

## PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 31 23 10 Excavation, Trenching and Backfilling
	.2	Section 32 11 16 Granular Sub-Base
	.3	Section 32 11 23 Granular Base
<u>1.2 Measurement Procedures</u>	.1	No measurement will be made under this section. Include costs in items of work that require aggregate.
<u>1.3 Source Approval</u>	.1	Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least four (4) weeks prior to commencing production.
	.2	If, in opinion of Departmental Representative, material from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
	.3	Should a change of material source be proposed during work, advise Departmental Representative four (4) weeks in advance of proposed change to allow sampling and testing.
	.4	Acceptance of a 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.
<u>1.4 Production Sampling</u>	.1	Aggregate will be subject to continual sampling by Department Representative during production.
	.2	Provide Departmental Representative with ready access to source and processed material for purpose of sampling and testing.
	.3	Install adequate sampling facilities at discharge end of

production conveyor to allow Departmental Representative to safely obtain representative samples of materials being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross-section sampling.

- .4 Bear the cost of sampling and testing of aggregates which fail to meet specified requirements.

## 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 are those whose greatest dimension exceeds four times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  - .1 Natural sand.
  - .2 Manufactured sand.
  - .3 Screening produced in crushing of quarried rock, boulders or gravel.
- .4 Coarse aggregates satisfying requirements of applicable section shall be one, or a blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
- .5 Particles having at least one fractured face are considered to be crushed particles.

## PART 3 - EXECUTION

### 3.1 Aggregate Source

- .1 Sources to be supplied by Contractor.

### 3.2 Processing

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

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use approved methods and equipment.

.3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.

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

3.3 Handling

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

3.4 Stockpiling

.1 Stockpile aggregates off site. Do not unload delivered aggregate on completed concrete surfaces where damage to concrete may result.

.2 Stockpile aggregates in sufficient quantities to meet project schedule.

## PART 1 - GENERAL

<u>1.1 Description</u>	.1	Work under this section consists of all operations and materials related to excavation and backfilling for Work.
<u>1.2 Related Sections</u>	.1	Section 31 32 21 - Geotextiles.
	.2	Section 32 11 16 - Granular Sub-base Materials.
	.3	Section 32 11 23 - Granular Base Materials.
	.4	Section 35 31 24 - Rock Protection.
<u>1.3 Measurement Procedures</u>	.1	There will not be any separate payment for the excavation of materials, such as, the sandy material located along the north face of the wharf. Include the cost for this work in the items for payment in Section 02 41 13 Site Work, Preparation and Removal.
<u>1.4 References</u>	.1	American Society for Testing and Materials International (ASTM)
	.1	ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
	.2	ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.3	ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
	.4	ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m <sup>3</sup> ).
	.5	ASTM D1557-09, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m <sup>3</sup> ).
	.6	ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
	.2	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.5 Definitions

- .1 Unclassified excavation: excavation of deposits of whatever character encountered in Work. This includes concrete foundations, rubble and other obstructions encountered during excavation.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136.
    - .2 Sieve sizes to CAN/CGSB-8.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
  - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

1.6 Existing Conditions

- .1 Existing surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing plants, service poles, wires, site features, survey bench marks and monuments which may be affected by work.
  - .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
- .2 Buried services:
  - .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with

- execution of work: pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .5 Prior to beginning excavation Work, notify Departmental Representative and Authorities having jurisdiction. Establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.
  - .6 Confirm locations of buried utilities by careful test excavations.
  - .7 Maintain and protect from damage, water, electric, telephone and other utilities and structures encountered.
  - .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
  - .9 Record location of maintained, re-routed and abandoned underground lines.
  - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
- .1 Conduct, with Departmental Representative, condition survey of existing service poles, wires, survey bench marks and monuments which may be affected by Work.
  - .2 Protect existing surface features from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.
- 1.7 Submittals
- .1 Make submittals in accordance with Section 01 33 00 Submittal Procedures.
  - .2 Quality Control: in accordance with Section 01 45 00 Testing and Quality Control:
    - .1 Submit condition survey of existing conditions as described in article 1.6 Existing Conditions

- of this Section.
- .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
- .3 Samples:
- .1 Submit samples in accordance with Section 01 33 00 Submittal Procedures.
- .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.
- .3 Submit 70 kg samples of type of fill specified, if requested by the Departmental Representative, including representative samples of excavated material.
- .4 Ship samples prepaid to Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.
- 1.8 Quality Assurance
- .1 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.
- .2 Health and Safety Requirements:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29 Health and Safety Requirements.
- 1.9 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 excess materials from landfill to local quarry for reuse as directed by Departmental Representative.

## PART 2 - PRODUCTS

- 2.1 Materials
- .1 Filter fabric: to Section 31 32 21 Geotextiles.
- .2 Granular Sub-Base (0-75 mm): to Section 32 11 16 Granular Sub-base Materials.

- .3 Granular Base (0-31.5 mm): to Section 32 11 23  
Granular Base Materials.

### PART 3 - EXECUTION

- |  |    |  |
|--|----|--|
| <u>3.1 Site Preparation</u>                            | .1 | Set out pertinent lines, grades and levels required for excavation and backfill work. Maintain accuracy of line and grade stakes during Work.  |
|  | .2 | Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.  |
| <u>3.2 Temporary Erosion and Sedimentation Control</u> | .1 | If requested by the Departmental Representative provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent. |
|  | .2 | Inspect, repair, and maintain erosion and sedimentation control measures during construction.  |
|  | .3 | Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.  |
| <u>3.3 Preparation/Protection</u>                      | .1 | Protect existing features in accordance with Section 01 10 10 General Instructions, and applicable local regulations.  |
|  | .2 | Keep excavations clean, free of standing water, and loose soil.  |
|  | .3 | Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental representative's approval.   |
|  | .4 | Protect natural and man-made features required to remain undisturbed.  |
|  | .5 | Protect buried services that are required to remain  |



undisturbed.

3.4 Sheathing, Shoring,  
Bracing and  
Underpinning

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29 Health and Safety Requirements and Health and Safety Act for the Province of New Brunswick.
- .2 During backfill operation:
  - .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
  - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 600 mm above toe of sheeting.
- .3 Upon completion of substructure construction:
  - .1 Remove shoring and bracing.
  - .2 Remove excess materials from site.

3.5 Dewatering

- .1 Keep excavations free of water while work is in progress.
- .2 Dispose of water in runoff areas and in manner not detrimental to property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage and other diversions outside of excavation limits.

3.6 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 directed by Departmental Representative.
- .3 Remove concrete foundations, rubble and other obstructions encountered during excavation.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench.

- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material at an approved land disposal site.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .9 Install filter fabric in accordance with Section 31 32 21 Geotextiles.

### 3.7 Fill Types and Compaction

- .1 Use types of fill as indicated or specified in Related Sections. Compaction densities are percentages of maximum densities obtained from ASTM D698.
- .2 Placement and compaction of crushed rock to be in accordance with Section 32 11 16 Granular Sub-base Materials and Section 32 11 23 Granular Base Materials.

### 3.8 Backfilling

- .1 Do not proceed with backfilling operations until 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 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer. Compact to 95% in accordance with ASTM D698.
  - .1 Compaction of the sandy material that is reinstalled along the outside face of the North

Breakwater will not be compacted.

- .5 Refer to related sections for backfilling and compaction requirements for sub-base, and base materials.
- .6 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.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 600 mm.
  - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
    - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.
    - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

3.9 Restoration

- .1 Upon completion of work, remove waste materials and debris, 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.

3.10 Quality Assurance  
Inspection and  
Testing

- .1 Testing of materials and compaction will be carried out by Testing Agency designated by Departmental Representative. Frequency of tests will be determined

- .2 by Departmental Representative.  
Departmental Representative will pay for services of testing laboratory.
- .3 Inspection and testing by the Soil Testing Agency and/or Departmental Representative will not augment or replace Contractor quality control nor relieve the Contractor of contractual responsibilities.

## PART 1 - GENERAL

- |                                   |    |  |
|-----------------------------------|----|--|
| <u>1.1 Description</u>            | .1 | This section specifies requirements for the supply and installation of synthetic non-woven filter fabric to be used in the reconstruction of the wharf.                            |
| <u>1.2 Samples</u>                | .1 | Submit to the Departmental Representative the following samples at least 2 weeks prior to commencing work: manufacturer's specifications on the filter fabric proposed to be used. |
| <u>1.3 Storage and Delivery</u>   | .1 | Store, handle and protect fabric in accordance with manufacturer's instructions and in such a manner that no damage is done to material.   |
| <u>1.4 Measurement Procedures</u> | .1 | <u>Filter Fabric:</u> The supply and installation of filter fabric will be paid by the square metre (m <sup>2</sup> ) of filter fabric installed and remaining in place.           |
|                                   | .2 | Measurement shall not account for overlapping of fabric i.e. overlaps are measured as a single layer of fabric.  |
|                                   | .3 | Damaged material shall be replaced at no cost to the owner.  |

## PART 2 - PRODUCTS

- |                      |    |  |
|----------------------|----|--|
| <u>2.1 Materials</u> | .1 | Filter Fabric to be synthetic fiber and be rot proof, unaffected by action of oil or salt water and not subject to attack by marine life, insects, or rodents. |
|                      | .2 | Filter fabric to be of non-woven construction supplied in rolls of minimum 3.0 metres width.   |
|                      |    | The filter fabric to have the following characteristics:   |
|                      | .1 | Mass(g/m2) 210   |
|                      | .2 | Grab tensile strength (N) 712  |
|                      | .3 | Grab elongation (%) 50   |
|                      | .4 | Tear resistance (N) 267  |
|                      | .5 | CBR puncture (N) 1820  |

- .6 Opening size (mm) 0.212
- .3 Contractor shall note that the material may become buoyant.

### PART 3 - EXECUTION

- |   |   |
|---|---|
| 3.1 <u>Filter Fabric<br/>Installation</u> | <ul style="list-style-type: none"> <li>.1 Place geotextile material by unrolling in orientation, manner and locations indicated and retain in position with securing pins and washers, weights or other method as approved by Departmental representative.</li> <li>.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.</li> <li>.3 Overlap each successive strip of geotextile minimum of 600 mm over previously laid strip.</li> <li>.4 Pin successive strips of geotextile with securing pins or fasteners as recommended by manufacturer.</li> <li>.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material.</li> <li>.6 Replace damaged or deteriorated geotextile to approval of Departmental Representative.</li> </ul> |
|---|---|

PART 1 - GENERAL

- |                                   |    |  |
|-----------------------------------|----|--|
| <u>1.1 Related Sections</u>       | .1 | Section 31 62 16 Steel H Piles.  |
|                                   | .2 | Section 31 63 19 Rock Sockets for piles.   |
| <u>1.2 Measurement Procedures</u> | .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.  |
| <u>1.3 Submittals</u>             | .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: <ul style="list-style-type: none"><li>.1 Details of boring method and equipment.</li><li>.2 Details of grout mix.</li><li>.3 Sequence and details of grouting operation.</li><li>.4 Spacer details.</li><li>.5 Details of method used to hold piles in place at the specified tolerance while the grout cures.</li></ul> |
|                                   |    | 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 investigation report: when site conditions differ from those indicated, submit written notification to Departmental Representative and await further instructions.   |
|                                   | .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 records 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 reference number.
- .2 Date and time of boring.
- .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 Working level.
- .9 Boring rates and material encountered.
- .10 Samples of rock cutting flushing in the rock socket.
- .11 Depth from working level to pile toe.
- .12 Toe level.
- .13 Depth from working level to pile head level.
- .14 Depth and level of top of rock socket.
- .15 Length and toe level of temporary casing.
- .16 Length of steel H-pile.
- .17 Grout mix.
- .18 Volume of grout in pile socket (actual and theoretical).
- .19 Details of obstructions, delays and other interruptions to sequence of work.
- .20 Flow rate and total time required for the grouting operation.
- .21 Grouting pressure used.
- .22 Contours of bedrock inferred from drill hole logs.
- .23 Any other data requested by the Departmental Representative.

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.

1.4 Delivery,  
Storage and Handling

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



- |                                |    |  |
|--------------------------------|----|--|
|                                | .2 | Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.                             |
|                                | .3 | Replace damaged piles as directed by Departmental Representative.  |
| <u>1.5 Existing Conditions</u> | .1 | The Contractor must make his own evaluation of soil conditions.  |
| <u>1.6 Scheduling</u>          | .1 | Provide schedule of planned sequence of installation to Departmental Representative for review, not less than two weeks prior to commencement of pile placement. |

## PART 2 - PRODUCTS

- |                      |    |   |
|----------------------|----|---|
| <u>2.1 Materials</u> | .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

- |                        |    |  |
|------------------------|----|--|
| <u>3.1 Preparation</u> | .1 | Protection: <ul style="list-style-type: none"><li>.1 Protect adjacent structures, services and work of other sections from hazards due to pile installation operations.</li><li>.2 Arrange sequencing of pile installation operations and methods to avoid damages to adjacent existing structures.</li><li>.3 When damages occur, remedy damaged items to restore to original or better condition at own expense.</li></ul> |
|                        | .2 | Ensure that existing wharf structure and ground  |

conditions at pile locations are adequate to support pile installation operation.

- .1 Make provision for access and support of piling equipment during performance of Work.
- .2 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, alignment and orientation.

### 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 Piles to be within 20 mm of locations as indicated, and as required to ensure fit of panels as indicated on plans.
- .2 Contractor will be responsible for all modifications to, and costs associated with, customizing pre-cast panel construction to accommodate any deviation from the required locations of the H-Piles in the Work.

### 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	<u>Related Sections</u>	.1	Section 05 50 00 Metal Fabrications.
		.2	Section 31 61 13 Pile Foundations, General Requirements.
		.3	Section 31 63 19 Rock Sockets for Piles
1.2	<u>Measurement Procedures</u>	.1	<u>Steel H Piles</u> : 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.
		.2	H Pile sections at pile location –E8 and S1 to be considered as 2 separate units for payment.
1.3	<u>References</u>	.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	<u>Submittals</u>	.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	<u>Waste Management and Disposal</u>	.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: HP310x174 to CSA-G40.20/G40.21, Grade 350W.
  - .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 H-piles to be socketed into bedrock in accordance with section 31 63 19 Rock Sockets for Piles.
- .3 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.

## PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 03 37 26 Underwater Placed Concrete
	.2	Section 31 61 13 Pile Foundations, General Requirements
	.3	Section 31 62 16 Steel H Piles
<u>1.2 References</u>	.1	American Society for Testing and Materials International (ASTM)
	.1	ASTM A 252-98 (2007), Standard Specification for Welded and Seamless Steel Pile Piles.
	.2	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.
<u>1.3 Payment Procedures</u>	.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.
<u>1.4 Submittals</u>	.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.

- .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/Socket

- .1 Secure equipment in position during drilling.
- .2 Drill sockets into sound bedrock as indicated.
- .3 Departmental Representative to determine elevation of top of sound rock.
- .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 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.

.8 Boring Mud:

.1 Piles shall be installed without the use of bentonite slurry or other boring muds. The Contractor's attention is drawn to the formation process of the pile shaft using air flushing where special care shall be taken to avoid caving of soil in forming the pile shaft.

### 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 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 30°C nor less than 5°C.

.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 26 - 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.