 mm	40 - 55
120 mm	0 - 15

.3 Ballast: R25-Clear

.2 Granular Base and Sub-Base:

.1 Granular Base rock, clear, hard durable, angular, crushed quarried rock aggregate free from silt, clay lumps, organic matter, foreign substances and free from splits, seams or defects. Specific gravity not less than 2.6 when tested to ASTM C127-12 (AASHTO T85-14).

2.1 Materials
(Cont'd)

- .2 Granular Base and Sub-Base:(Cont'd)
.2 Gradation to be within following limits when tested to ASTM C136-06 and ASTM C117-13 and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
.3 Gradation - Granular Base:

ASTM Sieve Size	% Passing
31.5 mm	95-100
25.0 mm	81-100
19.0 mm	66-90
12.5 mm	50-77
9.5 mm	41-70
4.75 mm	27-54
2.36 mm	17-43
1.18 mm	11-32
300 µm	4-19
75 µm	0-8

- .4 Gradation - Granular sub-base material:

ASTM Sieve Size	% Passing
75.0 mm	100
0.425 mm	30 max
0.075 mm	8 max

PART 3 - EXECUTION

3.1 EXCAVATION

- .1 Site excavation to consist of the removal of all material and substrate bottom material to the excavation limits as indicated on the drawing and as directed by the Departmental Representative.
.2 Contractor to submit excavation method adjacent to existing wharf structures. Method to define protection of existing structures and foundations.

3.2 Disposal Site

- .1 Layout disposal site, pay attention to off set of property lines, utilities, and access to building.
.2 Excavate cell, leave material on site for backfilling.

- 3.2 Disposal Site (Cont'd)
- .3 Install highly visable safety fence barrier all sides of cell/ complete with reflective warning signs
 - .4 Upon consolidation of excavated materials in the cell, backfill the cell with salvaged fill.
- 3.3 Filling Crib
- .1 Do not proceed with backfilling operations until the Departmental Representative has inspected and approved areas to be backfilled.
 - .2 Place R25 material into the bottom of the crib with thumb or bucket. Do not end dump.
- 3.4 Granular Bases
- .1 Do not place granular base underside of Concrete deck until sub-base surface is compacted, inspected and approved.
 - .2 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.
 - .3 Place materials to the lines, grades, and depths as indicated on Plan or as directed by the Departmental Representative.
 - .4 Remove and replace portion of work in which material becomes segregated during spreading.
 - .5 Compact to a density not less than 95% of maximum dry density ASTM D698-12, (AASHTO T99-10, Method D).
 - .6 Shape and roll alternately to obtain a smooth, even and uniformly compacted base.
 - .7 In areas not accessible to rolling equipment, compact to required density with approved mechanical tampers.
- 3.5 Restoration
- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21.
-

3.5 Restoration .2 Remove surplus materials and debris and
(Cont'd) correct defects noted by the Departmental
Representative.

PART 1 - GENERAL

1.1 Description

- .1 This section specifies requirements for the supply and installation of synthetic non-woven filter fabric to be used at locations shown on

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.3 MEASUREMENT PROCEDURES

- .1 Any filter fabric used will be incidental to the work. Silt curtain construction, installation and removal is incidental to Demolition and removal.
.2 Damaged material shall be replaced at no cost to the owner.

1.4 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 4595-86(2001), Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
.3 ASTM D 4751-99a, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-4.2 No. 11.2-M89(April 1997), Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

1.5 SUBMITTALS

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

-
- 1.5 SUBMITTALS
(Cont'd)
- .2 Submit to Departmental Representative the following at least 2 weeks prior to beginning Work.
- .1 manufactures specifications on the proposed materials to be used.
 - .2 samples of proposed materials.
- 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 74 21.
- .2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material.
- .3 Fold up metal banding, flatten and place in designated area for recycling.
- PART 2 - PRODUCTS
- 2.1 Filter Fabric
- .1 Non-woven synthetic fibre fabric, rot proof, unaffected by action of oil or salt water and not subject to attack by marine life, insects or rodents to be supplied in rolls.
- .2 Fabric to be of non woven construction supplied in rolls of minimum 3.0 metres width, minimum thickness of 4.0 mm and to the following properties or equivalent:
- .1 Mass(g/m²) 250 to 270
 - .2 Tear (N) 500
 - .3 Tensile Strength (N) 950
 - .4 Elongation at Break(%) 70-100
 - .5 Mullen Burst Strength (kPa) 2500
 - .6 Opening Size (um) 50 to 150
 - .7 Permeability (K cm s⁻¹) 2.7x10⁻¹.
- .3 Factory seams: sewn in accordance with manufacturer's recommendations.
-

-
- 2.1 Filter Fabric (Cont'd) .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
- 2.2 Silt Curtain .1 A full depth silt curtain will be deployed around the structure, or the portion of the structure to be deconstructed. The curtain to be maintained in place during the removal and excavation of material, and for at least 10 hours after operations cease.
- .1 The curtain will be full depth, weight at the bottom to shape itself to the contours. The curtain will be anchored as such to prevent significant interference with navigation.
- .2 The fabric will be non woven material, strength to withstand the elements.
- .3 The contractor is to design the anchoring and floatation system of the curtain. Provide this design to the Departmental Representative for his approval before fabrication of the curtain.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Place geotextile material by unrolling in orientation, manner and locations indicated and retain in position with securing pins and washers or weights.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .4 Pin successive strips of geotextile with securing pins as recommended by manufacturer.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material.
- .6 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

PART 1 - GENERAL

1.1 Related
Sections

- .1 Section 31 62 16 Steel H Piles.
- .2 Section 31 63 19 Rock Sockets for piles

1.2 Measurement
Procedures

- .1 There will be no measurement for payment under this section. Work included in this section will be included in pay item for Section 31 62 16 Steel H Piles

1.3 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 Submittal Procedures.
 - .2 Submit the following to the Departmental Representative for review at a maximum of 7 days after notice of award of bid:
 - .1 Details of rock socket drilling method and equipment.
 - .2 Details of grout mix.
 - .3 Sequence and details of grouting operation.
 - .4 Spacer details.
 - .5 Details of method used to hold piles in place at the specified tolerance while the grout cures. No piling works shall commence on site prior to review by the Departmental Representative.
 - .3 Product Data: submit manufacturer's printed product literature, specifications and datasheet.
 - .4 Sub-surface conditions: When site conditions differ from those indicated, submit written notification to Departmental Representative and await further instructions.
-

1.3 Submittals
(Cont'd)

- .5 Submit schedule of planned sequence of installation to Departmental Representative for review, as specified.
 - .6 Spliced piles are not permitted.
 - .7 Piling Records: the Contractor shall keep record of the installation of each pile and submit two signed copies of the record to the Departmental Representative not later than noon of the next working day after the pile was installed. The record shall give the following information in an approved format:
 - .1 Pile identification.
 - .2 Date and time of drilling of socket into sound rock.
 - .3 Soil samples taken and in-situ test carried out if any.
 - .4 Date pile installed.
 - .5 Pile type and size.
 - .6 Date of grouting.
 - .7 Position of pile in the works and ground level at pile position.
 - .8 Boring rates and material encountered.
 - .9 Samples of rock cutting flushing in the rock socket.
 - .10 Depth and level of top of rock socket.
 - .11 Length and toe level of temporary casing.
 - .12 Length of steel H-pile.
 - .13 Grout mix.
 - .14 Volume of grout in socket (actual and theoretical).
 - .15 Details of obstructions, delays and other interruptions to sequence of work.
 - .16 Flow rate and total time required for the grouting operation.
 - .17 Grouting pressure used.
 - .18 Any other data requested by the Departmental Representative.
 - .8 On completion of all piling works, submit to the Departmental Representative two copies of record piling plan showing, as appropriate, the position, identity number, size, verticality, orientation and level of top and bottom of each pile installed.
-

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Material requirements for piles are specified in Section 31 62 16 Steel H Piles.
 - .2 Supply full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.
 - .3 Spliced piles will not be permitted.
 - .4 Material requirements for rock sockets, casings and grout are specified in Section 31 63 19 - Rock Sockets for piles.

PART 3 - EXECUTION

- 3.1 Preparation
- .1 Protection:
 - .1 Protect adjacent structures, services and work of other sections from hazards due to pile installation operations.
 - .2 Arrange sequencing of pile installation operations and methods to avoid damages to adjacent existing structures.
 - .3 When damages occur, remedy damaged items to restore to original or better condition at own expense.
 - .4 Ensure that existing wharf structure at pile locations are adequate to support pile installation operation.
 - .5 Make provision for access and support of piling equipment during performance of work.
 - .6 Contractor to assess state of access structure(s) for load carrying capability.
- 3.2 Installation
- .1 Installation of each pile will be subject to review by Departmental Representative.
 - .1 Department Representative will be sole judge of acceptability of each pile with respect to final installation capacity.
-

- 3.3 Application .1 Cut off piles neatly and squarely at elevations as indicated on drawings.
- .2 Remove cut-off lengths from site on completion of work.
- 3.4 Installation Tolerances .1 Pile heads to be within 20 mm of locations as indicated.
- .2 Piles not to be more than 0.5% of length out of vertical alignment.
- 3.5 Obstructions .1 Where obstruction is encountered that causes sudden unexpected change in specified tolerances, proceed as directed by Departmental Representative.
- 3.6 Repair and Restoration .1 Pull out rejected piles and replace with new piles
- .2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Miscellaneous Metals: Section 05 50 00
 - .2 Pile Foundations, General Requirements: Section 31 61 13
 - .3 Section 31 63 19 Rock Sockets for Piles
- 1.2 MEASUREMENT PROCEDURES
- .1 **Steel H Piles** will be measured by unit (Unit), of pile supplied and acceptably incorporated into the work. Length to be defined by top and toe elevations indicated on plans.
- 1.3 REFERENCES
- .1 Canadian Standards Association (CSA International)
 - .1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .2 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
 - .3 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
 - .4 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
- 1.4 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Quality Assurance:
 - .1 Test Reports: submit 3 copies of mill test reports indicating yield and chemical analysis of steel piles to Departmental Representative.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Waste Management and Disposal.
- .2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel H piles: to CSA-G40.20/G40.21, Grade 350.
 - .1 Size and weight as indicated.
- .2 Welding materials: to CSA W48.
- .3 Steel plates: to CSA-G40.20/G40.21, Grade 300W.

PART 3 - EXECUTION

3.1 Installation

- .1 Install piling in accordance with Section 31 61 13 Pile Foundations, General Requirements.
- .2 Cut off piles squarely at required elevation.

3.2 Welding

- .1 Weld to CSA W59.
- .2 Welding certification of companies: to CSA W47.1.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 Cleaning.
 - .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
-

PSPC
Wharf 405 Removal and
Floating Wharves
Cap Lumiere, NB
R.076442.001

STEEL H PILES

Sect 31 63 16
Page 3
January 2016

PART 1 - GENERAL

- 1.1 Related Sections.1 Section 31 61 13 Pile Foundations, General Requirements
- .2 Section 31 62 16 Steel H Piles
- 1.2 References .1 American Society for Testing and Materials International (ASTM)
- .2 ASTM A 252-98 (2007), Standard Specification for Welded and Seamless Steel Pipe.
- .3 Canadian Standards Association (CSA International)
- .1 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
- .2 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
- .3 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
- 1.3 Payment Procedures .1 There will be no measurement for payment under this section. Work included in this section will be included in pay item for Section 31 62 16 H Piles.
- 1.4 Submittals .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Shop Drawings
- .1 Indicate methods of construction and operational sequence.
- .2 Submit each drawing complete with signature and stamp of qualified professional engineer registered or licensed in province of New Brunswick, Canada.
-

1.4 Submittals
(Cont'd)

- .4 Quality assurance submittals:
- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .3 Submit for review to Departmental Representative three copies of piling records as described in Section 31 61 13 - Pile Foundations, General Requirements.
 - .4 Equipment lists: submit to Departmental Representative, list of equipment for installation of rock sockets before beginning work.
 - .1 Provide details sufficient to evaluate performance of equipment.
 - .2 Include details of equipment for excavating, drilling, cleaning out piles and rock sockets, installation of piles and grouting of sockets.

1.5 Waste Management.
and Disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Waste Management and Disposal.
- .2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .3 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Grout: in accordance with manufacturer's recommendations.
 - .1 Grout having minimum cube strength less than 35 MPa shall not be accepted.
 - .2 Underwater placed concrete: in accordance with Section 03 37 26 - Underwater Placed Concrete.
 - .3 Materials for temporary casing: of pipe sections to ASTM A 252, Grade 2.
 - .4 Additional materials, including spiders, spacers and anchor dowels installation guides: as reviewed by Departmental Representative.

PART 3 - EXECUTION

- 3.1 Manufacturer's Instructions
- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 Installation/ Sockets
- .1 Secure equipment in position during drilling.
 - .2 Drill sockets into sound bedrock as indicated.
 - .3 Departmental Representative to review elevation of top of sound rock and required depth of embedment at time of construction.
 - .4 Drill socket to minimum depth as indicated.
 - .5 After drilling is completed, clean out socket.
 - .6 After socket has been cleaned out and inspected, allow to stand for 24 h and inspect again for intrusion of material. Repeat
-

- 3.2 Installation/ Sockets
(Cont'd)
- .6 (Cont'd)
clearing out and injection process as deemed necessary by the Departmental Representative.
- .7 Temporary Casing:
.1 Temporary casing shall be lowered at the same time when the hole is made. The embedded depth of temporary casing below the founding level (casing embedment depth) shall be 500 mm minimum or such other depths as required to avoid caving of soil at the interface of soil and bedrock during cleaning of rock socket.
.2 Temporary casing shall be free from distortion, internal projections and hardened grout.
.3 The minimum clearance (cover) between the casing and the steel H Pile shall be 40 mm. The Contractor shall submit his proposed spacer details to the Departmental Representative for review.
.4 Extraction of the temporary casing shall only be carried out after the completion of grouting.
.5 In case the temporary casing cannot be extracted for whatever reasons, pressure grouting shall be carried out at the peripheral of the temporary casing to fill up gaps between the pile and surrounding soils. The Contractor shall submit his proposed method of pressure grouting to the Departmental Representative for review.
- 3.3 Welding
- .1 Weld in accordance with CSA W59.
.2 Welding certification of companies in accordance with CSA W47.1.
- 3.4 Grouting
- .1 Grout in accordance with manufacturer's instructions and procedures.
.2 Grout in drilled socket up to elevation as indicated, as soon as possible after installing steel H-pile.
.3 Use grout mix that has been demonstrated to produce required strength at temperature
-

-
- 3.4 Grouting
(Cont'd) .3 (Cont'd)
prevailing in rock socket at time of
installation.
.1 Grout mix and grouting procedures to be
to approval of the Departmental
Representative.
.2 Water for grout shall be clean fresh
water having a temperature not exceeding 30₃C
nor less than 5₃C.
- .4 Hold pile securely in position so that it
does not move during grouting and until grout
has attained specified strength.
- .5 Place grout in one continuous operation to
fill socket up to specified level.
- 3.5 Underwater
Concrete Filling
of Rock Sockets .1 Encasement of pile in rock socket using 35
MPa concrete in accordance with Section 03 37
27 - Underwater Placed Concrete is an
acceptable alternate method to pressure
grouting.
- .2 Procedures to be as approved by Departmental
Representative.
- 3.6 Field Quality
Control .1 Site tests and inspection:
.1 Provide method and equipment for
inspection of each socket to ensure that
sockets are properly cleaned out.
.2 Co-operate with and assist Departmental
Representative to inspect each pile and
socket.