

PART 1 - GENERAL

- 1.1 Related Sections
- .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal (short form).
 - .3 Section 01 50 00 - Temporary Facilities.
 - .4 Section 01 35 44 - Environmental Procedures.
 - .5 Section 02 41 13 - Selective Site Demolition.
 - .5 Section 31 32 19.01 - Geotextiles.
- 1.2 Measurement Procedures
- .1 Excavated materials will be measured in cubic meters in their original location.
 - .1 Common excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as indicated.
 - .2 Width for excavation for structures as indicated.
 - .3 Depth from ground elevation immediately prior to excavation, to elevation as indicated or as directed by a Departmental Representative.
 - .2 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will not be measured separately for payment.
 - .3 Backfilling to authorized excavation limits will be measured in tonnes compacted in place for each type of material specified.
 - .4 Placing and spreading of gravel will be measured for payment in tonnes calculated

from cross sections taken in area of excavation from original location. If double handling of gravel is directed by a Departmental Representative through stockpiling and later placing, then quantities will be measured twice; on excavation from original location and on excavation from stockpile.

1.3 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117-[95], Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-[96a], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-[98], Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-[00a], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D 1557-[00], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D 4318-[00], Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A3000-[98]-A5-[98], Portland Cement.
 - .2 CAN/CSA-A23.1-[00], Concrete Materials and Methods of Concrete Construction.

1.4 Definitions

- .1 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Unsuitable materials:
 - .1 Weak and compressible materials under excavated areas.
 - .2 Frost susceptible materials under excavated areas.
 - .3 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: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
 - .2 Table 1

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.

1.5 Submittals

- .1 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform a Departmental Representative at least 4 weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.

.3 Upon Request, submit 70 kg samples of type of fill specified including representative samples of excavated material.

.4 Upon request, ship samples prepaid to a Departmental Representative in tightly closed containers to prevent contamination.

1.6 Quality Assurance

- .1 Design and supporting data submitted to bear stamp and signature of qualified professional Engineer registered or licensed in Province of Prince Edward Island, Canada.
- .2 Keep design and supporting data on site.
- .3 Engage services of qualified professional Engineer who is registered or licensed in Province of Prince Edward Island, Canada in which work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning if required for Work.

1.7 Waste Management and Disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal (short form).
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Ensure emptied containers are sealed and stored safely.

1.8 Protection of
Existing Features

- .1 Protect existing features in accordance with Section 01 50 00 - Temporary Facilities and applicable local regulations.
- .2 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing excavation Work, notify applicable Owner or authorities having jurisdiction; establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered [as indicated].
 - .5 Where utility lines or structures exist in area of excavation, obtain direction of a Departmental Representative before re-routing.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
 - .7 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with a Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately

make repair to approval of a Departmental Representative.

PART 2 - PRODUCTS

.1 Material: See Section 31 37 00 for material specifications.

.2 Geotextiles: See Section 31 32 19.01 for geotextile specifications.

PART 3 - EXECUTION

3.1 Site Preparation

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

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 Stripping of Topsoil

Not Applicable

3.3 Stockpiling

.1 Stockpile fill materials in areas designated by a Departmental Representative. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.4 Cofferdams, Shoring, Bracing and Underpinning

Not Applicable

3.5 Dewatering and

Not Applicable

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 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations.
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 48 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.25 m.
 - .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 a Departmental Representative.
- .6 Install geotextiles in backfill in accordance with section 31 32 19.01 - Geotextiles as directed by a Departmental Representative.

3.10 Restoration

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 24 - Construction/Demolition Waste Management And Disposal (short form), trim slopes, and correct defects as

directed by a Departmental Representative.

- .2 Replace gravel as indicated by a Departmental Representative.
- .3 Clean and reinstate areas affected by Work as directed by a Departmental Representative.

- .4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.

PART 3 - EXECUTION

3.1 Installation

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with pins or weights.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Pin successive strips of geotextile with securing pins at 600 mm interval at mid-point of lap.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, cover with overlying layer within 4 h of placement.
- .8 Replace damaged or deteriorated geotextile to approval of a Departmental Representative.
- .9 Place and compact soil layers in accordance with Section 31 23 33.01 -

Excavating Trenching and Backfilling.

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

3.3 Protection .1 Vehicular traffic not permitted directly on geotextile.

PART 2 - PRODUCTS

2.1 Materials

- .1 Class "A" Gravel
- .1 Gravels shall be sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material or other deleterious substances. The material shall be approved by a Departmental Representative prior to utilization.
- .2 The gravel shall meet the gradation requirements detailed in Table 1. Gradation to be within the following limits when tested to ASTM C136 and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.
- .3 Los Angeles Abrasion to ASTM C131 maximum percent loss by mass: 35.
- .4 The crushed material shall be a minimum of 75 % by mass retained on a 4.75 mm sieve having 2 or more mechanically fractured faces.
- .5 Petrographic number (max): 150.

Table 1 - Class "A" Gravel

ASTM Sieve Designation	% Passing by Mass
31.5 mm	100
25.0 mm	95-100
12.5 mm	50-83
4.75 mm	30-60
1.18 mm	15-40
600 µm	10-32
300 µm	5-22
75 µm	3-9

- .2 Rock Fill to be hard durable crushed quarried rock, free from silt, clay, organic matter and other foreign substances and free from splits, seams or defects likely to impair its soundness during handling or under action of water. Rock Fill shall be imported, well graded and free from fines. Gradation as per

Table 2. The following materials will not be considered acceptable for use as rock fill: slate, siltstone, sandstone, shale, conglomerate, and mudstone. The material is to be blended to ensure a homogeneous mix of smaller and larger stone sizes will be obtained.

Table 2 - Rock Fill

ASTM Sieve Designation	% Passing by Mass
112 mm	100
40 mm	60-85
5 mm	25-50
.315 mm	5-15
.080 mm	2-7

- .3 Sandstone fill (Premium borrow) shall consist of an approved soil (preferable granular) which is free of organics and deleterious materials such as a pit run sandstone or other approved inorganic soil. Fill material meeting the current Prince Edward Island Transportation and Infrastructure Renewal (PEITIR) Premium Borrow specification. Premium borrow shall be non-plastic well graded and composed of clean, uncoated particles free from lumps or other deleterious materials 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 μ m sieve. Sandstone fills to be placed and compacted to 100% Standard Proctor maximum dry density. Max lift thickness should not exceed 300 mm and must be compatible with the compaction equipment used.

PART 3 - EXECUTION

3.1 Preparation

- .1 Dredge and remove existing material in the area where rock fill sub-base is to be placed.
- .2 Sound area and record elevation of

material on which base will be placed before placing rock fill and/or rip rap.

3.2 Placement

- .1 Do not place rock fill until bottom area has been accepted by a Departmental Representative.
- .2 Place sub-base material to avoid segregation of material sizes.
- .3 Level top surface of sub-base to specified grade.

3.3 Tolerances

- .1 Surface of bearing layer to be within 50 mm of elevation indicated and variation in elevation over whole area of bearing layer not to exceed 75mm.
- .2 Other layers to be within 100 mm of lines shown.

3.4 Protection

- .1 Take into account anticipated weather conditions and degree of exposure of site in setting requirements for protection.
- .2 Schedule and carry out construction so that each phase of work is not left exposed longer than necessary.
- .3 The Contractor should note that the work site is subject to water level variations due to tidal action.
- .4 The Contractor will be responsible to replace any materials lost due to storms, tidal erosion or by his own activities.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 31 62 19 - Steel H-Piles
- 1.2 REFERENCES
- .1 Jacques, Whitford and Associates Limited Report: The entire report can be accessed through a Departmental Representative.
- 1.3 SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00.
 - .2 Sub-surface investigation reports: when site conditions differ from those indicated, submit written notification to a Departmental Representative and await further instructions.
 - .3 Submit schedule of planned sequence of driving to a Departmental Representative for review, as specified.
 - .4 Spliced piles: when authorized, submit design details of splice complete with signature and stamp of qualified Professional Engineer registered or licensed in Province of Prince Edward Island, Canada. All splices of piles shall be designed and constructed as full-strength splices.
 - .5 Equipment:
 - .1 Submit prior to pile installation for review by a Departmental Representative, list and details of equipment for use in installation of piles.
 - .2 Impact hammers: submit manufacturer's written data as specified.
 - .3 Non-impact methods; submit characteristics to evaluate performance.

- .6 Submit drivability analyses as specified, to a Departmental Representative for approval of hammers.
 - .7 Quality assurance submittals:
 - .1 Test reports: submit 3 copies of certified test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- 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 a Departmental Representative.
- 1.5 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for disposal in accordance with Section 01 74 21.
- 1.6 EXISTING CONDITIONS
- .1 Sub-surface investigation report is available upon request.
 - .2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.

1.7 SCHEDULING

- .1 Provide schedule of planned sequence of driving to Departmental Representative for review, not less than two weeks prior to commencement of pile driving.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Material requirements for piles are specified in Section 31 62 19.
- .2 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.
- .3 Splice piles only with written approval of Departmental Representative.
 - .1 When permitted, provide details for Departmental Representative's review.
 - .2 Design details of splice to bear dated signature stamp of Professional Engineer registered or licensed in Province of Prince Edward Island, Canada.

2.2 EQUIPMENT

- .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
- .2 Non-impact methods of installation such as auguring, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.
- .3 Hammer:
 - .1 Hammers to be selected on basis of

drivability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.

.2 Drivability analysis to include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.

.3 When required criteria cannot be achieved with the proposed hammer, use larger hammer and take other measures as required.

.4 Hammer shall be capable of delivering an energy of 450J/cm² of steel cross-sectional area.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Protection:
 - .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
 - .2 Arrange sequencing of pile driving 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.
- .2 Ensure that conditions at pile locations are adequate to support pile driving operation and load testing operation. Make provision for access and support of piling equipment during performance of Work.

3.2 INSTALLATION

- .1 Leads: construct pile driver leads to provide free movement of hammer.
 - .1 Hold leads in position at top and bottom, with guides, stiff braces, or other means reviewed by Departmental

Representative, to ensure support to pile while being driven.

.2 Lengths: provide sufficient length of leads to ensure that use of follower is unnecessary.

.3 Swing leads:

.1 Not permitted.

.2 Followers:

.1 Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance.

.2 Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.

.3 Installation of each pile will be subject to review of Departmental Representative.

.1 Departmental Representative will be the sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.

.2 A Departmental Representative to review final driving of all piles prior to removal of pile driving rig from site.

.4 Drive shoes or reinforced pile tips shall be used to protect all piles during driving.

.5 Drive each pile approximately 1500mm into bedrock and to elevation indicated on the project drawings.

.1 Do not overdrive to cause damage to piles in bedrock.

.6 Drive each pile to pile tip elevation as indicated.

3.3 APPLICATION /
DRIVING

.1 Use driving caps and cushions to protect piles.

- .1 Reinforce pile heads as required by Departmental Representative.
- .2 Piles with damaged heads as determined by Departmental Representative will be rejected.
- .2 Hold piles securely and accurately in position while driving.
- .3 Deliver hammer blows along axis of pile.
- .4 Ensure no contact between pile and existing structure takes place.
- .5 Re-strike already driven piles lifted during driving of adjacent piles to confirm set.
- .6 Cut off piles neatly and squarely at elevations as indicated to tolerance of plus or minus 5 mm.
 - .1 Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
- .7 Remove cut-off lengths from site on completion of work.

3.4 OBSTRUCTIONS

- .1 Where an obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, notify the Departmental Representative.

3.5 FIELD QUALITY CONTROL

- .1 Required Pile Testing
 - .1 Each pile shall be driven to the depth criteria and elevations outlined on the drawings.
 - .2 The depth of embedment of each pile shall be monitored and recorded to ensure piles are not obstructed during driving.
 - .3 A minimum of 10% of the piles installed

shall be re-tapped 24 hours after installation to ensure no relaxation has occurred. If any relaxation has occurred, notify Departmental Representative.

.2 Measurement:

.1 Maintain accurate records of driving for each pile, including:

.1 Types and make of hammer, stroke or related energy.

.2 Other driving equipment including water jet, driving cap, cushion.

.3 Pile size and length, location of pile.

.4 Numbers of blows per meter for entire length of pile and number of blows per 25 mm for last 300 mm.

.5 Final tip and cut-off elevations.

.6 Record pertinent information such as interruption of continuous driving or pile damage.

.7 Record elevations taken on adjacent piles before and after driving of each pile.

.2 Provide Departmental Representative with three copies of any records.

3.6 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

producer's certificates.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit details of pile stock material to be used, as described in PART 3.2 - FABRICATION, for review by Departmental Representative.

1.4 DELIVERY,
STORAGE, AND
HANDLING

.1 Deliver, store and handle to prevent damage to products.

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

.3 Deliver new, undamaged materials to site, accompanied by certified test reports, with manufacturer's logo and mill identification mark provided on pipe piling.

.4 Storage and Protection:

.1 Store and handle steel piles in accordance with manufacturer's written instructions to prevent permanent deflection, distortion or damage to interlocks.

.2 Support steel piles on level blocks or racks spaced not more than 3m apart and not more than 0.60m from ends.

.3 Store steel piles to facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.

.5 Waste Management and Disposal:

.1 Separate waste materials for disposal in accordance with Section 01 74 21.

.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.
.4 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
.5 Unused paint material must not be disposed of into sewer system, into streams, lakes, onto ground or in any other location where it will pose a health or environmental hazard.

1.5 MEASUREMENT FOR PAYMENT

- .1 Payment for steel H-piles will be measured as per Section 01 10 10.
- .2 The unit price for this item shall include all equipment, labour, temporary works and wastage to supply, position and install the steel H-piles to the lines, locations and elevations described by the project drawings. The unit price shall include all splices, pile tip reinforcing and flange reinforcing at tie rod connections.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel H-piles: HP 310x110 to CAN/CSA G40.21 - Grade 350W.
- .2 Pile tip reinforcement: to CSA-G40.20/G40.21, Grade 350W.
- .3 Splices: to CSA-G40.20/G40.21, Grade 350W.
- .4 Welding electrodes: to CSA W48 series.

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 FABRICATION

- .1 Fabricate full length piles to eliminate splicing during installation wherever possible.
- .2 Full length piles may be fabricated from piling material by splicing lengths together.
 - .1 Use complete joint penetration groove welds.
- .3 Submit details of planned use of pile material stock to Departmental Representative for approval prior to start of fabrication. Re-use cut-off lengths as directed by Departmental Representative.
- .4 Allowable tolerance on axial alignment to be 0.25% as measured by 3 m straight edge.
- .5 Allowable deviation from straight line over total length of fabricated pile to be 30mm.
- .6 Install pile tip reinforcement, splices and driving shoes as indicated.

3.3 INSTALLATION

- .1 Install piling in accordance with Section 31 61 13.
- .2 If approved by Departmental Representative, splice piles in place during installation by welding. Hold

members in alignment during splicing operation. Make splice by complete joint penetration groove welds as indicated on shop drawings.

3.4 WELDING

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