



City of Saint John

Contract Specifications

TENDER NO. 2021-081201T

Sea Wall Refurbishment



City of Saint John

**CONTRACT SPECIFICATIONS
FOR**

TENDER NO. 2021-081201T

**Sea Wall Refurbishment
Saint John, NB**

**Issued for Tender
January 26, 2021**

January 2021



City of Saint John

GENERAL SPECIFICATIONS

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CONTRACT SPECIFICATIONS

DIVISION 1

PROJECT DESCRIPTION

January 2021



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PROJECT DESCRIPTION

1.1 GENERAL DESCRIPTION

The work consists generally of repairs and raising of an existing Sea Wall, including but not limited to:

- Demolition and removal of various items including but not limited to mooring bollards, wheelguard, safety ladders, rubber fendering, vertical rails, instrument tower, electrical pedestals, pole foundation, shed, and access platform.
- Demolition and removal of deteriorated concrete as indicated on the Contractor Drawings.
- Refacing of existing concrete cribs, concrete gravity wall and concrete-encased steel sheet piling with new concrete.
- Supply and installation of a new steel sheet piling and associated tieback system and toe pinning into bedrock.
- Supply and installation of a new tieback system for an existing concrete-encased steel sheet pile wall.
- Raising of the existing Sea Wall by construction of a new cast-in-place wall built on top of the existing wall.
- Construction of other miscellaneous items including but not limited to mooring bollards and safety ladders.

1.2 CONTRACT DOCUMENTS

- a) General Specifications, City of Saint John, New Brunswick, with all applicable Divisions as listed in the Table of Contents of the Contract Specifications.
- b) Contract Specifications,
Tender No.: 2021-081201T
Contract: **Sea Wall Refurbishment**
City of Saint John, New Brunswick
- c) List of Drawings

<u>Sheet No.</u>	<u>Description</u>
S1	Existing Site Plan - Demolition
S2	Existing Sections
S3	Existing Sections and Detail
S4	Existing Sections, Plan and Detail
S5	Existing Elevations Stations #3-9 - Demolition
S6	Existing Elevations Stations #9-14 - Demolition
S7	Type 1-3 Concrete Removals
S8	Type 4-9 Concrete Removals
S9	New Site Plan
S10	New Wall Elevations - Stations #1-9
S11	New Wall Elevations - Stations #9-14

S12	Sections - New Steel Sheet Piling
S13	Refacing and Tieback System at Existing Concrete-faced SSP
S14	SSP Tieback Excavation Staging
S15	Section and Details - SSP and Tieback System
S16	Section and Details - SSP Toe Pinning, Anchor Wall, and Transitions
S17	Keyway Wall Extension
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S19	Details - Crib and Gravity Wall Refacing
S20	New Raised Wall
S21	Mooring Bollard and Cleat Sections and Details
S22	Expansion Joint and Safety Ladder
S23	Architectural Form Liner Treatment at North Wall (Stations #1-5)
S24	Architectural Form Liner Treatment at South Wall (Stations #10-14)
S25	Sewer Outfall Demolition Details
C1	Storm Sewer Outfall Plan & Profile Sta. 0+000 – Sta. 0+060
C2	Storm Sewer Outfall Details

1.3 AUTHORIZED ENQUIRIES CONTACT

During the procurement phase of this project, all inquiries shall be referred to:

Chris Roberts, SCMP, CPPB
Supervisor
Supply Chain Management
City of Saint John
175 Rothesay Avenue, Saint John, NB
chris.roberts@saintjohn.ca



City of Saint John

CONTRACT SPECIFICATIONS

DIVISION 2

INSTRUCTIONS TO TENDERERS AND TENDERING PROCEDURES

JANUARY 2021



City of Saint John

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INSTRUCTIONS TO TENDERERS AND TENDERING PROCEDURES

2.1 TRADE TREATIES AND TENDERING POLICY

2.1.01 Internal Trade Agreements

Tenderers should note that the within procurement is subject to internal trade agreements including the Canadian Free Trade Agreement and the Atlantic Procurement Agreement and the Agreement on opening public procurement for Quebec and NB.

2.1.02 Tendering Policy

Tenderers should note that the within Procurement shall conform with The City of Saint John “Tendering Policy for Construction Contracts” which is attached hereto as Appendix “A”.

2.2 MATERIAL DISCLOSURES

2.2.01 General

The City makes the following material disclosures with respect to this Request for Tender. While the City has used considerable efforts to ensure the accurate representation of all information in this Request for Tender, including these material disclosures, such information is supplied solely as a guideline for Tenderers. The City does not warrant or guarantee the accuracy of such information, nor is such information necessarily comprehensive or exhaustive. Nothing in this Request for Tender is intended to relieve Tenderers of the obligation to form their own opinions and reach their own conclusions with respect to the matters addressed in this Request for Tender.

2.2.02 Permits Required for Project

Except as stated otherwise in the Tender Document, any and all permits and approvals required by the Authorities having jurisdiction, and arrangements for all inspections of the Work by these Authorities shall be obtained and paid for by the Contractor. The cost of such approvals, permits and inspection shall be included in the Tender Price.

2.2.03 Deemed Examination and Acceptance

Tenderers should note that by submission of a Tender they will be deemed to have examined and accepted the Specifications and Drawings, visited the site, and informed themselves as to existing conditions and limitations.

2.2.04 Availability of Services

The Tenderer shall ascertain from the relevant Authorities the availability of services, including, but not limited to, electricity, sewer, water, telephone, natural gas and transportation to the project and shall ascertain what prior notice each Authority will require for the installation of the service to the project.

2.2 MATERIAL DISCLOSURES (Cont'd)

2.2.05 Tax

- a) Tenderers are advised to make special note of all applicable tax procedures.
- b) The City is required to pay the Harmonized Sales Tax (HST).
- c) The total tendered amount shall include the appropriate taxes on all labour, material and equipment to be incorporated into the Work.
- d) Tenderers shall submit their Tenders on the basis that the total amount of the Tender shall include all taxes for which the City is liable.
- e) Any increase or decrease in costs to the Tenderer due to the changes in such taxes and duties, after the date of the Tender Closing, shall increase or decrease the value of the Contract accordingly.

2.2.06 Performance Guarantees Required Prior to Contract Execution

Within five (5) Working Days following the City's notice of selection, the selected Tenderer shall provide the City with the required Performance Guarantees, in the form of either:

- a) A Performance Bond and a Labour and Material Payment Bond, each at fifty percent (50%) of the Tender Price covering the faithful performance of the full Contract. The bonds shall be in favour of *The City of Saint John* and show *The City of Saint John* as obligee; or
- b) A certified cheque in the amount of twenty percent (20%) of the Tender Price covering the faithful performance of the full contract.

2.2.07 Insurance

Tenders should refer to Division 6 (section 6.8) for details regarding insurance requirements.

2.2 MATERIAL DISCLOSURES (Cont'd)

2.2.08 WorkSafeNB Certificate and Business Corporations Act Certificate

- a) New Brunswick Tenderers shall provide to the City a WorkSafeNB certificate which confirms proper registration and good standing with WorkSafeNB and a *Business Corporations Act* Certificate which confirms proper registration with the Province of New Brunswick - Corporate Affairs (of which the Contractor must be in good standing) within five (5) Working Days following the City's notice of selection.
- b) Out-of-province Tenderers shall provide to the City a WorkSafeNB certificate which confirms proper registration and good standing with WorkSafeNB or a letter or certificate issued under the equivalent applicable legislation in the province of origin of the Tenderer confirming extension of coverage from said legislation to the Province of New Brunswick for the term of the Contract. Subject to paragraph c), out-of-province Tenderers shall also provide a *Business Corporations Act* Certificate which confirms proper registration with the Province of New Brunswick - Corporate Affairs (of which the Contractor must be in good standing) within five (5) Working Days following the City's notice of selection.
- c) Tenderers from Nova Scotia may submit the appropriate *Business Corporations Act* Certificate from the Province of Nova Scotia.

2.2.09 New Brunswick Construction Safety Association

If the total Tender Price for the work, inclusive of HST, is two hundred and fifty thousand dollars (\$250,000.00) or more, Tenderers shall supply a Letter of Good Standing under the Certificate of Recognition Program from the New Brunswick Construction Safety Association. Out-of-Province Tenderers shall supply an equivalent from the Tenderer's Province of origin acceptable to the Engineer.

2.2.10 Timetable for Completion of the Work

The portion of the Work as indicated on the drawings to be complete by September 30, 2021 shall be complete by September 30, 2021.

The Substantial Completion of the Work shall be no later than August 30, 2022. The Work shall be fully commissioned by September 30, 2022.

2.3 **SCHEDULE FOR THE TENDER PROCESS**

Issue Date of Request for Tender	Tuesday, January 26, 2021
Deadline for Enquiries	Friday, February 12, 2021, 4:00 pm, AST
Deadline for Issuing Addenda	Tuesday, February 16, 2021, 4:00 pm, AST
Tender Closing	Tuesday, February 23, 2021, 2:30 pm, AST

The Schedule for the Tender Process is tentative only and may be changed by the City in its sole discretion at any time prior to Tender Closing.

2.4 **TENDER DOCUMENTS**

2.4.01 **Tender Documents to be Obtained in Prescribed Manner**

Tender Documents shall be obtained by emailing a request to chris.roberts@saintjohn.ca.

Tenderers must register on the City's official list of bidders for this project, as follows:

- (i) registration of the full legal name, contact person, telephone number and email address of the Tenderer obtaining the Tender Documents; or, if applicable,
- (ii) the registration of the full legal name, contact person, telephone number and email address of the Tenderer on whose behalf the Tender Documents are being obtained.

The names of the Tenderers having complied with the above criteria will be consolidated onto the City's official bidders list. Only Tenderers listed on the City's official bidders list shall be entitled to submit a Tender. Any Tender received from a Tenderer who has not obtained the Tender Documents from the City of Saint John and is not registered on the City's official list of bidders for this project in the manner set out above will not be evaluated.

2.5 **COMMUNICATIONS AFTER ISSUANCE OF TENDER**

2.5.01 **Tenderers to Review Tender Documents**

Tenderers shall promptly examine all Tender Documents and:

- a) shall report any errors, omissions or ambiguities; and
- b) may direct enquiries or seek additional information

in writing by email before the Deadline for Enquiries to the Authorized Enquiries Contact or the Designated Alternate Contact (in the event of absence) as set out below. No such communications are to be directed to anyone other than the Authorized Enquiries Contact or the Designated Alternate Contact.

<u>Authorized Enquiries Contact</u>	<u>Designated Alternate Contact</u>
Chris Roberts, SCMP, CPPB Supervisor Supply Chain Management City of Saint John Email: chris.roberts@saintjohn.ca	Monic MacVicar, CPPB Procurement Specialist Supply Chain Management City of Saint John Email: monic.macvicar@saintjohn.ca

It is the Tenderer's responsibility to seek clarification from the City on any matter it considers unclear. The City shall not be responsible for any misunderstanding on the part of the Tenderer concerning this Tender or its process.

The City intends to confirm receipt of a Tenderer's communication by way of an email in reply. If a Tenderer has not received a reply, the Tenderer may wish to resend its communication as the lack of reply may have resulted from a technical problem. The City is under no obligation to respond to enquiries or provide additional information but may do so at its sole discretion.

2.5 **COMMUNICATIONS AFTER ISSUANCE OF TENDER (Cont'd)**

2.5.02 **Email Communication**

The following provisions shall apply to any communications with the Authorized Enquiry Contact or the Designated Alternate Contact by email where such email communication or delivery is permitted by the terms of this Tender:

- a) The City does not assume any risk or responsibility or liability whatsoever to any Tenderer:
 - (i) for ensuring that any email system being operated for the City is in good working order, able to receive transmissions, or is not engaged in receiving other transmissions such that a Tenderer's transmission cannot be received;
 - (ii) if a permitted email communication or delivery is not received by the City, or is received in less than its entirety, within any time limit specified by this Tender; and
 - (iii) for any error that may occur in the submission of communications or enquiries.
- b) All permitted communications submitted by a Tenderer by email to the Authorized Enquiries Contact or the Designated Alternate Contact shall be deemed to have been received on the dates and times indicated on the Authorized Enquiry Contact's or the Designated Alternate Contact's email system

2.5.03 **Addenda: Responses to Enquiries and Amendments or Clarifications to Tender Documents**

The City may, in its sole and absolute discretion, through the Authorized Enquiry Contact or the Designated Alternate Contact, respond to enquiries and/or amend the Tender Documents before Tender Closing.

Written Addenda are the only means of responding to enquiries or amending the Tender Documents. Only the Authorized Enquiry Contact or the Designated Alternate Contact, and no other employee or agent of the City, is authorized to respond to enquiries and amend the Tender Documents by issuing an Addendum.

Responses to enquiries, changes, clarifications or corrections prepared and circulated by the City form part of the Tender Documents and will be issued as Addenda. Responses will be made in writing and distributed by email to all Tenderers who are registered on the City's official bidders list in accordance with the procedure outlined in section 2.4.01 b) above, as of the date the response is prepared by the City. Each Addendum will contain a signature page(s) which each Tenderer is required to sign and include with its Tender submission. While the City will make reasonable efforts to deliver each Addendum to all Tenderers, it makes no guarantee of timely delivery of any Addendum to any Tenderer.

2.5.03 Addenda: Responses to Enquiries and Amendments or Clarifications to Tender Documents (Cont'd)

The City will not identify the source of the question in the response. If a Tenderer requests that an enquiry be treated as confidential, the City, in its sole discretion, will either treat the enquiry or any reply as confidential or inform the Tenderer that it will not respond to the enquiry unless the Tenderer withdraws in writing its request that the enquiry be treated as confidential.

Orally communicated information shall not be binding upon the City. Information offered from sources other than the Authorized Enquiry Contact or the Designated Alternate Contact with regard to the content, intent or interpretation of this Tender is not official, may be inaccurate and should not be relied on in any way, by any Tenderer, for any purpose.

2.6 SUBMISSION OF TENDER

2.6.01 Method of Tender Submission

Due to the ongoing Covid-19 pandemic, Tenders are to be submitted via email in a pdf format. Tenders are to be emailed to chris.roberts@saintjohn.ca and shall clearly identify the Tender Number and the Title of Work in the email's subject line.

2.6.02 Tenders Must be Submitted Only in the Prescribed Manner

- a) Tenders must be submitted in the prescribed *Form of Tender* together with the prescribed *Schedule of Quantities and Unit Prices*. The *Form of Tender* and the *Schedule of Quantities and Unit Prices* shall be filled out in ink or typewritten and bear the signature in longhand.
- b) Repealed.
- c) Each Tender shall be accompanied by a Tender (Bid) Bond or certified cheque in the amount of ten percent (10%) of the Tender Price.
- d) Repealed.
- e) All Tenders shall include a surety consent letter or agreement to bond as per the requirements in the *Form of Tender*.

2.6 SUBMISSION OF TENDER (Cont'd)

2.6.03 Contingency Allowance

The Tender Price shall include the contingency allowance as specified in the *Schedule of Quantities and Unit Prices*, to cover additional costs that may occur during the execution of the Contract attributed to approved additional work not originally contemplated. No part of this allowance shall be expended without the written direction of the Engineer, and any part not so expended shall be deducted from the contingency allowance.

2.6.04 Tenders Must be Submitted Before Tender Closing

It is the responsibility of each Tenderer to ensure that its Tender is submitted before Tender Closing.

Tenders submitted after Tender Closing will be deemed late and disqualified. For the purpose of calculating time, the time on the email shall govern.

The City assumes no responsibility for improperly submitted Tenders.

2.6.05 Amending or Withdrawing Tender Prior to Tender Closing

At any time prior to Tender Closing, a Tenderer may amend or withdraw a submitted Tender by submitting an amending letter via email before the Tender Closing.

The amending letter should clearly specify that the Tenderer intends to withdraw its Tender or, in the case of an amendment, clearly indicate the part of the Tender that the amending letter is intending to replace. In the case of a unit price contract, the amending letter shall show the revision to the Tender Price. In the case of a lump sum contract, the amending letter shall state the amount to be added or subtracted from the Tender Price.

The email should clearly indicate the Tender No., and Title of Work.

2.6.06 Tenderers Shall Bear the Costs of Preparing and Submitting a Tender

Under no circumstances will the City be responsible for a Tenderer's costs of preparing or submitting a Tender.

2.6 SUBMISSION OF TENDER (Cont'd)

2.6.07 Tenders in English

All Tenders are to be in English only. Any Tenders that are not entirely in the English language may be disqualified.

2.6.08 Tender Acceptance Period

Tenders submitted before Tender Closing shall remain open to acceptance in the form submitted by the Tenderer for a period of sixty (60) calendar days after Tender Closing. Failure of the Tenderer to keep the Tender open for sixty (60) calendar days will result in the enforcement of the Tender (Bid) Bond or the cashing of the certified cheque submitted in lieu of the Tender (Bid) Bond pursuant to section 2.6.02 c).

2.6.09 Tender Documents Incorporated into Tender

By submission of a Tender, a Tenderer is deemed to have accepted and incorporated all the instructions and terms and conditions contained in the Tender Documents into its Tender. Submission of a Tender shall also confirm that the Tenderer is satisfied as to the correctness and sufficiency of the Tender, the Tender Price and the prices entered in the *Schedule of Quantities and Unit Prices*.

2.7 AMENDMENT OR WITHDRAWAL OF TENDER POST TENDER CLOSING

2.7.01 No Amendment Post Tender Closing

No Tenderer is permitted to amend or withdraw its Tender after Tender Closing. A Tenderer who discovers an error in his Tender after Tender Closing may leave the Tender as is or request permission from Common Council to withdraw its Tender. A request to withdraw a Tender after Tender Closing must be delivered, along with the reasons for the request, to the Common Clerk for consideration by Common Council within twenty-four (24) hours of Tender Closing.

2.7.02 Withdrawal Requests

Common Council, in its sole discretion, will decide whether or not to grant the withdrawal request based on the information supplied by the Tenderer and a recommendation from City staff. Where Common Council, in its sole discretion, decides to not allow the withdrawal, Common Council may require the Tenderer to perform the Contract or forfeit the Tender (Bid) Bond or the certified cheque submitted in lieu thereof pursuant to section 2.6.02 c).

2.8 TENDER EVALUATION PROCESS

2.8.01 Delivery of Tender Box to Tender Opening Room

Repealed.

2.8.02 Tender Opening Process

Repealed.

2.8.03 Stage 1: Evaluation of Mandatory Requirements

Stage 1 will consist of a review to determine which Tenders comply with all of the mandatory requirements. Tenders which do not comply with all of the mandatory requirements set out below, shall be Disqualified and not evaluated further.

Tenders shall be deemed as not complying with the mandatory requirements where:

- a) Repealed
- b) The Tender is illegible or its pricing terms or conditions cannot be understood by the Tendering Opening Committee.
- c) Where it is a Tender for more than one item and where it is required that all items be bid, there is a failure to bid an item or it does not contain a unit price or extended total of all items to be bid.
- d) The Tender contains a bid on an item not included in the *Schedule of Quantities and Unit Prices*.
- e) The Tender does not contain the total tender price, the unit prices or the fixed price written in words or does not have the words “dollars” and, where applicable, “cents” set out in the written total tender price, unit prices or fixed price on the *Schedule of Quantities and Unit Prices*.
- f) The Tender is not accompanied by the required Tender (Bid) Bond or certified cheque pursuant to section 2.6.02 c).
- g) The Tender does not include a fully completed prescribed Form of Tender, signed by an authorized agent, which bears the Tenderer’s corporate seal, pursuant to section 2.6.02 a) and Division 4.

2.8.03 Stage 1: Evaluation of Mandatory Requirements (Cont'd)

- h) The Tender does not include all required documents specified in the Form of Tender, does not comply with the provisions of the Tender Documents, or does not include the signature page(s) of all addenda issued to the Tenderers signed by the Tenderer.
- i) The Form of Tender contains a change in price that is not initialed by the person signing the Form of Tender.
- j) The Tender contains an unsolicited alternative or a qualification to the terms of the Tender Documents.
- k) Where a Tenderer submits more than one Tender in response to the Request for Tender, all such Tenders shall be Disqualified.

In the case(s) where a Tender which are Disqualified by the Tender Opening Committee, the Tenderer(s) shall be notified accordingly. Tender Prices of Disqualified Tenders will not be made public.

2.8.04 Stage 2: Evaluation of Tender Price

Stage 2 will consist of a recording of the Tender Prices by the Tender Opening Committee.

2.8.05 Selection of the Successful Tenderer

At the conclusion of Stage 1 and Stage 2 of the evaluation process and, subject to the approval of selection by Common Council and the reserved rights of the City, the selected Tenderer will enter into the Contract, as set out in the Tender Documents.

2.9 NOTICE OF SELECTION AND EXECUTION OF CONTRACT

2.9.01 Selection of Tenderer

Notice of selection by the City to the selected Tenderer will be in writing. Within five (5) Working Days following the City's notice of selection, the Tenderer shall provide to the City:

- a) those items listed at section 6.8.04 ("Insurance Policies and Certificates");
- b) an executed Form of Agreement (Division 5); and
- c) the required Performance Guarantees pursuant to section 2.2.06

This provision is solely to the benefit of the City and may be waived by the City at its sole discretion.

2.9 NOTICE OF SELECTION AND EXECUTION OF CONTRACT (Cont'd)

2.9.02 Over-Budget Bids

If the Tender Price of the lowest compliant Tender exceeds the City's project budget or the Engineer's estimate for the Project, the City may proceed with negotiations with the lowest compliant Tenderer. Said negotiations shall be conducted within a prescribed timeframe to identify changes in scope and/or quantities of work, in exchange for a corresponding bid price reduction. Where the City and lowest compliant Tenderer establish acceptable changes and a corresponding bid price reduction, those changes shall be documented as post-bid addendum.

Any such negotiations or resulting recommendations shall be conditional and subject to the approval of Common Council and, in accordance with the Limitation of Liability and Waiver set out in section 2.12 below, there shall be no liability resulting from any failure to award a contract.

Where acceptable changes and a corresponding bid price reduction cannot be successfully negotiated with the lowest compliant Tenderer, the City may proceed with a new tender call at a later date.

2.9.03 Failure to Enter into the Contract

In addition to all of the City's other remedies, such as the enforcement of the Tender (Bid) Bond, if a selected Tenderer fails to execute the Contract, or satisfy any of the applicable conditions set out above at section 2.9.01 within five (5) Working Days of the notice of selection, the City may, in its sole and absolute discretion and without incurring any liability rescind the selection of the Tenderer and proceed with the selection of the next lowest compliant Tenderer.

2.10 CONFIDENTIAL INFORMATION AND MEDIA COMMUNICATIONS

2.10.01 Tenderer's Confidential Commercial Information

The City is committed to an open and transparent Tendering Process while understanding the Tenderers' need for protection of confidential commercial information. To assist the City in meeting this commitment, Tenderers will cooperate and extend all reasonable accommodation to this endeavour.

2.10.02 Tenderer Not to Communicate With Media and Public

To ensure that all public information generated about the Work is fair and accurate, and will not inadvertently or otherwise influence the outcome of the Tendering Process, all public information generated in relation to the Work, including communications with the media and the public, must be coordinated with, and is subject to the prior approval of, the City.

2.10.02 Tenderer Not to Communicate With Media and Public (Cont'd)

Tenderers will notify the City of requests for information or interviews from the media.

Tenderers will ensure that all of the Tenderers' Subcontractors and others associated with the Tenderer comply with the foregoing requirements.

2.11 RESERVED RIGHTS

The City reserves the right to:

- a) Reject an unbalanced Tender. For the purpose of this section, an unbalanced tender is a tender containing a unit price which deviates substantially from, or does not fairly represent reasonable and proper compensation for the unit of work bid or one that contains prices which appear to be so unbalanced as to adversely affect the interests of the City. The City reserves the right to use tenders submitted in response to this Request for Tender or for other like or similar work as a guideline in determining if a bid is unbalanced.
- b) Amend or modify the scope of the Work, and/or cancel or suspend the Tender award, at any time for any reason;
- c) Require Tenderers to provide additional information after the Tender Closing to support or clarify their Tender;
- d) Not accept any or all Tenders;
- e) Not accept a Tender from a Tenderer who is itself, or whose principals, owners or directors are also principals, owners or directors of another entity which is, involved in litigation, arbitration or any other similar proceeding against the City;
- f) Reject any or all Tenders without any obligation, compensation or reimbursement to any Tenderer or any of its team members;
- g) Withdraw this Request for Tender and cancel or suspend the Tendering Process;
- h) Extend, from time to time, any date, any time period or deadline provided in this Tender (including, without limitation, the Tender Closing), upon written notice to all Tenderers;
- i) Assess and reject a Tender on the basis of:
 - (i) information provided by references;
 - (ii) the Tenderer's past performance on previous contracts;
 - (iii) the information provided by a Tenderer pursuant to the City exercising its clarification rights under this Tendering Process;
 - (iv) the Tenderer's experience with performing the type and scope of work specified including the Tenderer's experience as a general contractor;
 - (v) other relevant information that arises during this Tendering Process;

2.11 **RESERVED RIGHTS (Cont'd)**

- j) Waive formalities and accept Tenders which substantially comply with the requirements of this Request for Tender;
- k) Verify with any Tenderer or with a third party any information set out in a Tender;
- l) Disqualify any Tenderer whose Tender contains misrepresentations or any other inaccurate or misleading information;
- m) Disqualify any Tenderer who has engaged in conduct prohibited by the Tender Documents;
- n) Disqualify any Tenderer who is guilty of an offence listed in Schedule C of the New Brunswick Regulation 2014-93 under the Procurement Act;
- o) Disqualify any Tenderer for documented significant or persistent deficiencies in fulfilling or performing a substantive requirement or obligation under a prior contract or contracts. The disqualification for past performance shall be conducted in accordance with sections 64 thru 81 of the New Brunswick Regulation 2014-93 under the Procurement Act;
- p) Make changes, including substantial changes, to the Tender Documents provided that those changes are issued by way of addenda in the manner set out in these Instructions to Tenderers;
- q) Select any Tenderer other than the Tenderer whose Tender reflects the lowest cost to the City;
- r) Cancel this Tendering Process at any stage, for any reason;
- s) Cancel this Tendering Process at any stage and issue a new Request for Tender for the same or similar deliverables;
- t) Accept any Tender in whole or in part; or
- u) Accept a Tender which contains the following errors:
 - (i) error in mathematics – whether this involves the extension of a unit price or an error in addition, the mistake will be corrected and the correct total will be used for evaluation purposes and will be binding on the Tenderer.
 - (ii) conflict between the written and numerical bid prices. In all cases, the total bid price will be corrected to reflect the written bid price, whether lump sum or unit price.
 - (iii) failure to include the contingency allowance in the total Tender Price. If the contingency allowance was not included in the addition, the Tender Price shall be corrected to reflect its inclusion.

and these reserved rights are in addition to any other express rights or any other rights which may be implied in the circumstances and the City shall not be liable for any expenses, costs, losses or any direct or indirect damages incurred or suffered by any Tenderer or any third party resulting from the City exercising any of its express or implied rights under this Request for Tender.

2.11 RESERVED RIGHTS (Cont'd)

By submitting a Tender, the Tenderer authorizes the collection by the City of the information set out at paragraph 2.11 i) in the manner contemplated in that subparagraph.

2.12 LIMITATION OF LIABILITY AND WAIVER

Each Tenderer, by submitting a Tender, agrees that:

- a) Neither the City nor any of its employees, agents, advisors or representatives will be liable, under any circumstances, for any Claim arising out of this Tendering Process including but not limited to costs of preparation of the Tender, loss of profits, loss of opportunity or for any other Claim; and
- b) The Tenderer waives any Claim for any compensation of any kind whatsoever, including Claims for cost of preparation of the Tender, loss of profit or loss of opportunity by reason of the City's decision to not accept the Tender submitted by the Tenderer, to award a Contract to any other Tenderer or to cancel this Tendering Process, and the Tenderer shall be deemed to have agreed to waive such right or Claim.

2.13 INVOICES

- a) In light of the requirements of Section 169 of the *Excise Tax Act*, R.S.C. 1985,c. E-15, and amendments thereto, the selected Tenderer shall provide to the City properly documented invoices with all requests for payments. This includes a government issued business number and the amount of tax included on the invoice.
- b) Failure to provide properly documented invoices may result in delays in processing payments or outright rejection of the payment request.



City of Saint John

APPENDIX 'A'

TENDERING POLICY FOR CONSTRUCTION CONTRACTS



City of Saint John

TENDERING POLICY FOR CONSTRUCTION CONTRACTS

PREAMBLE

Whereas the City of Saint John seeks to duly represent the public interest in the management of its public tendering process for construction contracts;

And whereas taxpayers/ratepayers have the right to expect the benefits of free and open competition, that is, the best goods and services at the lowest possible prices;

And whereas municipal tendering should duly respect the place of other stakeholders, including vendors and contractors, in the process;

And whereas the values of integrity, effectiveness, due process and efficiency must be inherent in the process;

Common Council establishes this tendering policy for construction contracts.

POLICY AND APPLICABLE STATUTES

Persons and/or companies that submit tenders for construction contracts are deemed to have understood and agreed to the requirements of this policy and all applicable tender documentation, as well as all applicable Municipal by-laws and Federal or Provincial statutes. Applicable federal and provincial statutes include, but are not limited to: the *Canada Competition Act*; the *New Brunswick Public Procurement Act*; the *New Brunswick Crown Construction Act*; and the *New Brunswick Municipalities Act*.

APPLICATION OF POLICY

The City of Saint John seeks to optimize fair, open and independent competition for municipal construction work and to afford interested and qualified contractors the opportunity to seek the business.

This policy has been established for construction contracts valued in excess of \$100,000 (before HST). The procedures detailed herein shall apply to all publicly advertised tender calls issued on behalf of the City of Saint John for construction contracts, but do not apply to publicly advertised tenders for the supply of goods and/or services or to invited bids or calls for proposal.

The following divisions of tender specifications for construction contracts form part of this policy: *Instruction to Tenderers and Tendering Procedures* (Division 2); *Form of Tender* (Division 4); and *Form of Agreement* (Division 5).

PUBLIC NOTICE OF TENDER/TENDER ADVERTISEMENT

A public notice of tender shall be issued for all construction contracts valued in excess of one hundred thousand dollars (\$100,000). The notice shall state the contract number, a brief description, the date and the time for the closing of tenders, the location of the locked box for receipt of tenders, and the date, time and location of the tender opening.

TENDER DOCUMENTATION

The following documentation shall be provided to those persons or companies who wish to submit a tender, at an appropriate cost as determined by the Chief City Engineer:

1. Division 1: *Project Description* – as determined by the Chief City Engineer or his designate;
2. Division 2: *Instruction to Tenderers and Tendering Procedures* – forming part of this policy;
3. Division 3: *Particular Specifications* - as determined by the Chief City Engineer or his designate;
4. Division 4: *Form of Tender* - forming part of this policy, and including a Certificate of Independent Tender Determination;
5. Division 5: *Form of Agreement* - forming part of this policy;
6. A notice that Division 6: *General Administration of Contract* and Division 7: *Construction of Municipal Services* of the General Specifications apply to all contracts, and that it is the responsibility of the tenderer to familiarize himself with the provisions in Divisions 6 and 7, as well as those of any other division in the General Specifications determined by the Chief City Engineer or his designate to be applicable to the contract; and
7. Applicable contract drawings, as determined by the Chief City Engineer or his designate.

TENDER PROCESSING

Tenders shall be received and processed in accordance with the provisions set out in Division 2: *Instruction to Tenderers and Tendering Procedures*.

TENDER OPENING COMMITTEE

A tender opening committee is hereby established, consisting of a chairman and two members, as follows:

Chairman: Purchasing Agent or his designate

Member: Chief City Engineer or his designate

Member: A member of staff designated by the City Manager

The committee shall proceed in accordance with the provisions set out in Division 2.

TENDER REJECTION AND AWARD OF CONTRACT

The City of Saint John reserves the right to reject any or all tenders, or to accept a tender other than the lowest tender and to accept the tender deemed to be in its best interests, based on evaluation of relevant criteria, including quality, service and price.

Common Council shall make the decision as to whether or not a contract shall be awarded and to whom it will be awarded.

GENERAL SPECIFICATIONS

The Chief City Engineer may, from time to time, revise the technical provisions of the General Specifications to reflect changes in technology, methods or construction industry practices.

APPROVAL AND EFFECTIVE DATE

This policy, adopted by Common Council on November 19, 2003, shall become effective on January 1st, 2004.



City of Saint John

CONTRACT SPECIFICATIONS

DIVISION 3

PARTICULAR SPECIFICATIONS

SEA WALL REFURBISHMENT

January 2021



City of Saint John

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PARTICULAR SPECIFICATIONS

This division shall be read in conjunction with and take precedence where they may prove at variance with the City of Saint John, General Specifications.

3.1 ADDITIONAL SPECIFICATIONS FOR THIS PROJECT

3.1.01 Work Description

The work consists generally of repairs and raising of an existing Sea Wall, including but not limited to:

- Demolition and removal of various items including but not limited to mooring bollards, wheelguard, safety ladders, rubber fendering, vertical rails, instrument tower, electrical pedestals, pole foundation, shed, and access platform.
- Demolition and removal of deteriorated concrete as indicated on the Contractor Drawings.
- Refacing of existing concrete cribs, concrete gravity wall and concrete-encased steel sheet piling with new concrete.
- Supply and installation of a new steel sheet piling and associated tieback system and toe pinning into bedrock.
- Supply and installation of a new tieback system for an existing concrete-encased steel sheet pile wall.
- Raising of the existing Sea Wall by construction of a new cast-in-place wall built on top of the existing wall.
- Construction of other miscellaneous items including but not limited to mooring bollards and safety ladders.

Also included under this Contract is the installation of a new large diameter storm sewer outfall, from Pugsley Slip to Water Street. The Contractor shall supply all necessary labour, materials and equipment for the excavation, demolition, installation, testing and backfilling of the proposed work, plus all necessary appurtenances. More specifically the work includes:

- Installation of approximately 10m of new 300mm, and 52m of 1800mm diameter storm sewer;
- Supply and installation of a new complete fire hydrant and approximately 5m of 150mm diameter PVC DR18 watermain complete with valves, boxes and appurtenances.
- Removal, salvage and reinstallation of an existing decorative traffic light pole, all arms and appurtenances, complete with new reinforced concrete base.
- Site restoration including the necessary labor, materials and equipment for the reinstatement of approximately 30m of concrete curb & gutter, 70m² of pigmented concrete sidewalk, salvage and reinstallation of approximately 10 m² of clay brick pavers, as well as the placement of 40 tonnes of Superpave 19, 20 tonnes of Superpave 9.5 and approximately 15 m² of 100mm thick top soil and sod.

3.1.02 Schedule of Work and Coordination

The specified completion date for the contract is on or before September 30, 2022. Additionally, the portion of work indicated on the drawings shall be complete by September 30, 2021.

The Contractor shall submit a proposed schedule for the work in accordance with Division 6.13 Schedule of Work of the City of Saint John General Specifications. The schedule is to be in the form of a bar chart showing all project milestones. The Contractor cannot start the work until the work schedule is accepted by the Engineer. Once the work is started by the Contractor, the work shall proceed diligently in accordance with the Engineer's direction and the program approved by the Engineer.

The schedule shall allow a minimum of two week notice in advance of any proposed shutdowns, connections or other activities that may interfere with operations of other infrastructure and/or systems, or that may require the attention of City staff. The Engineer will use this two week period to review the plan, notify stakeholders, and to schedule resources that may be required. Approval must be received from the Engineer in writing prior to proceeding with any stages of the work.

A pre-construction meeting will be arranged by the Engineer to discuss with the Contractor the schedule of work, scope of work, work coordination, specific construction procedures, traffic control, and other related issues.

Access must be granted to site for all City staff for the duration of the project.

3.1.03 Utility Poles and Light Standards

The Contractor shall be responsible for bracing and support of the utility poles, light standards, conduits and ducts within the construction zone. The Contractor must provide all necessary labour, material, and equipment to effectively and safely support these utility poles, light standards, conduits and ducts. The Contractor is to follow the bracing and support requirements as to be provided by Saint John Energy and Aliant, or their authorized agent(s).

No additional payment will be made to the Contractor for this work of bracing the utility poles and light standards and the cost for this work shall be deemed incidental to the works.

Prior to the start of construction, the Contractor shall daylight all buried underground utilities that intersect the alignment of the proposed storm sewer outfall system and proposed fire hydrant leads and shall confirm location and elevation of each utility. Daylighting shall be performed using hydro-vacuum method and shall be considered incidental to the work.

3.1.04 Existing Underground Utilities

It will be the responsibility of the Contractor to support the existing water, sanitary and storm pipes and any other underground infrastructure that cross the trench or other excavations during construction or replace, at the Contractor's option, all incidental to the work. The Contractor will also be responsible for protecting the existing water, sanitary and storm pipes and any other underground infrastructure that may run along deep excavations on the street, all incidental to the work.

All costs associated with working around existing infrastructure will not be paid for separately and will be considered incidental to the cost of the work.

Method of Measurement: No payment will be made for delay resulting from the agency's location of services. The Contractor is responsible for any damages to existing underground utilities resulting from construction activities.

3.1.05 Protection of Existing Services / Structures and Underground Utilities

In the event of damage to the existing water mains, sewers or catch basins, laterals, water, sewer and storm services, the Contractor shall make such repairs or replacements or rebuild such affected parts of the work as the engineer may deem necessary, at the Contractor's expense, if the underground infrastructure is properly marked (within 1.0m horizontally).

There shall be no additional payment to the contractor for delays or downtime as a result of improperly marked services. All repairs are to be done to the City of Saint John General Specification.

3.1.06 Traffic Management

When working on Public Streets:

Pedestrian traffic must be maintained throughout the construction period. The Contractor will be responsible for coordination of safe passage of pedestrians around the construction site. Pedestrian traffic control shall be considered incidental to the work.

3.1.07 Access to Residences and Businesses

The Contractor shall maintain access to all businesses and residences within the work site. The Engineer shall provide adequate notice to the property owners, residents and tenants in advance of blocking driveways. The Contractor shall ensure that a suitable means of egress and entrance is maintained to all businesses, residences and places of work for the duration of the Work.

The Contractor shall co-ordinate his activities and communicate with the Engineer, so that the Consultant can co-ordinate those activities with businesses and residents throughout the duration of the project.

The Contractor shall appoint a site supervisor liaison to co-ordinate the construction activities with the Engineer, business owners and residents. Prior to construction, the Contractor's representative shall notify the business owner and residents of each property of the work to be carried out and discuss the details of temporary access to the property, etc. according to **Division 7.10 Public Relations** of the City of Saint John General Specifications.

The Contractor shall promptly construct temporary pedestrian access to individual businesses and residences as deemed necessary by the Engineer.

No separate payment will be made for this work and the cost of this work shall be deemed to be incidental to the work.

3.1.08 Subsurface Conditions

The Contractor shall be responsible for all shoring and dewatering required for all works. This will include pumps, pipe, labour, and all related work, including control of discharges to prevent erosion and increased suspended solids levels in watercourses. Temporary works including shoring and dewatering shall be considered incidental to the work.

The Contractor is advised that the work area may be subject to tidal influence and may be within the groundwater table. As such, the Contractor may have to develop and implement a modified schedule such that work occurs during low tides and dry periods in order to maintain a safe and dry worksite.

There shall be no additional payment made to the Contractor for any delays or for overtime related to working modified schedules as necessary to safely complete the proposed work.

3.1.09 Concrete Sidewalk

Portland cement concrete used in this work for the coloured concrete sidewalk shall be proportioned to meet the following specifications:

Minimum Cement Content	400 kg/m ³ for metal forms
Nominal Maximum Size of Course Aggregate	20mm
Maximum Sand Content by Weight of Total Aggregate	40%
Maximum Water/Cement Ratio By Mass (w/c)	0.45
Air Content (a/c)	5% - 8%
Minimum Compressive Strength at 28 days	35 MPa
Slump	80mm

Colour Admixtures Shall be as follows:

- .1 Concentrated colour pigment RG-2827R “Baja Red” as manufactured by Interstar, or approved equal. Final Colour selection shall be approved by the Engineer prior to construction.
- .2 Pigment shall be applied at a rate of 2 prepackaged premeasured bags of pigment per cubic metre of concrete.
- .3 Add concrete materials to mixer in same order for each batch. Pigment shall not be added to the mixer as first concrete material. Colour pigment shall be added after the aggregate charge and prior to addition of water and cement.
- .3 Use of calcium chloride is not permitted.

Saw cuts and control joint spacing for concrete sidewalk repair shall match existing.

3.1.10 Notification to Residents & Businesses

The project may disrupt services and site access to residents who live in the immediate area. As a result, it is of significant importance to communicate disruptions and anticipate work schedules to the residents.

The Engineer will prepare written notices to advise residents of planned disruptions to services such as water and site access. These notices are to be delivered to each residence a minimum of 48 hours in advance of any planned disruption. Therefore it is the Contractor's responsibility to notify the Engineer one (1) week in advance of any planned water disruptions.

The Contractor shall not be entitled to additional payment for downtime or slow down related to water shutdowns. No additional payment will be made for failure to notify the Engineer of anticipated water shutdowns at least one (1) week in advance resulting in downtime or slow down.

3.1.11 1800mm Diameter Outfall Pipe Alignment

The City is currently finalizing limits of easements and right-of-ways for the adjacent development property. As such, the alignment of the proposed 1800mm diameter storm sewer piping may be adjusted prior to construction as necessary to permit future maintenance within the City's right-of-way and property limits.

Until the final shop drawings are approved, the City reserves the right to alter the horizontal alignment of the proposed 1800mm diameter storm sewer, between Tee Base MH2 and MH1, by up to 5 metres in either direction of the proposed pipe alignment shown on the Tender Drawings.

There shall be no additional payment made to the Contractor for pipe realignments within 5.0 metres of the Tendered pipe alignments as long as such realignments are communicated and identified by the City Engineer in advance of final shop drawing approvals.

3.1.12 Decorative Traffic Pole, Conduit and Duct Relocation

One existing decorative traffic light pole and all arms, lights and appurtenances will be removed, salvaged and reinstalled where shown on the drawings. The associated underground conduits and adjacent underground traffic ducts shall also be removed and replaced as shown on the drawings and/or as directed to complete the installation of the proposed storm sewer outfall.

The Contractor shall transport and store the traffic light pole, arms, lights and appurtenances in a safe and secure location until the equipment is ready to be permanently reinstalled and commissioned. The Contractor shall safely transport the equipment back to site immediately prior to reinstallation.

The new concrete light base shall be supplied and installed in accordance with the City of Saint John Standard Drawing S045-316A.

The Contractor shall coordinate the removal and reinstallation of all lights, equipment, conduit, ducts and wiring with Saint John Energy and the City of Saint John Traffic Department. All conduits and ducts shall be reinstated to Saint John

Energy and City of Saint John Standards. If there is a conflict in standards, the more stringent shall apply.

It is not anticipated that any additional poles or utilities will need to be relocated as a result of the proposed works.

3.1.13 Environmental Considerations

The Contractor is advised that the Work Site is known to contain impacted soils at various locations including contaminants such as heavy metals, petroleum hydrocarbons (PHCs) and polycyclic aromatic hydrocarbons (PAHs). As such, it is possible that impacted soils and/or groundwater may be encountered during the excavation and installation of the proposed storm sewer outfall pipes, structures and appurtenances and the Contractor shall routinely monitor the excavation for impacted soil and groundwater conditions.

If contaminated soil/groundwater conditions are, or perceived, to be encountered, the Contractor shall stop work and immediately notify the Engineer. The Engineer will review the site conditions and, if required, will provide a soil and/or water management plan to assist with the proper removal, handling, storage, treatment, disposal and reuse of potentially impacted soil and groundwater.

Method of Measurement: A contingency allowance has been included in the Schedule of Quantities and Unit Prices, to cover additional costs that may occur during the execution of the Contract attributed to approved additional work related to the management of impacted soil/groundwater should contamination be encountered. No part of this allowance shall be expended without the written direction of the Engineer, and any part not so expended shall be deducted from the contingency allowance.

3.1.14 Measurement for Payment – Sea Wall Repair Items

Contractor to submit progress payment breakdown in format acceptable to the Engineer prior to submitting invoices.

3.1.14.1 Mobilization and Demobilization

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to mobilize and demobilize all required equipment and material to the site. This item shall include installation and removal of site hoarding as required in the Contract Documents. Any other items required for the successful completion of the project but not specifically outlined under other payment items shall be included under this item.

The unit of measurement for this item shall be lump sum.

3.1.14.2 Engineer's Site Office

This item includes all work, plant, labour, material, tools, and equipment required to provide, maintain, and remove an on-site office for the Engineer as specified in the Contract Documents.

The unit of measurement for this item shall be lump sum.

3.1.14.3 General Demolition and Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to demolish and remove all items indicated on the Drawings or otherwise required to complete the Work. This includes but is not limited to demolition and removal of mooring bollards, wheelguard, safety ladders, fenders, shed, fencing, instrument tower, access platform, vertical rails, pole foundation, building foundation, and electrical pedestals. Portions of the work not included in this item included concrete removals specifically included under other payment items, and demolition and removal of concrete cribs and cope wall required to install the storm sewer ourfall.

The unit of measurement for this item shall be lump sum.

3.1.14.4 Type 1 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 1 Concrete Removal.

The unit of measurement for this item shall be square meters.

3.1.14.5 Type 2 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 2 Concrete Removal.

The unit of measurement for this item shall be square meters.

3.1.14.6 Type 3 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 3 Concrete Removal.

The unit of measurement for this item shall be square meters.

3.1.14.7 Type 4 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 4 Concrete Removal.

The unit of measurement for this item shall be square meters.

3.1.14.8 Type 5 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete, steel plates, angles and other miscellaneous existing steel to the limits as shown on the Drawings for Type 5 Concrete Removal.

The unit of measurement for this item shall be per each.

3.1.14.9 Type 6 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 6 Concrete Removal.

The unit of measurement for this item shall be square meters.

3.1.14.10 Type 7 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 7 Concrete Removal.

The unit of measurement for this item shall be cubic meters.

3.1.14.11 Type 8 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing deteriorated concrete to the limits as shown on the Drawings for Type 8 Concrete Removal.

The unit of measurement for this item shall be cubic meters.

3.1.14.12 Type 9 Concrete Removal

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing

deteriorated concrete to the limits as shown on the Drawings for Type 9 Concrete Removal.

The unit of measurement for this item shall be cubic meters.

3.1.14.13 Expansion Joints

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install expansion joints.

The unit of measurement for this item shall be linear meters.

3.1.14.14 Dowels – Type 1

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install dowels into the vertical face of the existing concrete cribs from elevation -4.60m to elevation -2.20m.

The unit of measurement for this item shall be per each.

3.1.14.15 Dowels – Type 2

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install dowels into the vertical face of the existing concrete cribs above elevation -2.20m.

The unit of measurement for this item shall be per each.

3.1.14.16 Dowels – Type 3

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install dowels into the vertical face of the existing gravity wall from elevation -4.60m to elevation -2.20m.

The unit of measurement for this item shall be per each.

3.1.14.17 Dowels – Type 4

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install dowels into the vertical face of the existing concrete gravity wall above elevation -2.20m.

The unit of measurement for this item shall be per each.

3.1.14.18 Dowels – Type 5

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install dowels into the vertical face of the existing concrete-encased steel sheet pile wall for all elevations at which dowels are required.

The unit of measurement for this item shall be per each.

3.1.14.19 Dowels – Type 6

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install 15M dowels into the upper horizontal face of the existing cope wall above existing concrete cribs and gravity wall. Not included in this item is 20M dowels at mooring bollard bases.

The unit of measurement for this item shall be per each.

3.1.14.20 Dowels – Type 7

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install 20M dowels at mooring bollard bases into the upper horizontal face of the existing cope wall above existing concrete cribs and gravity wall.

The unit of measurement for this item shall be per each.

3.1.14.21 Concrete Keyway Wall Extensions

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install new cast in place keyway wall extensions. This item includes doweling for new keyway wall extensions, formwork, reinforcing steel, joint filler, concrete, and bond breaker.

The unit of measurement for this item shall be per each.

3.1.14.22 Concrete Crib Refacing

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete on the face of existing concrete cribs. Include in unit price all costs required to install new concrete face including but not limited to cleaning of marine growth, reinforcing steel, formwork, control joints, concrete placement and curing. This item includes refacing at both the concrete cribs and the cope wall above the concrete cribs. There will be no difference in payment between the two different refacing thicknesses between the concrete crib and the cope wall above.

The unit of measurement for this item shall be per square meter.

3.1.14.23 Gravity Wall Refacing

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete on the face of the existing gravity wall. Include in unit price all costs required to install new concrete face including but not limited to cleaning of marine growth, reinforcing steel, formwork, control joints, concrete placement and curing.

The unit of measurement for this item shall be per square meter.

3.1.14.24 Concrete-Encased Steel Sheet Pile Wall Refacing

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete on the face of the existing concrete-encased steel sheet pile wall. Include in unit price all costs required to install new concrete face including but not limited to cleaning of marine growth, reinforcing steel, formwork, concrete placement and curing.

The unit of measurement for this item shall be per square meter.

3.1.14.25 New Steel Sheet Pile Wall Facing

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete on the face of the new steel sheet pile wall. Include in unit price all costs required to install new concrete face including but not limited to cleaning of marine growth, reinforcing steel, formwork, concrete placement and curing.

The unit of measurement for this item shall be per square meter.
The unit price shall include concrete placed between the existing and new steel sheet piling.

3.1.14.26 New Raised Wall

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete for the raised wall above the existing varying sections of wall. The limits of payment for each different section of wall shall be as shown on the drawings. Include in unit price all costs required to install concrete including but not limited to cleaning of marine growth, reinforcing steel, formwork, control joints, concrete placement and curing.

The unit of measurement for this item shall be per cubic meter. The quantity of concrete within the mooring bollard bases shall not be included in this item.

3.1.14.27 Mooring Bollard Bases

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install cast in place concrete for mooring bollard bases. Include in unit price all costs required to install concrete including but not limited to cleaning of marine growth, reinforcing steel, formwork, control joints, concrete placement and curing.

The unit of measurement for this item shall be per cubic meter.

3.1.14.28 Mock-up for Architectural Finish at Form Liner

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to complete a mock-up concrete placement for the architectural finish at form liners as specified herein.

The unit of measurement for this item shall be lump sum.

3.1.14.29 Mock-up for Crib Refacing

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to complete a mock-up concrete placement for concrete crib refacing as specified herein.

The unit of measurement for this item shall be lump sum.

3.1.14.30 Supply of Form Liners for Architectural Pattern

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply form liners.

The unit of measurement for this item shall be square meters.

3.1.14.31 Installation of Form Liners for Architectural Pattern

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to install form liners.

The unit of measurement for this item shall be square meters.

3.1.14.32 Tieback Anchor Walls

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install precast concrete for tieback anchor walls. Include in unit price all costs required to install concrete including but not limited to design

of lifting points and any required additional reinforcing and supply and installation of precast elements.

The unit of measurement for this item shall be per cubic meter of concrete anchor wall.

3.1.14.33 Timber Ladders

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install timber ladders. Include in unit price all costs required to install ladders including but not limited to timber, ladder handgrips, and doweling and connection of anchor rods.

The unit of measurement for this item shall be per each.

3.1.14.34 Supply of Steel Sheet Piling

This item includes supply and delivery of steel sheet piling to site.

The unit of measurement for this item shall be square meters.

3.1.14.35 Installation of Steel Sheet Piling

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to install new steel sheet piling.

The unit of measurement for this item shall be square meters. See Section 31 62 16.13 for detailed description.

3.1.14.36 Tieback System at New Steel Sheet Piling

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install the tieback system at the new steel sheet piling including staged excavation and backfill.

The unit of measurement for this item shall be lump sum. See Section 31 62 16.13 for detailed description.

3.1.14.37 Tieback System at Existing Concrete-Encased Steel Sheet Piling

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install the tieback system at the existing concrete-encased steel sheet piling.

The unit of measurement for this item shall be lump sum. See Section 31 62 16.13 for detailed description.

3.1.14.38 Toe Pins

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install toe pins at the base of new steel sheet piling, including but not limited to pipe pile casing, welding of pipe pile casing, drilling and grouting of rock sockets into bedrock, and supply and installation of H piles.

The unit of measurement for this item shall be per each.

3.1.14.39 10 Tonne Mooring Bollards

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install 10 tonne mooring bollards, including but not limited to anchor bolts and sealant, grouting, and cast iron mooring bollards.

The unit of measurement for this item shall be per each.

3.1.14.40 4 Tonne Mooring Cleats

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to supply and install 4 tonne mooring cleats, including but not limited to anchor bolts and sealant, grouting, and cast iron mooring cleats.

The unit of measurement for this item shall be per each.

3.1.14.41 Concrete Removals of Existing Crib Walls and Cope Wall for New Storm Sewer

This item includes but is not limited to all work, plant, labour, material, tools, and equipment required to remove existing concrete and rebar to the limits as shown on the Drawings in order to install new storm sewer. Doweling of new rebar, new rebar, and installation of concrete repair around pipe penetration through existing cope wall and crib wall as shown on the Drawings shall also be included under this item.

The unit of measurement for this item shall be lump sum.

3.1.15 Additional Specifications

Refer to Appendix A for additional technical specifications to be added to Contract Specifications.

APPENDIX 'A'
ADDITIONAL SPECIFICATIONS

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 78 39 – Project Record Drawings.

1.2 ADMINISTRATIVE

- .1 Submit to Engineer one electronic (PDF) copy of submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable. Review submittals prior to submission to Engineer. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .5 Notify Engineer, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and affected adjacent Work are co-ordinated.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by Engineer's review of submittals.
- .8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Engineer review.
- .9 Keep one reviewed copy of each submission on-site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of Work where required.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 days for Engineer's review of each submission.
- .5 Adjustments made on shop drawings by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.

- .6 Make changes in shop drawings as Engineer may require. When resubmitting, notify Engineer in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Supplier.
 - .2 Subcontractor.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Engineer's review, distribute copies.
- .10 Submit one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Engineer may reasonably request.
- .11 Submit one (1) electronic copy of test reports for requirements requested in specification Sections and as requested by Engineer.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit one (1) electronic of certificates for requirements requested in specification Sections and as requested by Engineer.

- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit 3 paper copies and one electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Engineer.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit 3 paper copies and one electronic of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Engineer.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Engineer, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by Engineer is for the sole purpose of ascertaining conformance with general concept. This review shall not mean that Engineer approves detailed design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omission in shop drawings of responsibility for meeting all requirements of the Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at the work site, for information that pertains solely to fabrication processes or techniques of construction and installation and for coordination of Work of all sub-trades.

1.4 SAMPLES

- .1 Submit for review samples in triplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Engineer's site office.
- .3 Notify Engineer in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.
- .6 Make changes in samples which Engineer may require, consistent with Contract Documents.

- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 PERMITS, CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.
- .3 Submit permits, notices, and certificates received by regulatory agencies having jurisdiction to the Work.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION 01 33 00

Part 1 General

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Province of New Brunswick
 - .1 Occupational Health and Safety Act, S.N.B.- Latest Edition.
- .3 FCC No. 301-1982 Standard for Construction Operations.
- .4 FCC No. 302-1982 Standard for Welding and Cutting.
- .5 CSA Standard Z275.2 “Occupational Safety Code for Diving Operations”.
- .6 CSA Standard Z275.4 “Competency Standards for Diving Operations”.
- .7 CSA Standard Z180.1 “Compressed Breathing Air and Systems”.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Submit site-specific Health and Safety Plan: Within 14 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Engineer will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven (7) days after receipt of plan. Revise plan as appropriate and resubmit plan to Engineer within three (3) days after receipt of comments from Engineer.
- .6 Engineer’s review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .7 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Engineer.
- .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 GENERAL PROTECTION

- .1 Companies undertaking this work shall have a clearance certificate from WorkSafe New Brunswick.

- .2 Carry out work placing maximum emphasis on safety, giving precedence to health and safety of public, site personnel, and protection of the environment over cost and schedule considerations of work.
- .3 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .4 Be vigilant and ensure that non-authorized persons are not allowed to circulate in designated construction areas of work site. Provide appropriate means by use of barricades, fences, warning signs and temporary lighting as required. Secure site at night time (or provide security guard) as deemed necessary to protect site against entry.

1.4 FILING OF NOTICE

- .1 File Notice of Project with New Brunswick authorities prior to beginning of Work.

1.5 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.
- .2 A site specific safety hazard assessment shall include but not be limited to the following:
 - .1 Working in close proximity of water.
 - .2 Using water craft.
 - .3 Working from heights.
 - .4 Wet and slippery conditions.
 - .5 Working on floating platforms.
 - .6 Working on suspended platforms.
 - .7 Diving operations.
 - .8 Pile driving operations.
 - .9 Working around excavations.
 - .10 Working with jackhammers and chipping hammers for removal of concrete.
 - .11 Working around equipment.

1.6 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Engineer prior to commencement of Work.

1.7 HEALTH AND SAFETY PLAN

- .1 Based on hazard assessment, prepare Project Health and Safety Plan to include the following:
 - .1 Summary of health risk and safety hazards resulting from analysis, clearly identifying those of high risk;
 - .2 List special tasks and operations which are to be followed for activities or operations of high health and safety risk;
 - .3 List hazardous materials to be brought on site as required by work;
 - .4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards;

- .5 Identify personal protective equipment to be used by workers as required to manage hazards that cannot be reasonably or practically managed by engineering and administrative control;
 - .6 State company's Safety Policy. Provide confirmation that General Contractor and subcontractors currently have in place Standard Operating Procedures (SOP) and Safe Work Practices (SWP), representative of the work type to be undertaken and meeting provincial safety regulations; that such procedures and practices will be stringently followed and enforced during work of this contract. Maintain a copy of all SOP and SWP on site at all times for own use and provide for inspection when requested by Engineer;
 - .7 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
 - .1 Designated personnel from own company;
 - .2 Local emergency resources;
 - .3 Regulatory agencies applicable to work and as per legislated regulations;
 - .4 City of Saint John.
 - .8 Provide a communication plan or strategy of approved measures to be followed on site by all workers as to how project specific construction information and Health and Safety issues must flow and be shared between Workers, Subcontractors, General Contractor, Engineer, and designated tenant representatives. Engineer will provide names of client contacts and their requirements for incorporation into the plan.
- .2 Develop plan in collaboration with all sub-contractors. Ensure that all work and activities of sub-contractors are included in the hazard assessment and reflected within plan.
 - .3 Implement, maintain, and enforce compliance with requirements of the Health and Safety Plan until final completion of work and demobilization from site.
 - .4 As project progresses, continually review and evaluate work and construction site. Carry out additional hazard assessments, identifying new or potential health risk and safety hazards not previously known. Immediately revise and update Project Health and Safety Plan. Notwithstanding the above, carryout additional hazard assessments and revise the Health and Safety Plan when:
 - .1 New subtrade work, new subcontractor (s) or new workers arrive at the site to commence another portion of the work;
 - .2 The scope of work has been changed by Change Order;
 - .3 Errors or omissions are identified by Engineer or any authorized safety representative.
 - .5 Post a legibly typed copy of the Health and Safety Plan in a common visible area at the work site. Ensure that all workers and other authorized persons allowed access to the construction area (s) are aware of and abide by the rules and regulations indicated in the plan.
 - .6 Post all revisions to the plan and submit an updated copy to the Engineer in all instances.
 - .7 Maintain copies of all hazard assessments on site for the entire duration of work. Make available to Engineer for review upon request.

- .8 Submission of the Health and Safety Plan, and any revised version, to the Engineer is for information and reference purposes only. It shall not be construed to imply approval by Engineer, be interpreted as a warranty of being complete, accurate and legislative compliant and shall not relieve Contractor of his legal obligations for the provision Health and Safety on the construction project.

1.8 GENERAL REQUIREMENTS

- .1 Engineer may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.
- .2 Deliver copies of WHMIS-MSDS data sheets to Engineer on delivery of materials.
- .3 All data sheets must be posted on site, in a common area, visible to all workers (and in locations accessible to tenants employees when work of this contract includes construction activities adjacent to occupied areas).
- .4 Make all efforts to select and use materials (i.e. adhesives, solvents, cleaners etc.) for the type and nature of work to be carried out which are the least hazardous products available, of low VOC content or low toxicity type products and emitting low noxious odours. Select products known to be friendly to the environment and to human health. Communicate this intent to sub-contractors, suppliers and manufacturers.
- .5 Where the use of hazardous and toxic products cannot be avoided:
- .1 Advise Engineer beforehand of the product (s) intended for use, submit WHMIS data sheets as per clause specification.

1.10 FIRE, SAFETY, AND HOT WORK REQUIREMENTS

- .1 Comply with Federal and Provincial fire safety regulations, including the requirements of the following standards as issued by the Fire Protective Services of Human Resources Development Canada:
- .1 FCC 301-Standard for Construction Operations.
- .2 FCC 302-Standard for Welding and Cutting.
- .2 Obtain Engineer's authorization before any welding, cutting or any other hot work operations can be carried out on site. Hot work includes all cutting with use of torch or other open flame devices and grinding with equipment which produces sparks.
- .3 Contractor shall develop, and implement use of written Hot Work Procedures and Safe Work Practices to be followed on the construction site for all hot work. Submit such procedures to Engineer for review and approval.
- .4 The Hot Work Procedures and Safe Work practices shall meet with fire safety regulations specified in clause (12.1) above and shall include the following criteria:

- .1 Use of a Hot Work Permit system, between Contractor and each worker performing the hot work; consisting of a form to be filled out and issued for each and every hot work operation.
- .2 Requirement for a hazard analysis to be carried out of the immediate area and on the nature and extent of the hot work required. The assessments must be done prior to and for each and every event where a Hot Work permit will be issued. Hazard analysis shall document in writing the following:
 - .1 Identified known and potential hazards;
 - .2 Protective controls and measures to be taken to minimize the risk of a fire;
 - .3 Planned emergency responses.
- .3 Provision of a designated person (s) to carry out fire safety watch for a minimum of 30 minutes after completion of the hot work.
- .5 Hot Work Permit Form to include, as a minimum, the following information:
 - .1 Project name and project number.
 - .2 Name and address of building or facility where work to be performed including specific floor or room etc.
 - .3 Description of hot work and nature of work to be carried out.
 - .4 Special precautions required, including the type of fire extinguisher needed.
 - .5 Worker (s) License or Certificate number when applicable in accordance with provincial regulations.
 - .6 Name and signature of Contractor, or his designated superintendent authorized to issue the permit, and the date when permit was prepared and issued.
 - .7 Name of worker (s) (clearly printed) to which the permit is being issued.
 - .8 Time duration when permit is in force (not to exceed 8 hours) indicating "Start" date and time and "completion" date and time.
 - .9 Worker signature with date and time when work has been completed.
 - .10 Name of fire safety watch person, with his signature, date and time at completion of safety watch, certifying that the surrounding area was under his watch and inspected for a minimum of (30 minutes) immediately upon hot work completion and found to be in a fire safe condition.
- .6 The Hot Work Permit shall be completed in full before work commences, signed by the respective persons upon completion and returned to the contractor.
- .7 Maintain Work Permits and Hazard analysis documentation on site for duration of Work. Upon request, make available for viewing by Engineer and by any person authorized by Engineer.
- .8 Submit copy of Contractor's Hot Work Procedures and Safe Work Practices to obtain Engineer's authorization of such procedures in sufficient lead time before any hot work must be carried out so as not to delay work.
- .9 In most cases, Engineer will issue only one written authorization covering the entire construction project and duration. However in some cases, depending on the nature or phasing of work, the quantity of various trades needing to perform welding and cutting, or other deemed situation, Engineer might designate certain portion of the construction

work as separate entities each requiring its own written authorization. Follow Engineer's directives in this regard.

1.11 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.12 COMPLIANCE REQUIREMENTS

- .1 Comply with all regulations of the New Brunswick Occupational Health and Safety Act.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
- .3 Observe and enforce construction safety measures required by:
 - .1 National Building Code of Canada (Latest Edition), Part 8;
 - .2 Provincial or Municipal statutes and ordinances.
- .4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Engineer will advise on the course of action to be followed.

1.13 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Engineer verbally and in writing.

1.14 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Engineer.

1.15 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Engineer.
- .2 Provide Engineer with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Engineer may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 FIRES

- .1 Fires and burning of rubbish on site is not permitted.

1.2 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .3 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.
- .4 Dispose of construction waste materials and demolition debris at approved landfill sites only. Carry out such disposal in strict accordance with provincial and municipal rules and regulations, Separate out and prevent improper disposal if items banned from landfills.

1.3 DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances with use of siltation fences, sedimentation ponds, diversion ditches, silt curtains, sedimentation blankets, slope stabilization and the like, all in accordance with required environmental regulations and permits.

1.4 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and on adjacent properties.
- .2 Minimize stripping of topsoil and vegetation.
- .3 Minimize disruption to active layer.

1.5 WORK ADJACENT TO WATERWAYS

- .1 Do not operate construction equipment in waterways.
- .2 Do not use waterway beds for borrow material.
- .3 Do not dump excavated fill, waste material or debris in to waterways.
- .4 Do not skid logs or construction materials across waterways.

1.6 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Control emissions from equipment and plant to local authorities emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contamination air beyond application area, by providing temporary enclosures.

- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Have emergency spill response equipment and rapid clean-up kit, appropriate to work, at site. Locate adjacent to work and where hazardous materials are stored. Provide personal protective equipment as required for clean up.
- .6 Provide a floating debris containment boom whenever any of the Contractor's methods of work allow for the potential of floating debris.

1.7 PROTECTION OF FISH HABITAT

- .1 The Contractor shall strictly follow all recommendations and requirements contained in the letter from the Department of Fisheries and Oceans regarding the Work dated June 30, 2020.

END OF SECTION 01 35 43

Part 1 General

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 – Shop Drawings and Submittals.

1.2 INSPECTION

- .1 Allow Engineer access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 The Contractor shall provide access for the Engineer to inspect the Work on the face of the Sea Wall by means of a motor operated vessel with a minimum length of 4 meters. The Contractor shall provide an operator for the vessel. The Contractor shall provide the operator and vessel at a time and frequency as requested by the Engineer.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Engineer's instructions, or law of Place of Work.
- .4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .5 Engineer will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged and paid for by Engineer for purpose of inspecting and/or testing portions of Work, except for the following which remain part of the Contractor's responsibilities:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities. Remove co-mingled materials to off-site processing facility for separation.
 - .2 Inspection and testing performed exclusively for the Contractor's convenience.
 - .3 Mill tests and certificates of compliance.
 - .4 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Engineer.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Engineer. Contractor to pay costs for retesting and reinspection.

1.4 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

- .1 Notify appropriate agency and Engineer in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Engineer as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.

1.7 REPORTS

- .1 Submit two copies of inspection and test reports to Engineer.
- .2 Provide copies to subcontractor, manufacturer, or fabricator of work being inspected or tested.

1.8 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include in each mock-up all related work components representative of final assembly.
- .2 Construct in locations acceptable to Engineer.
- .3 Prepare mock-ups for Engineer's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Engineer will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Engineer.

1.9 MILL TESTS

- .1 Submit mill test certificates as required of specification Sections or as requested by Engineer.

Part 2 Products

2.1 THIS SECTION IS NOT APPLICABLE

Part 3 Execution

3.1 THIS SECTION IS NOT APPLICABLE

END OF SECTION 01 45 00

Part 1 General

1.1 SECTION INCLUDES

- .1 Temporary utilities.

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.3 ACCESS

- .1 Provide and maintain adequate access to project site.
- .2 Maintain access roads for duration of Work and make good damage resulting from Contractor's use of roads.

1.4 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.5 ENGINEER'S SITE OFFICE

- .1 Provide or construct a separate site office for the use of Engineer. Office must be in place prior to commencement of Work.
- .2 Provide heating system to maintain 22 degrees Celsius inside temperature at -20 degrees Celsius outside temperature.
- .3 Size of office to be minimum 2400mmx3600mm. Roof and walls to be weatherproof. Interior floor to be plywood, or other material approved by Engineer. Interior walls and ceiling to be finished with drywall or other material approved by Engineer. Provide suitable screened window of at least 1 square meter size. Door to be fitted with lockset and two keys.
- .4 Contractor to provide table and chair for use by Engineer. Table to be 900mmx1500mm.
- .5 Contractor to provide electrical overhead lighting with minimum 750 lux.
- .6 Contractor to provide two electrical outlets in office for use by Engineer. Provide suitable power to electrical outlets throughout the duration of the Work.
- .7 Contractor to provide a high speed wifi connection for use by Engineer.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 TEMPORARY POWER AND LIGHT

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.
- .3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.7 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

1.8 SITE UTILITIES

- .1 Contractor to provide temporary sanitary facilities, water supply, lunchroom area, office area and phone for their own use. The Engineer shall be allowed access to sanitary facilities and water supply.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION 01 50 00

Part 1 General

1.1 SECTION INCLUDES

- .1 Site hoarding.
- .2 Guard rails and barricades.
- .3 Floating platforms.

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.3 HOARDING

- .1 Erect temporary site enclosures around the area of work using chain link fencing with a height of 1829 mm to prevent pedestrians or other personnel from entering the area of work.
- .2 Install chain link fencing with a height of 1829 mm around existing lighthouse.
- .3 Provide lockable truck entrances or man gates as required.

1.4 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, and around perimeter of the Sea Wall.
- .2 Guard rail around perimeter of Sea Wall to be designed and stamped by an engineer licenced to practise in New Brunswick. Submit design according to Section 01 33 00 Shop Drawings and Submittals.

1.5 FLOATING PLATFORMS

- .1 Provide secure, rigid guard rails and barricades around open edges of floating system.
- .2 Design of all floating platforms to be completed and stamped by an engineer licenced to practise in New Brunswick. Submit design according to Section 01 33 00 Shop Drawings and Submittals.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Engineer reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout the Work.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Engineer of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Engineer at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Engineer reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of the Engineer.
- .9 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use touch-up materials to match original. Do not paint over name plates.
- .10 Immediately remove damaged or rejected materials from site.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in the specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Engineer in writing, of conflicts between specifications and manufacturer's instructions, so that Engineer will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Engineer to require removal and re-installation at no increase in Contract Price or Contract Time.
- .4 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Engineer if required Work is such as to make it impractical to produce required results.
- .5 Do not employ anyone unskilled in their required duties. Engineer reserves right to require dismissal from site, workers deemed incompetent or careless.
- .6 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Engineer, whose decision is final.

1.7 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.8 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION 01 61 00

Part 1 General

1.1 WASTE PROCESSING SITES

- .1 Identify appropriate waste processing sites, based on municipal requirements, as required.

1.2 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Engineer.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

1.3 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner, or excavation material into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.
- .5 Dispose of waste in accordance with Municipal and Provincial regulations.

1.4 SCHEDULING

- .1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 THIS SECTION IS NOT APPLICABLE

Part 3 Execution

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION 01 74 19

Part 1 General

1.1 WORK INCLUDED

- .1 This section specifies requirements for cleaning and disposal of waste at the site.

1.2 GENERAL

- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
- .2 Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .3 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

1.3 MATERIALS

- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.4 CLEANING DURING CONSTRUCTION

- .1 Provide on-site containers for collection of waste materials, and debris.
- .2 Dispose of waste materials off-site.

1.5 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 When Work is complete, remove all tools, machinery, equipment, materials, and any other items. Site to be left in a condition free of debris or any other substance not forming part of the finished Work.

END OF SECTION 01 74 23

Part 1 General

1.1 PROJECT RECORD DRAWINGS

- .1 Closeout submittals for Project Record Drawings will be in accordance with Section 01 78 39 – Project Record Drawings.

Part 2 Products

2.1 NOT USED.

- .1 Not used.

Part 3 Execution

3.1 NOT USED.

- .1 Not used.

END OF SECTION 01 78 00

Part 1 General

1.1 RECORD DRAWINGS

- .1 Engineer will provide two sets of whiteprints for Record Drawing purposes.
- .2 Maintain project “As-Built” Record Drawings and record accurately deviations from Contract Documents caused by site conditions and changes ordered by the Engineer.
- .3 Mark “As-Built” changes in red coloured ink on one set of whiteprints.
- .4 Record following deviation on “As-Built” Record Drawings:
 - .1 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by Change Order or Field Order.
 - .4 Details not on original Contract Drawings.
 - .5 Other significant deviations which are concealed in construction and cannot be identified by visual inspection.
- .5 At completion of project and prior to final inspection, neatly transfer “As-Built” notations to second set of whiteprints using fine red marker. Neatly print lettering and number in size to match original. Lines may be drawn free-hand, but shall be neat and accurate. Add at each Drawing Title Block Note: “AS-BUILT RECORD”. Also circle on List of Drawings each title and number of Drawing marked with “As-Built” records.
- .6 Submit this set of “As-Built” Record Drawings to the Engineer.

1.2 SPECIFICATIONS

- .1 Specifications: mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.

1.3 PHOTOGRAPHS

- .1 Take sets of photographs during the Contract. The first set of photographs shall be taken prior to commencement of construction and the final set following completion of the project. Intermediate sets shall be taken at least once every month and at major milestones in construction. A minimum of three intermediate photo sets shall be taken.
- .2 Provide photographs to the Engineer. Digital photographs will be accepted provided they are taken at a resolution of 4 megapixel or greater. Digital photographs or prints shall be identified with the date of taking and the name of the job and the name of the Contractor.
- .3 Submit progress photographs to the Engineer with each monthly status report that includes application for payment.

Part 2 Products

2.1 THIS SECTION DOES NOT APPLY

Part 3 Execution

3.1 THIS SECTION DOES NOT APPLY

END OF SECTION 01 78 39

Part 1 General

1.1 DESCRIPTION

- .1 This section specifies requirements for demolishing and removing various items designated to be demolished removed.
- .2 As indicated on the accompanying drawings and herein specified, demolition and removal will consist of but not necessarily limited to the following:
 - .1 Mooring bollards.
 - .2 Wheelguard.
 - .3 Safety ladders.
 - .4 Fendering.
 - .5 Shed.
 - .6 Building foundation.
 - .7 Pole foundation.
 - .8 Vertical rails.
 - .9 Access platform.
 - .10 Instrument Tower.
 - .11 Electrical Pedestals.
 - .12 Concrete Removals, Types 1-9.
 - .13 Demolition and removal of concrete required to install new storm sewer.

1.2 REFERENCES

- .1 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012.
 - .2 Canadian Environmental Protection Act (CEPA), 2012.
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Substances Information Review Act, 1985
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 241-13, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .4 VIS 1-2002 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

- .5 SSPC-SP 6/NACE 3-2007 Commercial Blast Cleaning

1.3 MEASUREMENT FOR PAYMENT

- .1 With the exception of items listed in 1.3.2, 1.3.3, 1.3.4 and 1.3.5 of this Section, all items noted in the Contract Documents for demolition and removal or otherwise required to be demolished and removed to complete the Work will be measured as a lump sum item.
- .2 Type 1, 2, 3, 4 and 6 Concrete Removals shall be measured by the square meter. The limits of the removal area shall be as shown on the Drawings. The limits of removal may be adjusted at the sole discretion of the Engineer. The amount measured for payment shall be based on the final removed area as directed by the Engineer. Include in the unit price all costs for demolition and removal including but not limited to access to the work area, cleaning of the wall, painting of the area for removal as directed by the Engineer, sawcutting, protection of concrete from entering the water, removal of concrete, and abrasive blast cleaning of existing exposed reinforcing steel.
- .3 Type 7, 8 and 9 Concrete Removals shall be measured by the cubic meter. The limits of the removal area shall be as shown on the Drawings. The limits of removal may be adjusted at the sole discretion of the Engineer. The amount measured for payment shall be based on the final removed volume as directed by the Engineer. Include in the unit price all costs for demolition and removal including but not limited to access to the work area, cleaning of the wall, painting of the area for removal as directed by the Engineer, sawcutting, protection of concrete from entering the water, removal of concrete, and abrasive blast cleaning of existing exposed reinforcing steel. In cases where removals are required to locally extend beyond the second layer of reinforcing steel, these local removal areas shall not be measured for payment.
- .4 Type 5 Concrete Removals shall be measured per access opening around which Type 5 Concrete Removals are to be completed. The limits of the removal area around each access opening shall be as shown on the Drawings. Include in the unit price all costs for demolition and removal including but not limited to access to the work area, cleaning of the wall, painting of the area for removal as directed by the Engineer, removal of existing steel plates and other components, sawcutting, protection of concrete from entering the water, removal of concrete, and abrasive blast cleaning of existing exposed reinforcing steel.
- .5 Concrete removals as required to install new storm sewer will be measured as a lump sum item, including removals of all crib walls and removals required to penetrate through the existing front cope wall and crib wall.
- .6 There will be no change in the Measurement for Payment for any Concrete Removal Type if the size, depth of concrete cover, or location of existing rebar varies from the Drawings.
- .7 The Engineer shall keep a record of concrete removal areas. After layout of concrete removals for each section of the Work, the Engineer shall give a copy of the removal quantities to the Contractor. The Contractor shall review and confirm the quantities measured by the Engineer and sign the sketch confirming the quantities. Once signed, these quantities shall act as the amount measured for payment. There will be no additional measurement for payment for concrete removals completed outside the limits as laid out by the Engineer. In the case of concrete removals measured by cubic meter, the removal thickness shall be measured after completion of concrete removals. There

will be no additional measurement for payment for concrete removals beyond the limits shown on the Drawings or otherwise directed by the Engineer.

- .8 The Contractor shall supply as incidental to the Work two commercially made metal straight edges, 1.5 m and 3.0 m in length, for the purpose of acting as a datum line to assess concrete removal depths.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Provide a description of proposed methods for demolition and removal of concrete, including but not limited to specifications for jack hammers and chipping hammers to be used for concrete removals and specifications for abrasive blast cleaning compressor, hose, and nozzle.
- .3 Submit proposed method for collecting and containing all concrete debris during concrete removals. The Contractor shall develop a method for preventing any demolished concrete pieces of other debris resulting from concrete removal from entering the water. If the Contractor's method is not deemed acceptable by the Engineer, or if during construction debris is observed entering the water, the Engineer may require the Contractor to resubmit a suitable method for preventing debris from entering the water. There will be no measurement for payment for any aspect of the Contractor's method for preventing demolition debris for entering the water.

1.5 SITE CONDITIONS

- .1 Protect all existing objects outside of the limits of work. Protect existing rebar during demolition of adjacent concrete. In event of damage, immediately inform Engineer and repair at no additional cost and as directed by Engineer.

Part 2 Products

2.1 EQUIPMENT

- .1 Air compressor for abrasive blast cleaning:
 - .1 The air compressor for abrasive blast cleaning shall be capable of delivering material at a pressure of 620 kPa. The air pressure shall be measured in the delivery system at a distance not greater than 3 m from the nozzle end.
 - .2 The compressed air shall be clean, dry, and free of oil residue when tested according to ASTM 4285.
 - .3 Nozzles used for abrasive blast cleaning shall have a minimum diameter of 8 mm and the size shall be as indicated on the nozzle.
 - .4 Hoses used for abrasive blast cleaning shall have an internal diameter of not less than 40 mm.
- .2 Air hammers:
 - .1 Chipping hammers shall have a maximum weight of 9.0 kg prior to any handle modifications and a maximum piston stroke of 102 mm.
 - .2 Jack hammers shall have a maximum weight of 14.0 kg.

- .3 All hammers shall have the manufacturer's name and part or model number engraved on them by the manufacturer. All information must be clearly legible.
- .4 The manufacturer's published specifications shall be the sole basis for determining weight and piston stroke.
- .5 The use of rig-mounted breakers shall not be permitted.

Part 3 Execution

3.1 PREPARATION

- .1 Inspect site and verify with Engineer objects designated for removal.
- .2 Protection:
 - .1 Do not disturb adjacent work designated to remain in place.

3.2 CONCRETE REMOVALS

- .1 Sawcut around the perimeter of removals areas as indicated on the Drawings. Sawcuts to be completed before any removals by jackhammer or chipping hammers. Sawcuts to be in straight lines. Depth of sawcut to be 25 mm or to the depth of the reinforcing steel, whichever is less.
- .2 The use of sawcutting to assist in concrete removal shall not be permitted within the lap length of reinforcing steel to remain in place.
- .3 The use of chipping hammers is permitted at all areas of concrete removal.
- .4 The use of jack hammers for concrete removal shall not be permitted:
 - .1 Within 100 mm of concrete to remain in place.
 - .2 Within 20 mm of steel to remain in place. At locations with steel to remain in place, the Contractor shall first expose the depth to rebar using chipping hammers only. Once the depth to rebar has been established, jack hammers may be used to remove concrete to within 20 mm of the rebar to remain in place.
- .5 The depth of concrete removal for each concrete removal type shall be as indicated on the Drawings. In cases where removals are to extend beyond the existing reinforcing steel, the entire concrete removal depth shall extend 25 mm beyond the first layer of reinforcing steel, and locally 25 mm beyond the second layer of reinforcing steel.
- .6 At type 1 removal locations, the contractor shall go over the entire removal area surface with a chipping hammer with a weight between 7.0 and 9.0 kg. The maximum speed of each pass shall be 100 mm per second, and the chipping hammer shall be firmly applied to the concrete surface at angle of inclination relative to the concrete surface of at least 45 degrees. Any concrete that is visibly loose or soft as a result of the initial pass with the chipping hammer shall be removed. The maximum distance between hammer blade contact with the concrete surface in adjacent passes with the chipping hammer shall be 20 mm. The Engineer shall have sole discretion of determining what concrete constitutes cracked or soft concrete requiring further removal after the initial pass.

3.3 ABRASIVE BLAST CLEANING

- .1 Abrasive blast cleaning shall only be permitted when the concrete and reinforcing steel surfaces are dry. Dry surfaces with compressed air if required.
- .2 The full circumference of the existing exposed reinforcing steel shall be abrasive blast cleaned to a commercial blast cleaned finish according to SSPC-SP 6/NACE No. 3, and the blast cleaned surfaces shall be according to the applicable visual standards specified in SSPC-VIS 1.
- .3 Abrasive blast cleaning of steel shall be completed no more than 14 days before placement of new concrete at area of blast cleaning.

3.4 DEMOLITION SALVAGE AND DISPOSAL

- .1 Dispose of removed materials, except where specified otherwise, in accordance with Section 01 74 19 Construction Demolition Waste Management and Disposal.
- .2 During demolition of existing concrete, prevent demolished concrete from entering the water. All demolition product shall be collected and disposed of off site in accordance with Section 01 74 19 Construction Demolition Waste Management and Disposal.
- .3 Contractor shall obtain and pay for all necessary permits for use of approved dump site.

3.5 STOCKPILING

- .1 Stockpile materials in coordination with Engineer.

3.6 CLEANING AND RESTORATION

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Upon completion of project, reinstate areas, affected by Work to condition which existed prior to beginning of Work.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Shop Drawings and Submittals.
- .2 Section 03 20 00 – Concrete Reinforcing.
- .3 Section 03 30 00 – Cast-in-Place Concrete.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-O86-19, Engineering Design in Wood.
 - .3 CSA O121 (R2013), Douglas Fir Plywood.
 - .4 CSA O151-09 (R2014), Canadian Softwood Plywood.
 - .5 CSA O153-13, Poplar Plywood.
 - .6 CAN/CSA-O325.0-16, Construction Sheathing.
 - .7 CSA O437 Series-93(R2011), Standards for OSB and Waferboard.
 - .8 CSA S269.1-16 , Falsework and Formwork.
 - .9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork.
- .2 Council of Forest Industries of British Columbia (COFI)
 - .1 COFI Exterior Plywood for Concrete Formwork.

1.3 MEASUREMENT FOR PAYMENT

- .1 No measurement for payment to be made under this section. Include costs in unit prices for which concrete formwork is required.

1.4 DEFINITIONS

- .1 Architectural Concrete: all formed surfaces in contact with or within 150 mm of the edges of form liners.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Submit shop drawings for formwork and falsework stamped and signed by an engineer licenced to practise in New Brunswick. Stamped shop drawings to include detail drawings and design calculations of falsework and formwork for refacing of the existing concrete-encased steel sheet piling, existing concrete cope walls, and existing concrete cribs and gravity wall as well as new concrete facing on the new steel sheet pile wall.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance Section 01 33 00 – Shop Drawings and Submittals.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .6 Indicate sequence of erection and removal of formwork/falsework.

1.6 DELIVERY, STORAGE AND PROTECTION

- .1 Deliver, handle and store formwork material and accessories to prevent weathering, warping or damage detrimental to the strength of the materials or to the surfaces to be formed.
- .2 Ensure that formwork surfaces which will be in contact with concrete are not contaminated by foreign matter.
- .3 Handle and erect the fabricated formwork to prevent damage.

Part 2 Products

2.1 MATERIALS

- .1 General: material shall conform to the requirements of CAN/CSA-A23.1, except as amended or extended herein.
- .2 Formwork materials:
 - .1 Formwork Lumber: use wood and wood product formwork materials to CSA-O121 and CAN/CSA-O86.1.
 - .2 Formwork other than lumber may be used. The Contractor has the responsibility to ensure that other formwork materials are designed and suited to provide the concrete finishing requirements contained herein.
 - .3 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
- .3 Chamfers shall be formed of suitably shaped wood or pre-moulded elements secured in the forms.
- .4 Form ties or other formwork supports (in wall refacing below elevation +5.50 m):
 - .1 Ties or other formwork supports passing through the new concrete refacing shall be composed of stainless steel, fibreglass, or other corrosion resistant material approved by Engineer. No corrosive metal shall be within 100 mm of outside face of formwork.
 - .2 For locations above low water, snap off ties leaving holes no larger than 25 mm diameter may be used.
 - .3 For locations below low water, snap off ties resulting in a hole in the formed surface are not permitted.
 - .4 Systems for support of formwork installed below the underside of the new concrete refacing may be connected into the existing concrete crib. All connection hardware shall be stainless steel.
- .5 Form ties (in raised wall above elevation +5.50 m):
 - .1 Construct ties so that when end of fasteners of ties are removed, no metal shall be within 50 mm of formed faces of concrete.

- .6 Form release agent (other than at architectural concrete): Non-toxic, biodegradable chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.
- .7 Form release agent (at architectural concrete): Bio-Nox by Nox-crete or Kleen Kote by Progressive Solutions Corporation or as otherwise recommended in writing by form liner supplier.
- .8 Form liner panels: Aloha Wave Pattern by Fitzgerald Formliners.
- .9 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Ensure wall is cleaned of marine growth or other debris before enclosing the wall with formwork.
- .3 Do not allow form release agent to come in contact with hardened concrete against which fresh concrete is to be placed, or where waterproofing, floor finishes, paint, etc. are applied directly to finished concrete surfaces. Remove with approved solvents any form coating which contacts reinforcing steel.
- .4 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .5 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .6 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .7 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .9 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .10 Inspect forms immediately prior to placing concrete. Remove any loose metal ties, chairs, wood or other foreign material. Ensure that reinforcement, ties, inserts, anchors, etc. are clear of the forms.
- .11 Clean formwork in accordance with CAN/CSA-A23.1 and CAN/CSA-S269.3, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete.
 - .1 Seven (7) days for walls.

- .2 Loosen wall forms sufficiently 12 to 24 hours after concrete is placed to permit curing.
- .3 Exercise care in removing forms for concrete so that edges, corners, etc. are not damaged.
- .4 Design, supply and install all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .5 Space reshoring in each principal direction at not more than 3000 mm apart.
- .6 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1. Do not re-use formwork if there is evidence of surface wear which would impair concrete surface quality.
- .7 Patch tie holes and defects with grout to match adjacent concrete in texture and colour, remove fins, thoroughly clean and coat forms, to approval of Engineer, before re-using.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Shop Drawings and Submittals.
- .2 Section 03 30 00 - Cast-in-Place Concrete.

1.2 MEASUREMENT PROCEDURES

- .1 Expansion joints will be measured for payment to the limits as shown on the drawings.
- .2 Control joints will not be measured for payment. Include costs in items of work for which control joints are required.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
 - .2 ASTM C881/C881M-20a, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Preformed closed cell foam joint filler (non-staining) to ASTM D1751.
- .2 Joint filler adhesive: Joint filler adhesive applied below the water level to be Aquaseal Epoxy System, or Engineer approved equal. Joint filler adhesive applied above the water level to be non-sag moisture insensitive to ASTM C881.

Part 3 Execution

3.1 INSTALLATION

- .1 General:
 - .1 Construct joints as detailed on the drawings and as specified herein.
 - .2 Apply joint filler adhesive in accordance with manufacturer's instructions.
 - .3 Clean joints of all dirt, foreign matter and water before application of joint filler adhesive.
- .2 Control Joints:
 - .1 Form control joints as indicated on the drawings.
- .3 Construction Joints: refer to Section 03 30 00 - Cast-in-Place Concrete.
- .4 Expansion Joints:
 - .1 Provide expansion joints as shown on the drawings.
 - .2 Adhere joint filler to cleaned face of hardened concrete with adhesive.
 - .3 Apply joint adhesive in accordance with manufacturer's instructions.
 - .4 For below water joint filler adhesive application, use Aquaseal Epoxy System or Engineer approved equal.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Shop Drawings and Submittals.
- .2 Section 03 10 00 - Concrete Forming and Accessories.
- .3 Section 03 30 00 - Cast-in-Place Concrete.
- .4 Section 03 41 00 - Precast Structural Concrete.

1.2 MEASUREMENT FOR PAYMENT

- .1 With the exception of dowels into concrete, no measurement for payment will be made for this section. Include costs in unit price for which reinforcement is required.
- .2 Dowels into concrete will be measured per each.

1.3 REFERENCES

- .1 CSA International
 - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-14, Design of Concrete Structures.
 - .3 CAN/CSA-G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .4 CAN/CSA-G40.21-13 (R2018), Structural Quality Steels.
 - .5 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .6 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .2 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .3 Shop Drawings shall include the following:
 - .1 Reinforcing placing drawings to a minimum scale of 1:50, showing size, location spacing and identification of all bars, and outline of all concrete surrounding steel, drawn to scale.
 - .2 Bar lists showing all detailed dimensions, number of bars, size and location, prepared in accordance with recommendations of “Reinforcing Steel Manual of Standard Practice” by Reinforcing Steel Institute of Canada.
 - .3 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

- .4 Reproduction of Engineer's drawings to produce shop drawings will not be permitted.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different size bars only if permitted in writing by Engineer.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .3 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .4 Mechanical splices: subject to approval of Engineer. Tapered threaded couplers, use "Lenton Rebar Splicing System" by Erco Products Inc., or Engineer approved equal.
- .5 Plain round bars: to CSA-G40.21, grade 300W.
- .6 Doweling Adhesive:
- .1 Doweling adhesive used below the high water mark shall be Hilti HIT-RE 500 V3, Red Head Epcon S7 or Dayton Superior Unitex Pro-Poxy 400.
 - .2 Doweling adhesive used at locations above the high water mark shall be Hilti HIT-HY 200, Red Head A7 or Dayton Superior Sure Anchor J51.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Provide lapped splice lengths shown in the reinforcing lap length table on the drawings, or as detailed in the drawings.
- .3 Obtain Engineer's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .4 Upon approval of Engineer, weld reinforcement in accordance with CSA W186.
- .5 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request, provide Engineer with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
- .2 Upon request inform Engineer of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Engineer.

- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

- .1 Deliver, handle and store reinforcing steel and accessories in accordance with CAN/CSA-A23.1.
- .2 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1.
- .3 Tack welding of crossing bars and welding of pipe supports to reinforcing bars will not be permitted, unless approved by Engineer.
- .4 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease. Install expansion cap at end of plain round bar before placement of new concrete.
- .5 Prior to placing concrete, obtain Engineer's approval of reinforcing material and placement. In the case of walls, notify Engineer before closing in wall forms.
- .6 Ensure cover to reinforcement is maintained during concrete pour.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 15 00 - Joints.
- .3 Section 03 20 00 - Concrete Reinforcing.
- .4 Section 03 30 50 - Concrete Curing.

1.2 MEASUREMENT PROCEDURES

- .1 Keyway wall extensions shall be measured per wall extension required. The cost per keywall wall extension shall include all costs including but not limited to doweling, formwork, joint filler, reinforcing steel, concrete, and bond breaker installed on front face of extended keyway wall.
- .2 Concrete refacing of existing concrete cribs, existing cope wall, existing gravity wall and existing concrete-encased steel sheet pile wall shall be by the square meter. Include as incidental to the unit price excavation and replacement of harbour bottom material as required to install new refacing at existing concrete-encased steel sheet piling. There will be no additional measurement for payment for additional concrete at areas where concrete removals were completed.
- .3 Concrete facing of the new steel sheet pile wall shall be measured by the square meter. The unit cost shall include concrete placed between the existing steel sheet pile and the new steel sheet pile and concrete placed behind the new steel sheet pile wall above the concrete-encased wale up to an elevation of +5.50 m. Include in unit price cost of drilling holes in steel sheet piling for rebar to tie in new raised wall as shown on the drawings. Include as incidental to the unit price excavation and replacement of harbour bottom material as required to install new facing.
- .4 The new raised wall and new mooring bollard bases shall be measured by the cubic meter. The division between concrete paid under the raised wall and concrete paid under the mooring bollard base shall be as shown on the drawings. With the exception of the raised wall at the existing concrete-encased sheet pile wall, only concrete placed above elevation +5.50 m will be measured for payment. At the concrete-encased sheet pile wall, concrete will be measured to the limits as shown on the drawings.
- .5 Unit prices under this section shall include compensation for protection required for hot weather and cold weather. No additional payment will be made for measures required to comply with the requirements of Clauses 3.1 and 3.2. Unit prices shall also include removal and cleaning of marine growth or other debris from existing surfaces prior to placing new concrete.
- .6 Mock-up for architectural form liner finish will be paid as a lump sum item.
- .7 Mock-up for crib refacing will be paid as a lump sum item.

- .8 Supply of form liners for architectural pattern will be measured in square meters of form liner required.
- .9 Installation of form liners will be measured in square meters to the limits of form liner panels installed. Include all costs associated with installation and removal of form liner and achieving of architectural concrete requirements specified herein. There will be no additional measurement for payment for extension of architectural concrete requirements 150 mm beyond the edges of form liners.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C109/C109M-20b, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
 - .2 ASTM C260/C260M-10a(R2016), Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C494/C494M-19, Specification for Chemical Admixtures for Concrete.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A5-98, Portland Cement.
 - .2 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2-14, Test Methods and Standard Practises for Concrete.
 - .4 CAN/CSA-A23.5-98, Supplementary Cementing Materials.
 - .5 CAN/CSA A363-98, Cementitious Hydraulic Slag.
 - .6 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 DEFINITIONS

- .1 Architectural Concrete: all formed surfaces in contact with or within 150 mm of the edges of form liners.

1.5 DEFECTIVE CONCRETE

- .1 Concrete will be considered defective if concrete cylinder tests on any section of work fail to meet the acceptance standard specified in Clause 17.5.7 of CAN/CSA-A23.1. In such cases, concrete in place shall be checked by Engineer by obtaining core specimens, drilled and tested in accordance with CSA Test Method A23.2-14c.
- .2 Concrete shall also be considered defective if it is structurally unsound, not watertight, excessively honeycombed or improperly finished as determined by the Engineer.
- .3 The Engineer shall have the right to require, at his discretion, either replacement, strengthening or correction of defective portions of structure.
- .4 Contractor to pay all costs resulting from defective concrete, including coring, testing, strengthening, demolishing and replacing.

1.6 SOURCE QUALITY CONTROL

- .1 Sampling and testing of concrete materials shall be performed by an independent inspection and testing company specializing in this work and selected by the Engineer.
- .2 Provide, at no cost, all material requested by the Engineer for sampling and testing.
- .3 Sampling and testing of concrete materials shall be in accordance with the requirements of CAN/CSA-A23.2.
- .4 The Engineer shall have access to the material source and batching plants at all times for inspection of materials and production methods, and the Contractor shall extend full cooperation.

1.7 MIX DESIGN AND TEST REPORTS

- .1 Minimum 4 weeks before starting concrete work, submit the final mix design and results of tests for each class of concrete to the Engineer for review prior to placing any concrete. Mix designs shall be adjusted to prevent alkali aggregate reactivity problems.
- .2 Minimum 4 weeks before starting concrete work, provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .3 Minimum 4 weeks before starting concrete work, provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.8 MOCK UPS

- .1 Architectural concrete:
 - .1 Submit drawings indicating details of proposed mock-up for review and approval by Engineer before proceeding with mock-up construction.
 - .2 Provide one site mock-up for architectural concrete finish at form liners using the Contractor's proposed mix design, formwork methods and materials and procedures to place concrete. Mock-up to comply with following requirements:
 - .1 Build mock-up in location on site approved by Engineer.
 - .2 The mock-up shall represent the conditions of a full form liner panel (1981 mm wide x 1219 mm tall), including 150 mm additional area around the edges of the panel.
 - .3 The thickness of concrete placed in the mock-up shall be 300 mm.
 - .4 The form liner and form liner backing used in the mock-up shall be the same form liner and form liner backing used throughout construction.
 - .5 The method of concrete placement used for the mock-up shall represent the Contractor's proposed concrete placement methodology for actual construction, including but not limited to form liner release agent application.
 - .3 Obtain Engineer's acceptance of mock-up before starting construction; mock-up shall be used throughout construction period as standard of acceptance for subsequent refacing work.

- .4 If results of mock-up concrete placement produce unsatisfactory results, the Engineer may require a second mock-up to be completed with revisions to the mix design, formwork methods, or concrete placement methods. Alternatively, the Engineer may accept adjustments to the mix design, formwork methods, or concrete placement methods without requiring completion of a second mock-up. The acceptance of the Contractor's proposed formwork and concrete placement methodology shall be the sole discretion of the Engineer. There will be no additional payment if additional mock-ups are required.
- .2 Crib refacing:
 - .1 Submit drawings indicating details of proposed mock-up for review and approval by Engineer before proceeding with mock-up construction.
 - .2 Provide one site mock-up for crib refacing using the Contractor's proposed mix design, formwork methods and materials and procedures to place concrete. Mock-up to comply with following requirements:
 - .1 Build mock-up in location on site approved by Engineer.
 - .2 The mock-up shall represent the conditions of the first concrete placement at the bottom of the required crib refacing, including but not limited to size and spacing of dowels, size and spacing of vertical and horizontal reinforcing, formwork ties, formwork release agent and height of water above the bottom of the proposed concrete placement.
 - .3 The Contractor shall design a method for maintaining a water height in the mock-up formwork during concrete placement to represent the approximate water level during concrete placement at the bottom of the crib refacing.
 - .4 The height of the mock-up, including the height of concrete placed, shall be equal to the proposed height of the Contractor's first concrete placement at the base of the crib refacing.
 - .5 The width of the mock-up shall be the width of the Contractor's proposed placement with, or 5 meters, whichever is less. The Contractor may choose to complete a mock-up with a width greater than 5 meters, at no additional cost.
 - .6 The formwork used in the mock-up shall be the same formwork proposed for use for crib refacing.
 - .7 The method of concrete placement used for the mock-up shall represent the Contractor's proposed concrete placement methodology for crib refacing, including but not limited to diameter and horizontal spacing of proposed tremie pipes.
 - .3 Obtain Engineer's acceptance of mock-up before starting construction; mock-up shall be used throughout construction period as standard of acceptance for subsequent refacing work.
 - .4 If results of mock-up concrete placement produce unsatisfactory results, the Engineer may require a second mock-up to be completed with revisions to the mix design, formwork methods, or concrete placement methods. Alternatively, the Engineer may accept adjustments to the mix design, formwork methods, or concrete placement methods without requiring completion of a second mock-up. The acceptance of the Contractor's proposed formwork and concrete placement methodology shall be the sole discretion of the Engineer. There will be no additional payment if additional mock-ups are required.

- .5 The formwork and placement methodology at the gravity wall refacing shall be the same as accepted based on the mock-up for crib refacing.

1.9 LOADING OF STRUCTURE

- .1 Do not laterally load concrete walls until 14 days after placing concrete

1.10 INSPECTION AND TESTING COST

- .1 Payment for initial sampling, inspection and testing of materials and concrete will be paid by Engineer.
- .2 Payment for retesting required due to unsatisfactory results shall be paid by the Contractor.

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction Demolition Waste Management and Disposal.
- .2 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .3 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.
- .4 Choose least harmful, appropriate cleaning method which will perform adequately.

Part 2 Products

2.1 MATERIALS

- .1 General: material, storage of materials and testing of materials shall conform to requirements of CAN/CSA-A23.1 and CAN/CSA-A23.2, except as amended or extended herein.
- .2 Coarse aggregate: hard crushed stone with maximum size for each class of concrete as given in Clause 2.2.4 and in accordance with CAN/CSA-A23.1, Clause 5.
- .3 Portland Cement to CSA-3001 – Moderate Sulphate-Resistant Hydraulic Cement (Type MS).
- .4 Blended hydraulic cement to CSA-3001- Blended Moderate Sulphate-Resistant Hydraulic Cement (Type MSb).
- .5 Supplementary cementing materials: to CSA-A30001, maximum substitution of 25% for Portland Cement.
- .6 Water: to CSA-A23.1.
- .7 Aggregates: to CSA A23.1/A23.2.

- .8 Air entraining admixture: to ASTM C260.
- .9 Corrosion-inhibiting admixture: Concrete to contain 1.0 L per cubic meter of MCI 2005 NS, with the exception of concrete for the precast anchor walls.
- .10 Set Retarding Admixture: to ASTM C494. The mix designer shall consult with BASF to determine the appropriate retarding admixture to use in conjunction with Masterlife CI 30 corrosion-inhibiting admixture.
- .11 Accelerating Admixture: to ASTM C464. Engineer to approve use of accelerating admixtures.
- .12 Curing compound: curing compounds not to be used.
- .13 Superplasticizer: to ASTM C494.
- .14 Grout: Non-metallic, non-shrink and pre-mixed with a compressive strength of 50 Mpa at 28 days.
- .15 Bonding Agent:
 - .1 “Sikadur 32 Hi-Mod” two component epoxy bonding agent by Sika Canada Inc. or Engineer approved equal.

2.2 PRODUCTION OF CONCRETE

- .1 Measurement of materials, uniformity of concrete, mixing and delivery of concrete and concrete testing and sampling shall conform to requirements of CAN/CSA-A23.1 and CAN/CSA-A23.2, except as amended or extended herein.
- .2 All concrete shall be proportioned on basis of Alternative No. 1 as defined in CAN/CSA-A23.1. Trial mix designs shall be made and specimens tested, by and at the Contractor’s expense, prior to concreting operations. Once design mix has been established and reviewed by the Engineer, composition and source of materials shall not vary, unless approved by Engineer.
- .3 Make adjustments to design mix, when requested by Engineer, to meet acceptance standards of strength, workability or other requirements.
- .4 Class of concrete and concrete design criteria for mix proportions are given in table below:

Class	Location/ Exposure	28-Day Strength (MPa)	Minimum Cement Content (kg/m ³)	Maximum W/C Ratio (Note 1)	Maximum Coarse Aggregate (mm)	Slump (mm)	Notes
I	Crib, Gravity Wall, Concrete- Encased and Exposed SSP Wall Refacing /C-1 and S-3	35	-	0.40	20	150- 225++	See A23.1 Table for air- entrained

Class	Location/ Exposure	28-Day Strength (MPa)	Minimum Cement Content (kg/m ³)	Maximum W/C Ratio (Note 1)	Maximum Coarse Aggregate (mm)	Slump (mm)	Notes
II	Raised Wall and Mooring Bollard Bases/C-1 and S-3	35	-	0.40	20	60-90	See A23.1 Table 9 for air- entrained

Note:

++ Slump shown is after superplasticizer is added.

Notes:

- 1) W/C ratio by weight based on total water content including moisture content of aggregates.
- 2) Properties listed above apply to concrete placed by conventional methods. Adjustments to design mixes shall be required for pumped concrete.
- 3) Do not use admixtures formulated with calcium chloride.
5. Fabrication and operation of batching plants shall conform to the requirements of CAN/CSA-A23.1. Batching plants shall be located within a 25 km radius of project site.

2.3 ADMIXTURES

- .1 Dosages of all admixtures to be submitted with mix designs required in Clause 1.7 of this Section.
- .2 Air-entraining admixture shall be used only in concrete specified in Clause 2.2.4 of this Section.
- .3 Superplasticizer shall be added to concrete in wall refacing and new steel sheet piling facing.
- .4 All concrete admixtures shall be supplied by the same manufacturer, compatible with one another and used in accordance with the manufacturer's instructions.
- .5 Admixtures other than air-entraining, set-retarding and superplasticizing shall be used only with written approval of the Engineer and shall be without additional cost to the Owner. When an admixture is permitted, it shall be used without alteration to requirements of "Production of Concrete", specified in Clause 2.2 of this Section.

Part 3 Execution

3.1 COLD WEATHER REQUIREMENTS

- .1 Concrete placement during cold weather as defined by CAN/CSA-A23.1 shall be in accordance with CAN/CSA-A23.1, Clause 21, "Curing and Protection".

.2 General:

- .1 Concrete placement during cold weather as defined by CAN/CSA-A23.1 shall be in accordance with CAN/CSA-A23.1, except as amended or extended herein.
- .2 The ambient daily temperature will be obtained by Engineer from thermometer readings. If wind velocity at site exceeds 25 km/hr, 5°C shall be deducted from thermometer readings in establishing ambient temperature, unless work is completely protected by a windproof shelter.
- .3 When the air temperature is at or below 5°C or when there is a probability of it falling to that limit within 24 hours of placing, the temperature of the concrete as placed shall be more than 10°C, but not more than 25°C.
- .4 Concrete shall not be placed against any surface or subgrade that is at a temperature less than 5°C or more than 7°C colder than the concrete at the time of the pour.

.3 Protection:

- .1 Design protection for the worst conditions that can be reasonably anticipated from forecasts and local weather records. The protective systems shall retain the initial heat of the concrete and produce the specified curing condition in the concrete by retention of the heat generated by hydration, plus where necessary, the supply of additional heat.
- .2 Maintain the concrete as closely as possible to an optimum temperature of 20°C for a period of seven days. During the seven-day curing period, the concrete temperature shall not fall below 10°C.
- .3 The protection systems shall provide the conditions for curing as specified in Concrete Curing, Section 03 30 50.
- .4 Loose or absorbent insulation material shall be completely contained in waterproof liners. Straw is not an acceptable insulation material.
- .5 Concrete shall not be placed in insulated formwork when the air temperature is below the range for which it was designed. Insulating material shall be fastened tightly and secured against the forms. Seal all joints and tears.
- .6 Protective housing shall be designed to take into account weather and construction procedures. Housing shall provide the required environment for the curing of concrete. Where heating is necessary, provide equipment of sufficient capacity to establish and maintain the specified curing conditions. The use of salamanders, coke stoves, oil or gas burners and similar spot heaters which have an open flame and intense local heat, shall not be permitted. Fresh concrete shall be protected from exposure to carbon dioxide. Properly vent heating equipment to the outside to avoid damage to the concrete. Have available at the site adequate fire protection at all times that heating equipment is required. A watchman or attendant shall be maintained to keep heating units in continuous operation.

3.2 HOT WEATHER REQUIREMENTS

- .1 Concrete placement during hot weather as defined by CAN/CSA-A23.1 shall be in accordance with CAN/CSA-A23.1, Clause 21, "Curing and Protection".

3.3 PLACING CONCRETE

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.

- .2 Provide Engineer with 24 hours' notice prior to placing concrete.
- .3 Ensure face of wall is clean of all marine growth or other debris before placing concrete.
- .4 Handling, depositing and consolidation of concrete shall be in accordance with CAN/CSA-A23.1, except as amended or extended herein.
- .5 With the exception of tremie concrete, all concrete shall be placed in the "dry". Any water shall be diverted from inside forms and excavation pits through proper side drains, or removed by other Engineer-approved methods.
- .6 Placing of concrete by pumping equipment shall be permitted, provided properties of concrete are not altered by method of pumping and placing.
- .7 Pumping equipment shall be of suitable kind with adequate pumping capacity. Loss of slump shall not exceed 50 mm. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with adhesive according to Section 03 20 00 – Concrete Reinforcing to anchor and hold dowels in positions as indicated.
- .10 At locations with wall refacing, the existing concrete surface shall be pre-wetted and continuously maintained in a wet condition for a minimum period of 6 hours immediately prior to placement of the concrete refacing.

3.4 INSERTS

- .1 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Engineer before placing of concrete.
- .2 Anchor bolts:
 - .1 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete.

3.5 FINISHING OF CONCRETE

- .1 General:
 - .1 Finishing of non-formed concrete surfaces and treatment of formed concrete surfaces after formwork has been removed shall be in accordance with CAN/CSA-A23.1, except as amended or extended herein.
 - .2 Fill tie holes solid and patch defects with grout to match adjacent concrete in texture and colour. Completely remove all fins.
 - .3 Excessive honeycomb in any part of structure may be considered sufficient cause for rejection of honeycombed section. If Engineer gives permission for honeycombing

- and defects to be made good, the corrective method of treatment shall be carried out as directed by Engineer.
- .4 Tops of walls, horizontal offsets, etc. adjacent to formed surfaces shall be struck smooth after concrete is placed and wood float finished, except as otherwise specified herein.
- .2 Architectural concrete: the quality of finish shall be such that when forms are stripped, it meets the standards set out below, without further finishing work other than clean-up:
- .1 Dense, even concrete free of major defects such as deep or extreme honeycombing, inconsistencies in plane, severe cold joint lines and major loss of fines. Minor imperfections may be acceptable. Major defects will necessitate replacement. The judgment as to what constitutes major or minor defects will be the Engineer's decision. Patching will not be permitted and if used, will constitute a major defect. Repairs, i.e., removal of sections of a member, may be carried out if approved by the Engineer, but the repair shall match the colour and texture of the surrounding concrete.
 - .2 Concrete members of generally uniform colour.
 - .3 Concrete members with sharp, accurate definition at corners, arrises, reglets and the like, generally free of chipped or spalled areas and within dimensional tolerances set out in CAN/CSA-A23.1. Members shall be visually straight.
 - .4 Plane surfaces without protuberances, indentations, ridges or bulges.
 - .5 Under no circumstances shall repair to any architectural concrete be undertaken without Engineer's written consent. Concrete members which are repaired without the Engineer's consent will be classified as defective work and the Engineer may require their removal and replacement.

3.6 CONSTRUCTION JOINTS

- .1 All joints shall be constructed in accordance with CAN/CSA-A23.1, except as amended or extended herein. Location and details of construction joints are shown on the Drawings.
- .2 Preparation of construction joints before placing fresh concrete against set concrete shall conform to CAN/CSA-A23.1. Where construction joints are made in the raised wall or above elevation +2.0 m in wall refacing or new wall facing, apply concrete bonding agent to previously placed concrete immediately before placing fresh concrete. Reinforcing bars extending through joints shall be cleaned of concrete and foreign matter prior to placing adjacent concrete.

3.7 GROUT

- .1 Grout between mooring bollard bases and concrete supports and other locations shown on the Drawings using non-metallic non-shrink grout.
- .2 Ensure that all voids are completely filled with grout.

3.8 FIELD QUALITY CONTROL

- .1 The Engineer will arrange for inspection and testing to be performed by an independent Inspection and Testing Company specializing in this work.

- .2 Provide, at no cost, all concrete samples requested by the Engineer for testing and allow access to the Engineer to all areas of work, and extend full co-operation. In addition, provide suitable storage facilities for the Engineer to conduct and store test equipment and specimens.
- .3 Inspection and testing of concrete shall be in accordance with CAN/CSA-A23.1 and CAN/CSA-A23.2.
- .4 Number and frequency of cylinder tests taken shall be as follows: two 28-day and one 7-day test specimen taken for each 50 cubic metres of concrete, or fraction thereof, for each class of concrete cast daily.
- .5 Engineer may take additional test cylinders during cold weather concreting. Cure cylinders on site under same conditions as concrete which they represent.
- .6 Frequency of slump and air content tests and any other tests shall be determined by the Engineer.
- .7 Inspection and testing by Engineer will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this section. Include costs in items of work for which concrete curing is required.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 Construction Demolition Waste Management and Disposal.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Provide adequate and suitable facilities for storage and protection of curing materials and be responsible for any loss of, or damage to, when handling and delivering.
- .2 Store and protect membrane curing compounds in accordance with manufacturer's instructions.

1.6 TEMPERATURE

- .1 When air temperature is at or below 5°C or there is a probability of it falling to that limit within 24 hours of placing, the additional requirements of "Cold Weather Requirements", Section 03 30 00 shall apply.
- .2 When air temperature is at or above 25°C or there is a probability of it rising to 25°C during the placing period, the requirements of CSA A23.1, Clause 21, "Curing and Protection" shall apply.

Part 2 Products

2.1 MATERIALS

- .1 Water to CSA A23.1.

Part 3 Execution

3.1 APPLICATION

- .1 Keep loosened forms on wall surfaces completely and continuously wet, for full 7-day curing period, by applying water to top surface so that it will pass down between forms and concrete surfaces.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 30 00 - Cast-in-place Concrete.
- .3 Section 31 63 19.13 - Rock Sockets for Piles.

1.2 REFERENCE STANDARDS

- .1 CSA Group CSA
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.3 DEFINITIONS

- .1 Tremie concrete: concrete placed underwater through tube called tremie pipe.
- .2 Tremie pipe: pipe has hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete. Pipe has diameter of 125 mm minimum, constructed from sections with flange couplings fitted with gaskets.
 - .1 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.
- .3 Pumped concrete method: method of placing concrete underwater uses concrete pump with discharge line used in similar manner to tremie pipe.

Part 2 Products

2.1 MATERIALS

- .1 Concrete materials: to Section 03 30 00 - Cast-in-Place Concrete.

2.2 CONCRETE MIXES

- .1 Concrete mix and admixtures: to Section 03 30 00 - Cast-in-Place Concrete.

Part 3 Execution

3.1 EXAMINATION AND PREPARATION

- .1 Examination and preparation shall be in accordance with Section 03 10 00 – Concrete Forming and Accessories and Section 03 30 00 Cast-in-place Concrete.

3.2 INSTALLATION

- .1 Do concrete work in accordance with Section 03 30 00- Cast-in-Place Concrete and Section 03 20 00- Concrete Reinforcing and to CSA A23.1/A23.2.

- .2 Where concrete placement extends above water surface, protect concrete from direct contact with air at temperature below 5 degrees C for 7 days.
- .3 Place concrete in one continuous operation to planned placement height.
 - .1 Supply complete equipment for every phase of operation.
 - .2 Provide sufficient supply of concrete to complete pour without interruption.
- .4 Tremie method:
 - .1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 125 mm.
 - .2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.
 - .3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.
 - .4 Provide maximum spacing of 6 m centre to centre between tremie pipes. Contractor may use smaller spacing. Do not move tremie pipes laterally through concrete.
 - .5 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 900 mm in freshly placed concrete.
 - .6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.
 - .7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.
- .5 Pumped concrete method:
 - .1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.
 - .2 Pump discharge line diameter: 125 mm minimum.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 20 00 - Concrete Reinforcing.
- .2 Section 03 30 00 - Cast in Place Concrete.

1.2 MEASUREMENT PROCEDURES

- .1 Measure precast elements in cubic meters for tie back anchor walls.

1.3 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C260/C260M-10a(R2016), Standard Specification for Air-Entraining Admixtures for Concrete.
- .2 CSA Group
 - .1 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-A23.3-14, Design of Concrete Structures.
 - .3 CSA-A23.4-16, Precast Concrete - Materials and Construction.
 - .4 CAN/CSA-A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .5 CAN/CSA-G30.18-09R2014, Carbon steel bars for concrete reinforcement.

1.4 DESIGN REQUIREMENTS

- .1 Design precast elements to CSA-A23.4 CSA-A23.3 to carry handling stresses. Any additional reinforcing steel to accommodate lifting, handling and erection is the responsibility of the Contractor.
- .2 Design connections/attachments of precast elements and rigging to safely lift and install precast units.
- .3 Provide detailed calculations and design drawings for typical precast elements and connections.

1.5 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CSA-A23.4.
- .2 Length of precast elements not to vary from design length by plus or minus 5 mm.
- .3 Cross sectional dimensions of precast elements not to vary from design dimensions by plus or minus 5 mm.
- .4 Precast elements not to vary by plus or minus 5 mm from true overall cross sectional shape as measured by difference in diagonal dimensions.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Shop Drawings and Submittals.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of New Brunswick.
 - .2 Submit shop drawings prepared in accordance with CSA-A23.3 and include following items:
 - .1 Design calculations for items designed by manufacturer.
 - .2 Details of prestressed and non-prestressed members, reinforcement and their connections.
 - .3 Camber.
 - .4 Finishing schedules.
 - .5 Methods of handling and erection.
 - .6 Openings, sleeves, inserts and related reinforcement.
 - .3 Submit three weeks prior to manufacture.

1.7 QUALITY ASSURANCE

- .1 Quality Control Plan: submit written report, to Engineer verifying concrete provided meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.8 QUALIFICATIONS

- .1 Fabricate and erect precast concrete elements by manufacturing plant certified in appropriate categories according to CSA-A23.4
- .2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants prior to submitting Tender and to verify as part of Tender that plant has current certification in appropriate category, structural.
- .3 Only precast elements fabricated in certified plants will be acceptable and plant certification must be maintained for duration of fabrication, erection and until warranty expires.
- .4 Welding companies certified to CSA-W47.1.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, handle and store precast/prestressed units according to manufacturer's instructions.

Part 2 Products

2.1 MATERIALS

- .1 Cement to CAN/CSA-A3001, Type MS.
- .2 Blended hydraulic cement: type MSb to CAN/CSA-A3001.

- .3 Supplementary cementing materials: to CAN/CSA A3001, maximum substitution of 25% for Portland Cement.
- .4 Water: to CSA-A23.1.
- .5 Reinforcing steel: to CAN/CSA-G30.18.
- .6 Hardware and miscellaneous materials: to CSA-A23.1/A23.2.
- .7 Forms: to CSA-A23.4.
- .8 Air entrainment admixtures: to ASTM C260.
- .9 Chemical admixtures: to ASTM C464. Engineer to approve use of any chemical admixtures.

2.2 MIXES

- .1 Concrete:
 - .1 Alternative 1 - Performance Method for specifying concrete: to meet Engineer performance criteria in accordance with CAN/CSA-A23.1/A23.2.
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance.
 - .2 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-1 and S-3.
 - .2 Minimum compressive strength at 28 age: 35 MPa.
 - .3 Intended application: Buried below grade and exposed to sea water.

2.3 FABRICATION

- .1 Manufacture units in accordance with CSA-A23.4.
- .2 Provide hardware suitable to handle precast elements.
- .3 Galvanize steel embedments after fabrication with hot dipped galvanizing with minimum zinc coating of 610 g per square meter to ASTM 123 / ASTM 123M and touch up with zinc-rich primer after welding.

2.4 FINISHES

- .1 Finish units to standard grade to CSA-A23.4.

2.5 SOURCE QUALITY CONTROL

- .1 Provide Engineer with certified copies of quality control tests related to this project as specified in CSA-A23.4.
- .2 If requested, provide records from in-house quality control program based upon plant certification requirements to Engineer for inspection and review.
- .3 Upon request, provide Engineer with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.
- .4 Precast plants to keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Engineer for review upon request.

Part 3 Execution

3.1 ERECTION

- .1 Precast concrete work in accordance with CSA-A23.3 and CSA-A23.4.
- .2 Welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.
- .3 Set elevations and alignment between units to within allowable tolerances before connecting units. Maximum tolerance for difference of elevation of face alignment for adjacent units to be 20 mm.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 62 16.13 - Steel Sheet Piles.

1.2 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this section. Include costs in items of Work that require templates.

1.3 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A252-19, Standard Specification for Welded and Seamless Steel Pipe Piles.
 - .2 ASTM F3125-19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Metric Dimensions 830 Mpa and 1040 MPa Minimum Tensile Strength.
- .2 CSA Group (CSA)
 - .1 CAN/CSA-G40.20/G40.21-13(R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
 - .2 CAN/CSA-S16-14, Limit States Design of Steel Structures.
 - .3 CSA W47.1-09(R2019), Certification of Companies for Fusion Welding of Steel.
 - .4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .5 CSA W59-18, Welded Steel Construction (Metal Arc Welding) (metric version).

1.4 GENERAL

- .1 The Contractor is permitted to use the existing steel sheet pile wall as part of the pile driving template system.
 - .1 The Contractor shall take full responsibility for assessing the adequacy of the existing steel sheet piling to be used to support templates for new steel sheet piling.

1.5 SYSTEM DESCRIPTION

- .1 Design Requirements: design templates to safely withstand following loads:
 - .1 Gravity loads to which template are subjected.
 - .2 Lateral loads to firmly hold pile in position when driving, including but not limited to wind load, tides, and current loads.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Shop Drawings and Submittals.
- .2 Product Data: submit manufacturer's printed product literature, specifications and datasheet.

- .1 Include product characteristics, performance criteria, and limitations.
- .3 Submit shop drawings and indicate following items:
 - .1 Material.
 - .2 Anchorage, field control and alignment methods.
 - .3 Design parameters.
 - .4 Tolerance for driving pile.
 - .5 Removable members.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Construction Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21.
- .2 Welding materials: to CSA W59.
- .3 Bolts, nuts and washers: to ASTM F3125, grade A325.

2.2 FABRICATION

- .1 Fabricate structural steel for templates: to CAN/CSA-S16 and approved shop drawings.
- .2 Welding: to CSA W59.
- .3 Use welding companies qualified under CSA W47.1.

Part 3 Execution

3.1 POSITIONING

- .1 Position and hold template in location to receive piles.
 - .1 Ensure pile positions are within tolerances specified.

3.2 REMOVAL OF TEMPLATES

- .1 Avoid damage to piling when removing templates.

3.3 PROTECTION

- .1 Protect templates from damage.
- .2 Repair damage to templates, formwork or concrete arising from operations at no extra cost.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 This section specifies requirements for supply and installation of structural timber as follows:
 - .1 Supply and installation of untreated timber hardwood ladders and ladder handgrips.

1.2 REFERENCES

- .1 American Wood-Preserver's Association (AWPA)
 - .1 Latest edition of AWPA M4, Standard for the Care of Preservation – Treated Wood Products.
- .2 Canadian Standards Association (CSA International)
 - .1 Latest edition of CAN/CSA-G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Steel.
 - .2 Latest edition of CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Latest edition of Standard Grading Rules for Canadian Lumber.

1.3 DIMENSIONS

- .1 Check existing site dimensions and report discrepancies to Engineer before commencing work.

1.4 PROTECTION

- .1 Avoid dropping, bruising or breaking of wood fibres.

1.5 DELIVERY AND STORAGE

- .1 Store timber horizontally, evenly supported and open piled to permit circulation when stored for prolonged period.
- .2 When handling long timber, provide support at sufficient number of points, properly located to prevent damage due to excessive bending.
- .3 Handle treated timber with hemp, manila or sisal rope slings or other approved means of support that will not damage surface.

1.6 MEASUREMENT FOR PAYMENT

- .1 Supply and installation of ladders will be measured per ladder required, including but not limited to timber, steel rungs, ladder handgrips, and adhesive anchoring into concrete.

Part 2 Products

2.1 TIMBER MATERIALS

- .1 Timber: Use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Administration Board of CSA.
- .2 Species
 - .1 Ladder uprights: Birch or Maple untreated.
- .3 Grade: No. 1 Structural Grade
- .4 Grading Authority: NLGA

2.2 MISCELLANEOUS STEEL AND FASTENINGS

- .1 Miscellaneous Steel: All steel and fastenings to be CSA G40.21, Grade 300W, galvanized.
- .2 Galvanizing: will conform to CSA G164 "Hot Dip Galvanizing of Irregularly Shaped Articles." Unless otherwise specified, minimum weight of zinc coating will be as stated in Table 1 of this standard. Fabricator is to adhere to recommendations of Appendix A and Appendix B of standard.
- .3 Ladder Rungs: to CSA G40.21, galvanized.
- .4 Adhesive for anchor bolts: to Section 03 20 00 – Concrete Reinforcing.
- .5 Anchor bolts: to ASTM F1554, grade 55, galvanized.

Part 3 Execution

3.1 LADDERS

- .1 Install ladders at locations as shown on the drawings.
- .2 Fasten ladders to wharf as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 62 16.13 Steel Sheet Piles.

1.2 MEASUREMENT PROCEDURES

- .1 There will be no measurement for payment under this section. Include costs in items of Work that require pile driving.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Product Data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Sub-surface investigation report: when site conditions differ from those indicated, submit written notification to Engineer and await further instructions.
- .4 Submit schedule of planned sequence of driving to Engineer for review.
- .5 Spliced piles: when authorized, submit design details of splice complete with signature and stamp of qualified professional engineer registered or licensed in New Brunswick, Canada.
- .6 Equipment:
 - .1 Submit prior to pile installation for review by Engineer, 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.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .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 Engineer.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 – Construction Demolition Waste Management and Disposal.

1.6 EXISTING CONDITIONS

- .1 Sub-surface investigation report is provided in Appendix B.
- .2 As-built drawings of the existing Sea Wall are provided in Appendix C.

1.7 SCHEDULING

- .1 Schedule driving of piles in accordance with all recommendations and requirements contained in the letter from the Department of Fisheries and Oceans regarding the Work dated June 30, 2020.
- .2 Provide schedule of planned sequence of driving to Engineer 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 16.13 – Steel Sheet Piles.
- .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 from Engineer.
 - .1 When permitted, provide details for Engineer review.
 - .2 Design details of splice to bear dated signature stamp of professional engineer registered or licensed in New Brunswick, 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 augering, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.
- .3 If selected driving equipment is not capable of driving piles to bedrock as indicated, provide driving equipment with a higher driving capability.

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 ground conditions at pile locations are adequate to support pile driving operation.
 - .1 Make provision for access and support of piling equipment during performance of Work.

- .3 No pile driving equipment is permitted to be used in the waterway.
- .4 No pile driving equipment shall be located within 15 m of the back face of the existing exposed or concrete-encased steel sheet pile wall.

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 guys, stiff braces, or other means approved by Engineer to ensure support to pile while being driven.
 - .2 Length: Provide sufficient length of leads to ensure that use of follower is unnecessary.
 - .3 Swing leads:
 - .1 Obtain approval from Engineer prior to using swing leads.
 - .2 Firmly guy top and bottom to hold pile in position during driving operation.
 - .3 Method to be approved by Engineer.
- .2 Installation of each pile will be subject to approval of Engineer.
 - .1 Engineer will be sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine acceptable installation.
 - .2 Engineer to approve final driving of all piles prior to removal of pile driving rig from site.
- .3 Drive each pile to practical refusal in bedrock.
 - .1 Do not overdrive to cause damage to piles in bedrock.
 - .2 Engineer will determine refusal criteria for piles driven to rock based on type of pile and driving equipment.

3.3 APPLICATION / DRIVING

- .1 Hold piles securely and accurately in position while driving.
- .2 Deliver hammer blows along axis of pile.
- .3 Ensure no contact between new steel sheet piles and existing structure takes place when driving sheet piles.
- .4 Restrike already driven piles lifted during driving of adjacent piles to confirm set.
- .5 Remove loose and displaced material from around piles after completion of driving, and leave clean, solid surfaces to receive facing concrete.
- .6 Use of water jet:
 - .1 If permitted, provide details for approval by Engineer.
 - .2 Restriction: when conditions are unacceptable, as determined by Engineer, stop using water jet.
- .7 Cut off piles neatly and squarely at elevations as indicated.

- .1 Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
- .8 Remove cut-off lengths from site on completion of work.

3.4 OBSTRUCTIONS

- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, proceed as directed by Engineer.

3.5 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.

3.6 FIELD QUALITY CONTROL

- .1 Measurement:
 - .1 Maintain accurate records of driving for each pile, including:
 - .1 Type 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 in pile group, location or designation of pile group.
 - .4 Sequence of driving piles in group.
 - .5 Number of blows per metre for entire length of pile and set for last 10 blows.
 - .6 Final tip and cut-off elevations.
 - .7 Other pertinent information such as interruption of continuous driving, pile damage.
 - .8 Record elevation taken on adjacent piles before and after driving of each pile.
 - .2 Provide Engineer with digital copies of records.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-place Concrete.
- .2 Section 31 61 13 - Pile Foundations, General Requirements.
- .3 Section 31 63 19.13 - Rock Sockets for Piles.

1.2 MEASUREMENT PROCEDURES

- .1 Measure supply of steel sheet piling in square metres of piling supplied and delivered to site.
 - .1 Calculate area by multiplying lengths of piles by widths.
 - .2 Width of steel sheet pile section is defined as centre to centre distance between pile interlocks measured along a plane parallel to finished wall.
 - .3 The length of steel sheet pile supplied shall be minimum 15.00 m. The length of steel sheet pile measured for payment for supply shall be 15.00 m.
 - .4 Supply of additional sheets required due to damage to sheets during transportation, handling, or installation will not be measured for payment.
- .2 Measure installation of sheet piling in square metres of piling.
 - .1 Calculate area by multiplying lengths of piles by widths.
 - .2 Width of steel sheet pile section is defined as centre to centre distance between pile interlocks measured along a plane parallel to finished wall.
 - .3 The length of piles measured for payment will be from an assumed toe elevation of -6.00 m to a cutoff elevation of +5.20 m (total length of 11.2 m). If the final installed toe elevation is higher in elevation than -6.00 m, the quantity will be measured based on an assumed toe elevation of -6.00 m. If the final toe elevation is between -6.00 m and -7.50 m, the quantity will be measured based on an assumed toe elevation of -6.00 m. If the toe elevation is deeper than -7.50 m, the quantity will be measured based on the actual toe elevation.
 - .4 Include as incidental to the unit price all costs for removing existing armourstone or rip-rap as required to complete installation of sheet piling.
- .3 Measure tieback system at new steel sheet piling, including but not limited to all staged excavation and backfill required to install the tieback system, cutting of existing steel sheet piles, tie rods, nuts, sleeve nuts, connectors, pipe sleeves, bearing plates, fixing plates, washers, transfer bolts, steel wales, concrete encasement of wale system, placement of additional fill, and other associated hardware supplied and incorporated in Work, and new fill above new tieback system, as indicated, as a lump sum.
- .4 Measure tieback system at existing concrete-encased steel sheet piling, including but not limited to all staged excavation backfill required to install the tieback system, drilling of holes through existing steel sheet piles, tie rods, nuts, sleeve nuts, connectors, pipe sleeves, washers, placement of additional fill, and other associated hardware supplied and incorporated in Work, as indicated, as a lump sum.

- .5 Measure toe pins and pipe sleeves, including supply and welding of pipe pile sleeves to sheet piling, drilling and grouting rock sockets into bedrock, and supply and installation of H piles by number of toe pins placed. This unit price shall also include cleanout and inspection of the drilled out rock sockets.

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM A6/A6M-19, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - .2 ASTM A1011/A1011M-18, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra High Strength.
 - .3 ASTM F3125-19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Metric Dimensions 830 Mpa and 1040 MPa Minimum Tensile Strength.
 - .4 ASTM A328/A328M-13a(R2018), Standard Specification for Steel Sheet Piling.
- .2 CSA Group (CSA)
 - .1 CAN/CSA-G40.20/G40.21-13(R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
 - .2 CSA W47.1-09(R2019), Certification of Companies for Fusion Welding of Steel.
 - .3 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .4 CSA W59-18, Welded Steel Construction (Metal Arc Welding) (metric version).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Shop Drawings and Submittals.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for piles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings for items as follows:
 - .1 Steel sheet pile wale system including channels, bolts, plates, and concrete encasement.
 - .2 H piles.
 - .3 Welding of pipe piles to steel sheet piles.
 - .4 Tierods, including double corrosion protection system.
- .4 Certificates:
 - .1 Submit 2 weeks prior to fabrication, 2 copies of steel producer certificates in accordance with ASTM A1011/A1011M, and mill test reports in accordance with CSA G40.20/G40.21.
 - .2 Submit copy of certification for fusion welding in accordance with CSA W47.1.

1.5 QUALITY ASSURANCE

- .1 Inspection and testing of steel sheet piling material may be carried out by testing laboratory designated by Engineer at any time during course of Work.
- .2 Materials inspected or tested by Engineer which fail to meet contract requirements will be rejected.
- .3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections. Engineer to approve corrected work.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location indoors off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect sheet piles from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Use slings for lifting piling and make sure mass is evenly distributed and piling is not subjected to excessive bending stresses.
- .5 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.
 - .1 Provide blocking at spacing not exceeding 5 m so that there is no excessive sagging in piling.
 - .2 Overhang at ends not to exceed 0.5 m.
 - .3 Block between lifts directly above blocking in lower lift.
- .6 If material is stock-piled on structure, ensure structure is not overloaded.

Part 2 Products

2.1 MATERIALS

- .1 Steel sheet piles: to ASTM A572, grade 60 (415 MPa).
- .2 Continuous interlocking Z section as shown on the drawings.
- .3 Sheet piling: AZ-50-700:
 - .1 Mark each piece of sheet piling legibly by stencilling or die-and-stamping with information as follows:
 - .1 Heat number.
 - .2 Manufacturer's name.
 - .3 Length and section number.

- .2 Do not precut lifting or slinging holes in sheet piles.
- .4 Structural steel for wales, bearing plates, fixing plates, wales splices, capping channels, support angles and miscellaneous steel: to CSA G40.21, Grade 300 W.
- .5 Structural steel for H piles in toe pins: to CSA G40.21, Grade 350W.
- .6 Tie rods, sleeve nuts and turnbuckles:
 - .1 Tie rods: to ASTM A615, Grade 550 MPa, continuously threaded bar with double corrosion protection. Double corrosion protection to consist of HDPE sheathing with grout installed in the annular space between the sheathing and the tierod. Also provide double corrosion protection at extension of tierod past anchor wall.
- .7 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM F3125, grade A325.
- .8 Backfill material: Reuse existing soils. Any additional fill material required to reach fill elevations indicated on the drawings shall be crushed gravel aggregate subbase or pit run gravel subbase as per Division 13 of the General Specifications.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for steel sheet piles installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Engineer.
 - .2 Inform Engineer of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Do pile installation Work in accordance with Section 31 61 13- Pile Foundations, General Requirements except where otherwise specified.
- .2 Do welding in accordance with CSA W59.
- .3 Submit full details of method and sequence of installation of piling to Engineer for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.
- .4 Pipe pile casings for toe pins shall be welded to double sheet piles before driving as indicated on the drawings.
- .5 When installing sheet piles in bulkhead wall, use procedure as follows:
 - .1 Provide temporary templates or bracing to hold piles in alignment during setting and driving.
 - .2 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.

- .3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
- .4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.
- .6 Steel sheet piles shall be driven to practical refusal in bedrock in accordance with Section 31 61 13 – Pile Foundations, General Requirements.
- .7 When installation is complete, face of wall at top of sheet piles to be within 50 mm of location as indicated and deviation from vertical not to exceed 1 in 100.

3.3 OBSTRUCTIONS

- .1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
- .2 Advise Engineer immediately if impossible to drive pile to full penetration, and obtain direction from Engineer on further steps required to complete Work.

3.4 HOLES

- .1 Drill any required holes in piling. Do not use flame cutting without permission of Engineer.

3.5 CUTTING

- .1 When flame cutting tops of piles, and flame cutting holes in piles approved by Engineer, use following procedure:
 - .1 When air temperature is above 0 degrees C, no pre-heat is necessary.
 - .2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Tempil sticks or temperature indicating crayon marks may be used to measure temperature.
 - .3 Use torch guiding device to ensure smooth round holes or straight edges.
 - .4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.6 SPLICING

- .1 Use full length piles unless splicing is approved on site by Engineer.

3.7 TIE ROD ANCHORAGE SYSTEM

- .1 Complete excavation work in accordance with the requirements of Division 13 of the General Specifications, unless specified otherwise in this section.
- .2 Complete excavation work in accordance with the sequencing notes, loading restrictions, and information on the drawings. Construction sequencing and loading restrictions are an acceptable minimum only. The Contractor shall be responsible for evaluating and ensuring the stability of the existing sheet pile wall throughout construction, and shall

design and install additional measured to ensure stability of the existing wall as determined by the Contractor.

- .3 Do not place backfill behind anchored bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.
- .4 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.
- .5 Install clear stone bedding around entire length of tierod as indicated on the drawings.
- .6 Encase wale system in concrete in accordance with Section 03 30 00 - Cast-in-place Concrete and as indicated on the drawings.
- .7 After installation of tierods, survey location of tierod both at connection to anchor wall and at connection to concrete-encased wale, and submit copy of survey to Engineer.

3.8 TOE PINNING

- .1 Drive sheet piling with connected pipe pile casing at pinned sections to bedrock.
- .2 Drill sockets into bedrock and install grouted H pile in accordance with Section 31 63 16.13 – Rock Sockets for Piles and as indicated on the drawings.
- .3 Do not place backfill behind anchored wall until all toe pins have been installed and grouted for 7 days.

3.9 CONCRETE FACING

- .1 Install concrete facing in front of new steel sheet piling and between new and existing sheet piling in accordance with Section 03 30 00 - Cast-in-place Concrete and as indicated on the drawings.
- .2 Do not place backfill behind anchored wall until concrete between new and existing steel sheet piles has been installed up to the underside of the concrete-encased wale system and cured for a minimum of 7 days.

3.10 BACKFILLING

- .1 Backfill in accordance with Division 13 of the General Specifications, unless otherwise specified in this section.
- .2 All excavated material required to install tierods shall be reused as backfill.
- .3 Any additional fill material required to reach fill elevations indicated on the drawings shall be crushed gravel aggregate subbase or pit run gravel subbase as per Division 13 of the General Specifications.
- .4 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.
- .5 Place backfill 500 mm above the level of the tierods, then compact fill to 95% of the maximum dry density as determined by ASTM D698. Place backfill above this level in 300 mm lifts and compact fill to 95% of the maximum dry density as determined by ASTM D698.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 62 16.13 - Steel Sheet Piles.

1.2 MEASUREMENT PROCEDURES

- .1 There will be no measurement for payment under this section. Include costs in unit price for toe pinning under Section 31 62 16.13 - Steel Sheet Piles.

1.3 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A252-19, Standard Specification for Welded and Seamless Steel Pipe Piles.
- .2 CSA Group (CSA)
 - .1 CSA W47.1-09(R2019), Certification of Companies for Fusion Welding of Steel.
 - .2 CSA W59-18, Welded Steel Construction (Metal Arc Welding) (metric version).
 - .3 CAN/CSA-G40.20/G40.21-13(R2014), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Shop Drawings and Submittals.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet for proposed drill bit, and any other equipment requested by Engineer.

Part 2 Products

2.1 MATERIALS

- .1 Grout: in accordance with Section 03 30 00- Cast-in-Place Concrete.
- .2 Underwater concreting: in accordance with Section 03 37 26 - Underwater Placed Concrete.

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 PREPARATION/PILE CLEAN-OUT

- .1 After pipe pile casing is driven to bedrock, remove overburden inside pile down to tip of pile.
 - .1 Clean out material adhering to inside surface of pile.
- .2 Protect open piles from intrusion of foreign materials.

3.3 INSTALLATION / SOCKETS

- .1 Secure equipment in position during drilling.
- .2 Drill sockets into sound bedrock as indicated.
- .3 After drilling is completed, clean out socket. Ensure loose material is removed, and rock socket is free of foreign matter.
- .4 Perform internal video camera inspection of steel pipe casing, joints, and rock socket as directed by Engineer.
- .5 After socket has been cleaned out and inspected, allow to stand for 12 hours and inspect again for intrusion of material.
 - .1 Redrive pile, as required to seal socket and repeat drilling, cleaning out and inspection process.
- .6 Test fit H pile to ensure H pile rests at bottom of socket hole.
 - .1 If H pile does not reach bottom of socket hole, clean out hole and test fit H pile again as required.

3.4 INSTALLATION / H PILE

- .1 Install H pile in drilled socket and in pile.
 - .1 Locate relative to pile tip as indicated.

3.5 GROUTING

- .1 Grout in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Grout H piles inside pipe piles, in drilled socket and up to elevation as indicated, as soon as possible after installing H piles.
- .3 Use grout mix that has been demonstrated to produce required strength at temperature prevailing in socket and pile in specified time.
 - .1 Grout mix and grouting pressure to approval of Engineer.
- .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 and pile up to specified level.

3.6 FIELD QUALITY CONTROL

- .1 Site Tests and inspection:
 - .1 Provide method and equipment for inspection of each pile to ensure that pile and socket are properly cleaned out.

- .2 Co-operate with and assist Engineer to inspect each pile and socket.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 MEASUREMENT PROCEDURES

- .1 Bollards/Cleats: Measure in number of units of each type installed.

1.3 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A536-84(R2019), Standard Specification for Ductile Iron Castings.
- .2 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual-[February 2004].
 - .1 MPI #9, Exterior Alkyd Enamel.
 - .2 MPI #79, Marine Alkyd Metal Primer.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Shop Drawings and Submittals.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.

Part 2 Products

2.1 MATERIALS

- .1 Bollards: ductile cast iron to ASTM A536.
 - .1 Type 1: 10 tonne T Head bollard.
 - .2 Type 2: 4 tonne cleat bollard.
- .2 Paint:
 - .1 Shop prime coat: to CAN/CGSB-1.212 MPI #79.
 - .2 Two finish coats: to CAN/CGSB-1.61 MPI #9, colour as directed by Engineer .
- .3 Grout: shrinkage compensating non-metallic.
- .4 Anchor bolts: to ASTM F1554, grade 55 galvanized.
- .5 Anchor bolt hole sealant: Self-leveling polyurethane intended for use in a marine environment.

Part 3 Execution

3.1 SETTING AND GROUTING

- .1 Set mooring devices at locations and elevations as indicated.
 - .1 After tightening of anchor bolts or positioning wedges, grout under base.
 - .2 Ensure that temperatures of foundation, air, base and grout are within range specified by grout manufacturer.
 - .3 After setting and grouting, fill anchor bolt holes with sealant flush with upper surface of bollards.

END OF SECTION

APPENDIX 'B'

SUB-SURFACE INVESTIGATION REPORT



Geotechnical and Materials Engineers

GEOTECHNICAL INVESTIGATION REPORT STABILITY ASSESSMENT OF CONCRETE CRIB STRUCTURES FUNDY QUAY DEVELOPMENT, SAINT JOHN, NEW BRUNSWICK

Report to:
CBCL Limited
14 Kings Street
Suite 420
Saint John, NB E2L 1G2

Prepared by:
CONQUEST ENGINEERING LTD.
575 Crown Street
Saint John, NB E2L 5E9
ph: (506) 635-7565

Project No: 034-325
October 15, 2019

As requested, Conquest Engineering Ltd. has performed a stability assessment of the existing concrete crib structure located at the former Coast Guard site in Saint John, NB.

Please find enclosed an electronic copy (PDF version) of our report for the above-mentioned project.

We trust that the information contained in this report is sufficient for your needs. If you have any questions or comments regarding the content of this report, or if you require additional information, please do not hesitate to contact us at your convenience.

Best regards,
CONQUEST ENGINEERING LTD.

Robert Y. Cyr, M.A.Sc., P.Eng.
Senior Geotechnical Engineer

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1.0 INTRODUCTION

At the request of CBCL Limited and Develop Saint John, Conquest Engineering Ltd. (CEL) has performed a geotechnical investigation to assess the soil conditions around the existing concrete crib structures in order to review the stability of the cribs for the proposed Fundy Quay Development at the former Coast Guard site in Saint John, NB. The purpose of the investigation was to obtain information on the geotechnical conditions including the groundwater levels and tidal lag behind the existing cribs.

This report has been prepared specifically and solely for the area as described and should not be extrapolated beyond the limits of the investigation.

2.0 SITE DESCRIPTION

The investigated site is located on the Saint John waterfront at the former Coast Guard Terminal located west of Water Street. The area is currently used as parking spaces by the City of Saint John Parking Commission. The elevation at the top of the existing cope wall at the Coast Guard site is 5.6 m +/- (Geodetic CGVD28), which is about +9.75 m with respect to Chart Datum. The difference between Chart datum and CGVD28 in the Saint John Harbour is about 4.2 m.

From our review of the 1957 design drawings of the Coast Guard Terminal site, we learned that prior to construction the areas designated for concrete cribs were dredged of all former wharf structures and overburden down to bedrock. A mattress of rockfill (between 300 mm and 1,200 mm thick) was then placed over the bedrock and the concrete cribs founded on the rockfill mattress. The area behind the concrete cribs was not dredged and the remains of the former slips and timber cribworks are buried at the site.

Our geotechnical investigation has shown that the principal overburden strata are random fills (mostly granular) overlying native silty clayey sand followed by bedrock. The fill was noted to extend directly to the bedrock surface underneath the existing cribs. Bedrock is classified as black SHALE of the Kings Square Formation (Saint John Group – Early Cambrian to Ordovician Era).

3.0 FIELD PROCEDURES

The field investigation was carried out between July 3, 2019 and July 9, 2019. A total of six (6) boreholes were drilled with a track mounted drill rig to depths ranging between 15.5 m and 21.6 m below the existing ground surface. The location of the boreholes are shown on the attached plan. Three (3) boreholes were drilled directly behind the inner edge of the existing cope wall and three (3) boreholes were drilled within the zone of backfill behind the cribs.

Conquest Engineering Ltd. laid out the borehole locations in the field as per the Public Works of Canada drawings Plan No. B-290 Sheet 7 of 13 (Details – Concrete Cribs 1 & 5) and Sheet 10 of 13 (Details – Concrete Cope Wall) dated in 1957. Borehole locations are shown on the appended Borehole Location Plan (Appendix C – Figure 1). Borehole coordinates (Northing and Easting) and elevations were obtained by our personnel and referenced to geodetic datum.

The following table summarizes all borehole coordinates and elevations for this investigation:

Table 1: Survey Data

BH No.	Northing	Easting	Elevation (CGVD28) (m)
BH-01	7363585.02	2534137.14	5.49
BH-02	7363592.07	2534145.36	5.33
BH-03	7363532.30	2534184.79	5.56
BH-04	7363540.73	2534193.10	5.50
BH-05	7363512.34	2534250.32	5.33
BH-06	7363523.34	2534247.13	5.29

A CEL engineer supervised the drilling and sample collection activities and logged the subsurface conditions encountered at each borehole. The boreholes were advanced vertically using a 115mm outside diameter HW sized casing and the soil samples were collected at frequent intervals using a 50 mm outside diameter split-spoon sampler. Standard Penetration Tests (SPT's) were performed and N-values recorded for each split-spoon sample obtained. The performance of the Standard Penetration Tests was based on the test method described in ASTM D1586-84. The determination of the compactness of granular soils and consistency of cohesive soils, as indicated on the Borehole Records, is based primarily on the results of Standard Penetration Testing. Bedrock was cored at each location using a 64 mm inside diameter HQ sized diamond core barrel. Detailed logs of the soils and bedrock encountered are given on the Borehole Records appended (Appendix B).

A 50mm OD PVC monitoring well was installed in boreholes BH-02, BH-04 and BH-06 to permit the subsequent monitoring of groundwater conditions throughout the tidal cycles to evaluate the tidal lag behind the concrete cribs.

Soil and bedrock samples were returned to our laboratory for further engineering review. All remaining samples will be kept in storage for a period of two (2) months from the date of issue of this report. After this time the samples will be discarded unless we receive instructions to retain them longer.

4.0 SUMMARIZED SOIL CONDITIONS

The principal soil strata encountered at the site are described in detail on the appended Borehole Records (Appendix B). Soil classification was based on the procedures described in ASTM D2488 (Standard Practice for Description and Identification of Soils, Visual-Manual Procedure) and limited laboratory testing. For an explanation of the descriptions used on the Borehole Records, reference should be made to the appended Symbols and Terms used on Borehole and Test Pit Records (Appendix A).

The principal soil strata encountered at the site are:

1. Brown sand with silt and gravel: FILL,
2. Brown to grey sand and gravel with occasional cobbles: FILL,
3. Grey to brown silty/clayey SAND with gravel: TILL (BH-02, BH-04 and BH-06 only),
4. Weathered black SHALE.

In BH-03 and BH-04, remnants of wood, likely from former wooden crib structures, were occasionally encountered.

A FILL thickness ranging between 1.9 m to 2.8 m was encountered between the bottom of the concrete cribs and the top of bedrock in boreholes BH-01, BH-03 and BH-05. This is consistent with the crib mattress construction indicated on the PWGSC drawings previously referenced.

Bedrock was observed in all boreholes at depths ranging from 13.7 m to 20.4 m below the existing ground surface.

5.0 GROUNDWATER

The prevailing groundwater table is influenced by the tidal cycles in the adjacent Saint John Harbour. Tides in the Saint John Harbour are diurnal having a range of about 8.5 m between Lowest Normal Tide (Chart Datum) and high tide.

A 50mm OD PVC monitoring well was installed at boreholes BH-02, BH-04 and BH-06. Following completion of the drilling, our personnel returned to the site to install a vibrating wire piezometer (pressure transducer) in each monitoring well. The vibrating wire piezometers were left for a period of time in order to collect groundwater data. These data were compared to tidal cycle information and a tidal lag was estimated during both the high and low tide period. The measured tidal lag between low tide and the groundwater table observed in the concrete crib backfill was on the order of 1 m for a limited observation period.

6.0 DISCUSSION AND RECOMMENDATIONS

We understand that the site grade behind the sea wall may be raised by as much 2.0 m to accommodate potential sea level rise due to climate change. The potential impact that additional surcharge loading may have on the overall stability of the current concrete cribs was analysed.

6.1 ASSUMPTIONS USED FOR STABILITY ANALYSES

The following assumptions were made for the analysis:

- All structures built behind the existing cribs will be supported by piles or caissons driven or drilled into bedrock.
- Concrete cribs and cope walls are built as per the Public Works of Canada drawings Plan No. B-290 Sheet 7 of 13 (Details – Concrete Cribs 1 & 5) and Sheet 10 of 13 (Details – Concrete Cope Wall).
- The rockfill mattress extends to a minimum of 1.5 m (5 ft) in front of cribs #1 to #4 and to a minimum of 3.0 m (10 ft) in front of cribs #5 & #6 as shown in the Public Works of Canada drawings Plan No. B-290 Sheet 3 of 13 (Typical Cross-Sections).
- No erosion has occurred at the base of the concrete crib structures, therefore the rockfill mattress mentioned above is still in place and intact.
- As per the proposed concepts from exp Engineering Consultants, above ground parking lots are not part of the design, there would be underground parking only.

- The proposed fill will be placed over the crib to the same grade as the proposed fill to be used to raise the back-land area.
- A tidal lag of 2 m between low tide and the groundwater behind the existing cribs was assumed for analyses.
- The existing concrete cribs are structurally capable to withstand the new loads applied by the grade rising. We understand that the overview of the structural integrity of the concrete cribs and cope wall will be carried out by others.
- The backfill material behind the concrete cribs extends down to the bottom of the concrete slab even if shallow bedrock was encountered (north end of the concrete crib structure by the area of BH-02).

6.2 CONCRETE CRIB STRUCTURES STABILITY ANALYSES

For stability analysis, the concrete crib structures must satisfy the following stability conditions:

- Sliding Stability
- Overturning Stability
- Adequate Bearing Capacity and Settlement

The current concrete cribs and cope wall were analysed to assess the impact of raising the grade behind and over the cribs by 2.0 m. The grade rising is understood to be necessary to accommodate the potential sea level rise due to climate change.

For the proposed grade raise development, sliding and overturning were found to be acceptable for both static and seismic conditions. Seismic analyses were based on Pseudo-static methods using horizontal ground acceleration based on the 1:2475 seismic event. Stability analyses rely on the new fill providing vertical resisting weight over the cribs.

Raise the grade by 2 m will result in an increase in bearing pressure of 45 kPa. The concrete crib structures founded on compacted fill (1.9 m to 2.8 m thick) placed over bedrock will be able to support the additional loads imparted from the grade raise. The increase in bearing pressure will cause some settlement. The expected new settlement is estimated to be less than 25 mm.

We recommend that the new fill be a well graded pit run gravel or crushed quarried stone with no more than 7% passing the No.200 sieve size. We recommend placing the fill in lifts not thicker than 300 mm and be compacted to 98% of the Standard Proctor maximum dry density in accordance with ASTM D698. Fill must be placed simultaneously over the cribs and back-land area so as not create an unbalanced fill height between over the cribs and the back-land area.

7.0 CLOSURE

This report has been prepared for the sole benefit of the Client. All information, documentation or other material contained in, attached to, or forming part of this report reflects Conquest's opinion and best judgment based on the information available to us at the time of preparation. Any use or reliance on this report by the Client in circumstances where there has been a change in site conditions or for any purpose not expressly intended by or delineated in this report shall be the sole responsibility of the Client and Conquest accepts no liability for such use or reliance. Any use or reliance on this report by any third party, without Conquest's prior express written consent, shall be the sole responsibility of that third party. Conquest accepts no liability whatsoever for such use or reliance.

The information and conclusions contained in this report are generally consistent with professional standards for engineering and scientific professionals providing similar services at the same time, in similar locations and under similar circumstances.

A geotechnical field investigation is a limited sampling of a site. Some variation between sampling locations should be expected. The conclusions presented in this report represent the technical judgment of Conquest, based on the data obtained from the work and on Conquest's understanding of the project. The data obtained by Conquest is specific to the time the work was performed at the specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area surrounding these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. Due to the nature of the investigation and the limited data available, Conquest cannot and does not warrant that undiscovered environmental liabilities and/or undetected subsurface conditions may not arise.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we require that we be notified immediately to allow for reassessment of the conclusions provided herein. Further, if there are changes to Client's design we require that we be notified to allow for review and possible changes to our recommendations.

We trust this is the information you require at this time. If you have any questions or if we can be of any further assistance, please feel free to contact us.

Respectfully submitted,
CONQUEST ENGINEERING LTD.



Robert Y. Cyr, M.A.Sc., P. Eng.
Senior Geotechnical Engineer

APPENDIX A

SYMBOLS AND TERMS USED ON BOREHOLES AND TEST PIT RECORDS

Geotechnical and Materials Engineers

SOIL DESCRIPTION

Terminology describing common soil genesis:

<i>Topsoil</i>	variable mixture of mineral particles and organic matter
<i>Peat</i>	decomposing vegetative matter having fibrous and/or amorphous structure
<i>Till</i>	unstratified glacial deposit which may range from clay to boulders
<i>Fill</i>	any materials below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

<i>Desiccated</i>	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
<i>Fissured</i>	having cracks, and hence a blocky structure
<i>Varved</i>	composed of regular alternating layers of silt and clay
<i>Stratified</i>	composed of alternating successions of different soil types, e.g. silt and sand
<i>Layer</i>	>75 mm
<i>Seam</i>	2 mm to 75 mm
<i>Parting</i>	< 2 mm
<i>Well Graded</i>	having wide range in grain sizes and substantial amounts of all intermediate particle sizes
<i>Uniformly Graded</i>	predominantly of one grain size

Terminology describing soils on the basis of grain size and plasticity is based on the ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The classification excludes particles larger than 76 mm (3 inches). This system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

<i>Trace, or occasional</i>	Less than 10%
<i>Some</i>	10-20%
<i>Frequent</i>	Greater than 20%

The standard terminology to describe cohesionless soils includes the compactness as determined by laboratory test or by the Standard Penetration Test ‘N’ – value.

Relative Density	‘N’ Value	Compactness %
<i>Very Loose</i>	<4	<15
<i>Loose</i>	4-10	15-35
<i>Compact</i>	10-30	35-65
<i>Dense</i>	30-50	65-85
<i>Very Dense</i>	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by in-situ vane tests, penetrometer tests, unconfined compression tests, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength (Su)		'N' Value
	Kips/sq.ft.	KPa	
<i>Very Soft</i>	< 0.25	< 12.5	< 2
<i>Soft</i>	0.25 – 0.5	12.5 – 25	2 – 4
<i>Firm</i>	0.5 – 1.0	25 – 50	4 – 8
<i>Stiff</i>	1.0 – 2.0	50 – 100	8 – 15
<i>Very Stiff</i>	2.0 – 4.0	100 – 200	15 – 30
<i>Hard</i>	> 4.0	> 200	> 30

ROCK DESCRIPTION

Rock Quality Designation (RQD)

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on N-size (45 mm) core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from in situ fractures.

RQD	ROCK QUALITY
90 – 100	Excellent, intact, very sound
75 – 90	Good, massive, moderately jointed or sound
50 – 75	Fair, blocky and seamy, fractured
25 – 50	Poor, shattered and very seamy or blocky, severely fractured
0 – 25	Very poor, crushed, very severely fractured

Terminology describing rock mass:

Spacing (mm)	Bedding, Laminations, Bands	Discontinuities
2000 – 6000	<i>Very Thick</i>	<i>Very Wide</i>
600 – 2000	<i>Thick</i>	<i>Wide</i>
200 – 600	<i>Medium</i>	<i>Moderate</i>
60 – 200	<i>Thin</i>	<i>Close</i>
20 – 60	<i>Very Thin</i>	<i>Very Close</i>
< 20	<i>Laminated</i>	<i>Extremely Close</i>
< 6	<i>Thinly Laminated</i>	

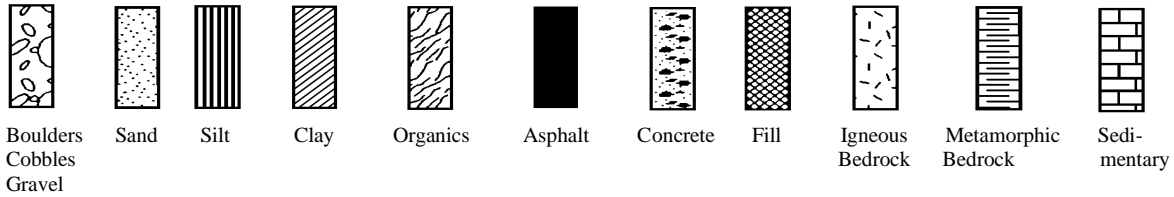
Strength Classification	Uniaxial Compressive Strength (MPa)
<i>Very Weak</i>	1 – 5
<i>Weak</i>	5 – 25
<i>Medium Strong</i>	25 – 50
<i>Strong</i>	50 – 100
<i>Very Strong</i>	100 – 250
<i>Extremely Strong</i>	> 250

Terminology describing weathering:

- Slight* - Weathering limited to the surface of major discontinuities. Typically iron stained.
- Moderate* - Weathering extends throughout rock mass. Rock is not friable.
- High* - Weathering extends throughout rock mass. Rock is friable.

STRATA PLOT

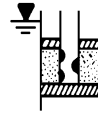
Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



WATER LEVEL MEASUREMENT



Borehole or
Standpipe



Piezometer

SAMPLE TYPE AND/OR FIELD TESTS





SS	Split Spoon Sample (obtained by performing the Standard Penetration Test)	AS	Auger Sample
ST	Shelby Tube or Thin Wall Tube	BS	Bulk Sample
PS	Piston sample	WS	Wash Sample
DC	Dynamic Cone Penetration	HQ, NQ, BQ, etc.	Rock Core Samples (obtained with the use of standard size diamond drilling bits)
FSV	Field Shear Vane		

N- VALUE

Numbers in this column are the results of the SPT (Standard Penetration Test): the number of blows of a 140 pound (64kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and 'N' values cannot be presented, the abbreviation SSR (Split Spoon Refusal) will appear in place of a numerical value.

OTHER TESTS

Symbols in this column indicate that the following laboratory tests have been carried out and the results are presented separately.

S	Sieve analysis	H	Hydrometer analysis
G _s	Specific gravity of soil particles	γ	Unit weight
k	Permeability	C	Consolidation
	Single packer permeability test; test interval from depth shown to bottom of borehole	CD	Consolidated drained triaxial
	Double packer permeability test; Test interval as indicated	CU	Consolidated undrained triaxial with pore pressure measurements
	Falling head permeability test using casing	UU	Unconsolidated undrained triaxial
	Falling head permeability test using well point or piezometer	DS	Direct shear
		Q _u	Unconfined compression
		I _p	Point Load Index (I _p on Borehole Records equals I _p (50); the index corrected to a reference diameter of 50 mm)
		MSV	Laboratory Miniature Shear Vane

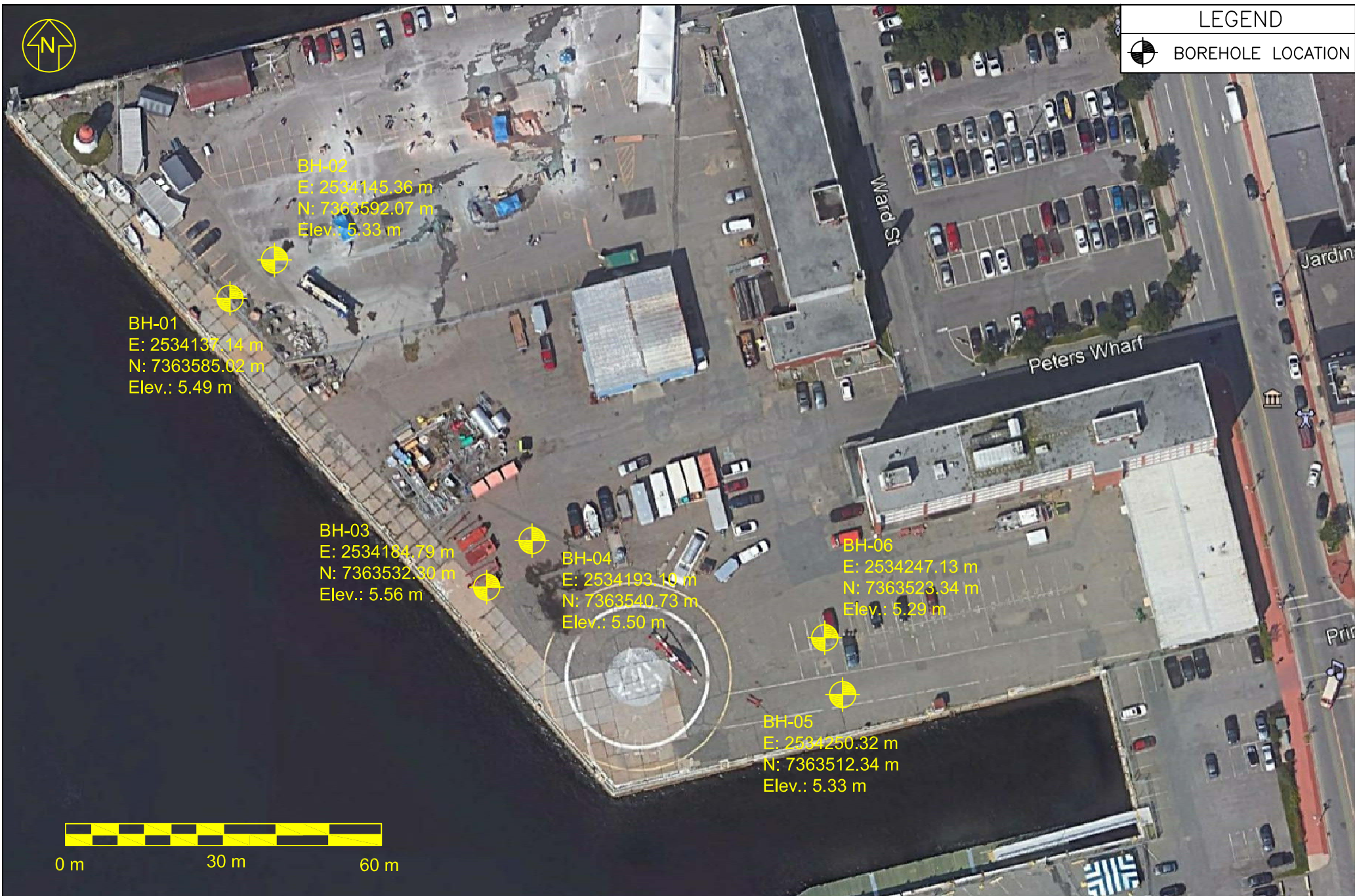
APPENDIX B
BOREHOLE RECORDS

APPENDIX C

FIGURE 1 – BOREHOLE LOCATION PLAN



LEGEND	
	BOREHOLE LOCATION



BH-02
 E: 2534145.36 m
 N: 7363592.07 m
 Elev.: 5.33 m

BH-01
 E: 2534137.14 m
 N: 7363585.02 m
 Elev.: 5.49 m

BH-03
 E: 2534184.79 m
 N: 7363532.30 m
 Elev.: 5.56 m

BH-04
 E: 2534193.19 m
 N: 7363540.73 m
 Elev.: 5.50 m

BH-06
 E: 2534247.13 m
 N: 7363523.34 m
 Elev.: 5.29 m

BH-05
 E: 2534250.32 m
 N: 7363512.34 m
 Elev.: 5.33 m



0 m 30 m 60 m

BOREHOLE LOCATION PLAN
INFRASTRUCTURE & SITE UPGRADES
COAST GUARD SITE, SAINT JOHN, NB



Saint John
 Moncton
 Fredericton
 Bedford

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DATE:
2019-09-09

PROJECT No.:
034-325

SCALE:
NTS

FIGURE:
1

APPENDIX 'C'

AS-BUILT DRAWINGS OF EXISTING SEA WALL



City of Saint John

CONTRACT SPECIFICATIONS

DIVISION 4

FORM OF TENDER

January 2021



City of Saint John

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4.1 TENDER IDENTIFICATION

Tender No: 2021-081201T

Title of Work: Sea Wall Refurbishment

4.2 TENDERER'S RESPONSIBILITIES AND AGREEMENT

TO THE CITY OF SAINT JOHN, NEW BRUNSWICK:

The undersigned hereby agrees that failure to complete all required parts of the Form of Tender shall be subject to the reserved rights of the City and shall be grounds for rejection of the Tender in accordance with Section 2.11.

The undersigned Tenderer has carefully examined the site of the Work described herein, has become familiar with local conditions and the character and extent of the Work, has carefully examined every part of the proposed Contract, and thoroughly understands its stipulations, requirements and provisions and has carefully examined all of the following documents which together comprise the Tender Documents:

1. Project Description (Division 1)
2. Instructions to Tenderers and Tendering Procedures (Division 2)
3. The Particular Specifications (Division 3)
4. The Form of Tender (Division 4)
5. The Form of Agreement (Division 5)
6. The General Specifications (Divisions 6 through 31)
7. The Plans and Drawings
8. Addenda Issued

together, the "Tender Documents".

The undersigned Tenderer has determined the quality and quantity of materials required, has investigated the location and determined the source of supply of materials required, has investigated labour conditions, and has arranged for the continuous execution of the Work herein described.

The undersigned Tenderer hereby agrees to be bound by the award of the contract, and if awarded the Contract, to sign the Form of Agreement (Division 5) within five (5) working days following the City's Notice of Selection.

In the event the City accepts its Tender, the undersigned Tenderer hereby agrees to Substantially Complete the Work no later than **August 30, 2022**. The undersigned Tenderer hereby agrees to complete the portion of the Work indicated on the Drawings to be complete by September 30, 2021 by **September 30, 2021**. Furthermore, the undersigned Tenderer agrees to complete full commissioning of the site no later than **September 30, 2022**.

The undersigned Tenderer agrees that he has received all Addenda and the Tender Price includes the provisions set out in the Addenda.



4.2 TENDERER’S RESPONSIBILITIES AND AGREEMENT (Cont’d)

The undersigned Tenderer further agrees to provide all necessary permits, approvals, labour, material, plant, equipment, tools, incidentals, products, water, light, heat, power, transportation, facilities, services and other means of the specified requirements which are necessary to complete the work in accordance with the contract and agrees to accept, therefore, in payment in full, the unit prices stated herein in the *Schedule of Quantities and Unit Prices*, for the actual quantities performed in accordance with the drawings and specifications, for the total sum of

in Canadian Funds, which price excludes HST (the “Tender Price”).

By submitting a Tender, the Tenderer absolutely waives any right, cause of action or claim for any compensation of any kind whatsoever as a result of participating in this Request for Tender Call or by reason of the City’s failure to accept the Tender submitted by the Tenderer, and the Tenderer shall be deemed to have agreed to waive such right, cause of action or claim.

Place of Signing: Signed, sealed and delivered at _____

Date of Signing: This _____ day of _____, in the year _____

Name and Title: By _____

Legal Name of Tenderer: _____ *PLACE*

Signature of Tenderer or Authorized Agent: _____ *SEAL*

Signature of Witness: _____ *HERE*

Address of Tenderer: _____

4.3 BONDING AND INSURANCE COMMITMENTS

Failure of the Tenderer to complete Sections 4.3.01, 4.3.02 and 4.3.03 may be grounds for rejection of the Tender.

4.3.01 Tender (Bid) Bond or Certified Cheque

A certified cheque or Tender (Bid) Bond accompanies this Tender, as indicated below:

(a) Certified Cheque

Provided is a certified cheque payable to The City of Saint John in the amount of _____

Signature of Tenderer or Authorized Agent: _____

(b) Tender (Bid) Bond

Provided is a Tender (Bid) Bond payable to The City of Saint John in the amount of _____

The Tender (Bid) Bond has been negotiated for, procured from and the premium paid to a New Brunswick resident agent of an insurance company licensed to do business in New Brunswick.

Signature of Tenderer or Authorized Agent: _____

4.3.02 Performance Guarantees

One of the following acceptable forms of Performance Guarantees will accompany the Contract, as indicated below:

(a) Performance Bond

The Performance Bond and the Labour and Material Payment Bond, each at fifty percent (50%) of the Tender Price covering the faithful performance of the full Contract, will be negotiated for, procured from and the premium paid to an insurance company licensed to do business in the Province of New Brunswick.

A surety consent letter or Agreement to Bond must accompany the Tender submission.

Signature of Tenderer or Authorized Agent: _____

4.3.02 Performance Guarantees (Cont'd)

(b) Certified Cheque

In lieu of the performance bond and the labour and material payment bond, we shall supply a certified cheque in the amount of twenty percent (20%) of the Tender Price.

Signature of Tenderer or Authorized Agent: _____

4.3.03 Insurance

The undersigned Tenderer has reviewed the insurance requirements in the Contract. The following provision for contract insurances will be utilized, as indicated below:

The insurance required in the contract will be negotiated for, procured from and the premium paid to an insurance company licensed to do business in the Province of New Brunswick.

Signature of Tenderer or Authorized Agent: _____

4.4 STATEMENTS

A Tender which does not include completed statements at Sections 4.4.01 to 4.4.07 hereunder and the duly completed Schedule of Quantities and Unit Prices at Appendix 4A may be Disqualified.

4.4.01 Reference Regarding Tenderer's Financial Status

Name of Reference: _____

Address of Reference: _____

4.4.02 Particulars of Tenderer's Recent Contracts

The Tenderer shall provide hereunder particulars of at least three (3), and if possible, five (5) contracts which the Tenderer has successfully carried to completion within the last three (3) years, or is now carrying to completion.

Tenderers shall be actually engaged in performing the type and standard of work specified, and the projects referenced below shall be work of a similar character to the Work now being tendered and shall be of comparable or greater size.

Tenderers who have not performed work for The City of Saint John within the last three (3) years shall submit additional information with the Form of Tender that would demonstrate the Tenderer's ability to perform the type and standard of work specified and the Tenderer's financial, technical and project management reliability.



4.4.02 Particulars of Tenderer's Recent Contracts (Cont'd)

Contract 1: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____

Contract 2: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____

Contract 3: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____



4.4.02 Particulars of Tenderer's Recent Contracts (Cont'd)

Contract 4: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____

Contract 5: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____

Contract 6: Brief description of contract: _____

Owner, contact name and telephone number: _____

Contractor's supervisor: _____

Year completed: _____ Contract Value: _____



4.4.03 Particulars of Current Construction Work by Tenderer

If none of the projects described in 4.4.02 were in progress in Canada during the twelve (12) months immediately preceding this Tender, the Tenderer shall provide below particulars of a contract which the Tenderer satisfactorily carried out in Canada during that period.

Brief description of contract: _____

Owner, contact name
and telephone number: _____

Date of commencement: _____

Date of (anticipated) completion: _____

Contract value: _____

Contractor's supervisor: _____

4.4.04 Tenderer's Senior Supervisory Staff

The Tenderer shall identify their senior supervisory staff in the spaces below.

Tenderers who have not performed work for the City within the last three (3) years shall submit with their Form of Tender a completed resume for each staff member listed hereunder outlining their experience, education, designations/certificates and continued training/education.)

<u>Name</u>	<u>Position</u>	<u>Qualifications</u>	<u># Years Experience</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



4.4.05 Tenderer's Plant

The Tenderer shall list below the construction plant (type of machinery, equipment, trucks, etc.) the Tenderer proposes to use, other plant under the Tenderers control, and the plant the Tenderer proposes to hire, to complete the work within the time allowed.

<u>Type</u>	<u>Make</u>	<u>Model # & Year</u>	<u>Gas/ Diesel</u>	<u>Net Engine Horsepower</u>	<u>Bucket Size Excavator GVW</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

4.4.06 Tenderer's Other Resources

The Tenderer shall list below the batch plant, gravel pits or quarries, and the like that the Tenderer proposes to use to complete the work within the time allowed.



4.4.07 Sub-Contractors and Suppliers

Tenderers shall state the name and address of each proposed sub-contractor or supplier.

The listing of more than one sub-contractor or supplier for any one sub-trade or failure to submit a complete list of sub-contractors and suppliers may be grounds for rejection of the Tender. After the City has provided the selected Tenderer with written notification of the City’s acceptance of its Tender, the selected Tenderer shall not substitute other sub-contractors or suppliers in place of those named below without the written approval of the Engineer.

<u>Sub-Trade or Supplier</u>	<u>Name of Sub-Contractor/Supplier</u>	<u>Address</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4.5 SCHEDULE OF QUANTITIES AND UNIT PRICES

The tenderer shall complete and attach as Appendix 4A the required *Schedule of Quantities and Unit Prices* for the Work tendered, in the format specified by the Engineer.

4.6 CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying Tender to The City of Saint John for:

Tender No.: 2021-081201T

Title of Work: Sea Wall Refurbishment

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of _____ that:

(Corporate Name of Tenderer)

4.6 CERTIFICATE OF INDEPENDENT TENDER DETERMINATION (Cont'd)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying Tender will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the Tenderer to sign this Certificate, and to submit the accompanying Tender, on behalf of the Tenderer;
4. Each person whose signature appears on the accompanying Tender has been authorized by the Tenderer to determine the terms of, and to sign, the Tender, on behalf of the Tenderer;
5. For the purposes of this Certificate and the accompanying Tender, I understand that the word “competitor” shall include any individual or organization, other than the Tenderer, whether or not affiliated with the Tenderer, who:
 - (a) may submit a Tender in response to this Request for Tender;
 - (b) could potentially submit a Tender in response to this Request for Tender, based on their qualifications, abilities or experience;
6. The Tenderer discloses that (check one of the following only, as applicable):
 - the Tenderer has arrived at the accompanying Tender independently from, and without consultation, communication, agreement or arrangement with, any competitor; or
 - the Tenderer has entered into consultations, communications, agreements or arrangements with one or more competitors regarding this Request for Tender, and the Tenderer discloses, in the attached document(s), complete details thereof, including the names of the competitors and the nature of, and reasons for, such consultations, communications, agreements or arrangements.
7. In particular, without limiting the generality of paragraphs (6)(a) or (6)(b) above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - (a) prices;
 - (b) methods, factors or formulas used to calculate prices;
 - (c) the intention or decision to submit, or not to submit, a Tender; or
 - (d) the submission of a Tender which does not meet the specifications of the Request for Tender;except as specifically disclosed pursuant to paragraph (6)(b) above;



4.6 CERTIFICATE OF INDEPENDENT TENDER DETERMINATION (Cont'd)

- 8. In addition, there has been no consultation, communication, agreement or arrangement with any competitor regarding the quality, quantity, specifications or delivery particulars of the products or services to which this Request for Tender relates, except as specifically authorized by The City of Saint John or as specifically disclosed pursuant to paragraph (6)(b) above;
- 9. The terms of the accompanying Tender have not been, and will not be, knowingly disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official Tender Opening, or of the awarding of the Contract, whichever comes first, unless otherwise required by law or as specifically disclosed pursuant to paragraph (6)(b) above.

Name of Tenderer or Authorized Agent: _____

Signature of Tenderer or Authorized Agent: _____

Position Title: _____

Date: _____

Address of Tenderer: _____

ATTACHMENT: TENDERER'S CHECKLIST

(The onus is entirely on the Tenderer to understand all the requirements of the tendering process and the Tender Documents. This checklist is provided for information only and is not required to be submitted with the Form of Tender.)

BEFORE SUBMITTING YOUR TENDER, CHECK THE FOLLOWING POINTS:

- Has your Tender been signed and witnessed?
- Have you sealed the *Form of Tender* with your corporate seal?
- Have you enclosed your Tender (Bid) Bond or certified cheque?
- Have you enclosed the surety consent letter?
- Have you completed all sections of the *Form of Tender*?
- Have you completed all schedules and prices in the *Form of Tender*?
- Have you written each unit price or lump sum price out in words, including the words "dollars" and "cents"?
- Have you included signed copies of all addenda signature pages?
- Have you listed your Subcontractors and suppliers?
- Have you listed your experience in similar work?
- Have you listed your senior staff?
- Have you listed the Tenderer's plant?
- Have you attached required appendices and required supplemental information?
- Are the documents complete?
- Is everything legible?

PLEASE MAKE SURE THAT YOU:

- (a) Place the Tender in an envelope;
- (b) Seal the envelope;
- (c) Put the Tender number, title of Work and closing date and time on the sealed envelope;
- (d) Put the full legal name and return address of the Tenderer on the envelope; and
- (e) Deposit the envelope in the Tender Box located at 175 Rothesay Avenue, 2nd Floor, Saint John, N.B.

DIVISION 4

SCHEDULE OF QUANTITIES AND UNIT PRICES

UNIT PRICE TO BE EITHER
TYPEWRITTEN OR PRINTED
IN INK IN WORDS AND
PRINTED NUMERICALLY

CONTRACT NUMBER TBD
TITLE: SEAWALL REFURBISHMENT

ITEM NO.	DESCRIPTION	DIV. NO.	UNIT	EST. QTY.	UNIT BID PRICE		TOTAL (\$)
					WRITTEN	NUMERICAL	
A	WATER			X			
2	<u>Backfill</u>	13		X			
	b Unshrinkable Fill (max 28 day compressive strength < 0.4MPa, Slump 150-200mm, max 25kg of Type 10 Portland cement per m³, Air entrainment between 4-6%)		m³	2			
3	<u>Pipelaying & Jointing: Watermain - Supply & Install</u>	7, 10		X			
	150mm Ø PVC, DR18, Class 150 or approved equal including tracer wire and connections		m	5			
	300mm Ø Coupling for connection to existing watermain		Each	1			
	150mm Mechanical Joint Cap c/w restraints, concrete thrust blocks		Each	3			
	5.5kg (12 lb.) Anodes on valves and mechanical fittings 200mm Ø and smaller	10	Each	4			
	11kg (24 lb.) Anodes on water service connections, valves and mechanical fittings	10	Each	2			
	Excavate & remove existing gate valve and concrete valve chamber cover (outside normal limits of excavation)		Each	1			
	Fire hydrant complete, including anchor tee, 150mm GV, 130mm VB, restraints, concrete thrust blocks, vertical piping, polyethylene encasement, tracer wire and Storz pumper nozzle		Each	1			
	<u>Contingency</u>	2.6.03	LS	1	Two Thousand Dollars and Zero Cents		
	AMOUNT "A" (WATER)			X			
C	STORM SEWER			X			
	<u>Pipelaying & Jointing: Storm Sewer - Supply & Install</u>	7, 11		X			
	300mm Ø concrete, class III C-XL with gasket or approved equal		m	10			
	1800mm Ø concrete, class IV C-XL with gasket or approved equal		m	52			
	1800mm Ø x 1200mm concrete cap with spigot, class IV C-XL with gasket or approved equal		Each	1			
	1800mm Ø Rubber Check Valve. Includes supply and installation of all mounting hardware, labour, equipment and materials to complete installation as specified and to manufacturers requirements. Valve as specified on Drawings.		Each	1			
	Connection of new 300mm Ø pipe to existing 300mm Ø pipe incl. coupling		Each	1			

DIVISION 4

SCHEDULE OF QUANTITIES AND UNIT PRICES

UNIT PRICE TO BE EITHER
TYPEWRITTEN OR PRINTED
IN INK IN WORDS AND
PRINTED NUMERICALLY

CONTRACT NUMBER TBD
TITLE: SEAWALL REFURBISHMENT

ITEM NO.	DESCRIPTION	DIV. NO.	UNIT	EST. QTY.	UNIT BID PRICE		TOTAL (\$)
					WRITTEN	NUMERICAL	
	Connection of new 300mm Ø pipe to existing STMH concrete structure including all modifications, cutting and grouting to complete the connection. Manholes & Catch Basins -Supply & Install	12	Each	1			
	3600mm Ø precast MH (Marine Grade) complete with City standard frame and cover and incl. all labour & materials necessary to connect to new and existing mains & laterals, etc.		Each	1			
	Tee base MH (Marine Grade) for 1800 Ø pipe with 1800Ø shafting complete with City standard frame and cover and incl. all labour & materials necessary to connect to new and existing mains & laterals etc. CCTV Video	11	Each	2			
	Contingency - Impacted / Contaminated Soils	2.6.03	LS	1	Forty Thousand Dollars and Zero Cents	40,000.00	40,000.00
	Contingency	2.6.03	LS	1	Forty Thousand Dollars and Zero Cents	40,000.00	40,000.00
	AMOUNT "C" (STORM SEWER)			X			
E	CONCRETE CURB AND SIDEWALK	23		X			
	Concrete Curb & Gutter (Regular & Dropped) - Supply & Place	23		X			
	Concrete curb & gutter (regular & dropped) INCLUDING excavation and imported Granular Base Material backfill (Method "A")		m	30			
	Concrete Sidewalk - Supply & Place	23		X			
	Variable width pigmented concrete sidewalk (Regular and Dropped) INCLUDING 2-bag per m ³ pigment, excavation and backfill (Method "A"). Colour Shall be Interstar RG-2827R "Baja Red" 2-bag mix.		m ²	70			
	Clay Brick Pavers	30		X			
	Remove and reinstall existing tight packed mortarless bricks complete with 50mm (uncompacted) cement sand mix		m ²	30			
	Supply and install 100 mm thick concrete slab under all brick areas.		m ²	30			
	Expansion Joint Filler	23		X			
	Supply & Install 13mm thick impregnated asphalt fiberboard filler between new curb and where full width sidewalk is installed between curb and face of buildings, retaining walls, or other structures. Also supply & install expansion joint filler around utility poles, manhole covers & fire hydrants.		m	10			
	Contingency	2.6.03	LS	1	Three Thousand Dollars and Zero Cents		
	AMOUNT "E" (CONCRETE CURB & SIDEWALK)			X			
				X			

DIVISION 4

SCHEDULE OF QUANTITIES AND UNIT PRICES

UNIT PRICE TO BE EITHER
TYPEWRITTEN OR PRINTED
IN INK IN WORDS AND
PRINTED NUMERICALLY

CONTRACT NUMBER TBD
TITLE: SEAWALL REFURBISHMENT

ITEM NO.	DESCRIPTION	DIV. NO.	UNIT	EST. QTY.	UNIT BID PRICE		TOTAL (\$)
					WRITTEN	NUMERICAL	
F	ROAD WORK	13, 24		X			
	<u>Asphalt Concrete - Supply & Place</u>	27		X			
	Superpave 9.5 (3 to < 10 million ESALs)		t	15			
	Superpave 19 (3 to < 10 million ESALs)		t	35			
	Superpave 9.5 (3 to < 10 million ESALs) Miscellaneous Handwork		t	5			
	Superpave 19 (3 to < 10 million ESALs) Miscellaneous Handwork		t	5			
	<u>Traffic Markings</u>	3		X			
Traffic Lines (Painted) - Yellow, White, Cross Hatching, Stop Bars, Arrows and Crosswalks. Reinstate all traffic markings within the limits of the work.		L.S.	1				
<u>Contingency</u>	2.6.03	LS	1	Two Thousand Dollars and Zero Cents			
	AMOUNT "F" (ROAD WORK)			X			
G	LANDSCAPING	26		X			
	<u>Landscaping - Supply & Place</u>			X			
	Topsoil - 100mm thickness		m ³	1.5			
Nursery Sod (minimum thickness 40mm)		m ²	15				
	AMOUNT "G" (LANDSCAPING)			X			
H	<u>MISCELLANEOUS WORK</u>			X			
	<u>Light Pole Relocation</u>	3		X			
	Traffic Light Pole Relocation- Remove, salvage and reinstall existing decorative traffic light pole where shown on design drawings. Includes repouring the cast-in-place concrete light base (Std Dwg S045-316A), realignment and reinstatement of all electrical connections, wiring, conduit, concrete encasement and bracing as necessary. Includes all labour, materials, conduit, appurtenances, concrete encasement, and wiring to realign existing ducts around MH1.		LS	1			
<u>Contingency</u>	2.6.03	LS	1	Five Thousand Dollars and Zero Cents			
	AMOUNT "H" (MISCELLANEOUS)			X			
I	<u>SEA WALL REPAIR AND RAISING</u>			X			

DIVISION 4

SCHEDULE OF QUANTITIES AND UNIT PRICES

UNIT PRICE TO BE EITHER
TYPEWRITTEN OR PRINTED
IN INK IN WORDS AND
PRINTED NUMERICALLY

CONTRACT NUMBER TBD
TITLE: SEAWALL REFURBISHMENT

ITEM NO.	DESCRIPTION	DIV. NO.	UNIT	EST. QTY.	UNIT BID PRICE		TOTAL (\$)
					WRITTEN	NUMERICAL	
1	<u>Mobilization and Demobilization</u>	N/A	LS	1			
2	<u>Engineer's Site Office</u>	N/A	LS	1			
3	<u>General Demolition and Removal</u>	N/A	LS	1			
4	<u>Type 1 Concrete Removal</u>	N/A	m ²	504.4			
5	<u>Type 2 Concrete Removal</u>	N/A	m ²	52.7			
6	<u>Type 3 Concrete Removal</u>	N/A	m ²	31.0			
7	<u>Type 4 Concrete Removal</u>	N/A	m ²	1.2			
8	<u>Type 5 Concrete Removal</u>	N/A	Each	6			
9	<u>Type 6 Concrete Removal</u>	N/A	m ²	1.3			
10	<u>Type 7 Concrete Removal</u>	N/A	m ³	0.87			
11	<u>Type 8 Concrete Removal</u>	N/A	m ³	2.22			
12	<u>Type 9 Concrete Removal</u>	N/A	m ³	1.33			
13	<u>Expansion Joints</u>	N/A	m	122.8			
14	<u>Type 1 Dowels</u>	N/A	Each	681			
15	<u>Type 2 Dowels</u>	N/A	Each	4983			
16	<u>Type 3 Dowels</u>	N/A	Each	51			
17	<u>Type 4 Dowels</u>	N/A	Each	374			
18	<u>Type 5 Dowels</u>	N/A	Each	351			
19	<u>Type 6 Dowels</u>	N/A	Each	434			
20	<u>Type 7 Dowels</u>	N/A	Each	130			
21	<u>Concrete Keyway Wall Extensions</u>	N/A	Each	5			
22	<u>Concrete Crib Refacing</u>	N/A	m ²	2832.5			
23	<u>Gravity Wall Refacing</u>	N/A	m ²	211.2			
24	<u>Concrete-Encased Steel Sheet Pile Wall Refacing</u>	N/A	m ²	134.8			
25	<u>New Steel Sheet Pile Wall Facing</u>	N/A	m ²	298.7			

DIVISION 4

SCHEDULE OF QUANTITIES AND UNIT PRICES

UNIT PRICE TO BE EITHER
TYPEWRITTEN OR PRINTED
IN INK IN WORDS AND
PRINTED NUMERICALLY

CONTRACT NUMBER TBD
TITLE: SEAWALL REFURBISHMENT

ITEM NO.	DESCRIPTION	DIV. NO.	UNIT	EST. QTY.	UNIT BID PRICE		TOTAL (\$)
					WRITTEN	NUMERICAL	
26	<u>New Raised Wall</u>	N/A	m ³	339.3			
27	<u>Mooring Bollard Bases</u>	N/A	m ³	51.6			
28	<u>Mock-up for Architectural Finish at Form Liner</u>	N/A	LS	1			
29	<u>Mock-up for Crib Refacing</u>	N/A	LS	1			
30	<u>Supply of Form Liners for Architectural Pattern</u>	N/A	m ²	223.0			
31	<u>Installation of Form Liners for Architectural Pattern</u>	N/A	m ²	223.0			
32	<u>Tieback Anchor Walls</u>	N/A	m ³	117.6			
33	<u>Timber Ladders</u>	N/A	Each	5			
34	<u>Supply of Steel Sheet Piling</u>	N/A	m ²	483.0			
35	<u>Installation of Steel Sheet Piling</u>	N/A	m ²	360.6			
36	<u>Tieback System at New Steel Sheet Piling</u>	N/A	LS	1			
37	<u>Tieback System at Existing Concrete-Encased Steel Sheet Piling</u>	N/A	LS	1			
38	<u>Toe Pins</u>	N/A	Each	22			
39	<u>10 Tonne Mooring Bollards</u>	N/A	Each	10			
40	<u>4 Tonne Mooring Cleats</u>	N/A	Each	16			
41	<u>Crib and Cope Wall Concrete Removals for New Storm Sewer</u>	N/A	LS	1			
42	<u>Contingency</u>	N/A	LS	1			
	AMOUNT "I" (SEA WALL REPAIR AND RAISING)			X			
	SUBTOTAL (A+C+E+F+G+H+I)			X			
	HARMONIZED SALES TAX (HST) 15 %			X			
	TOTAL INCLUDING HST			X			



City of Saint John

CONTRACT SPECIFICATIONS

DIVISION 5

FORM OF AGREEMENT

January 2021



City of Saint John

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DIVISION 5 – FORM OF AGREEMENT

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5.1 AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT made in triplicate between **THE CITY OF SAINT JOHN** herein (and in the Specifications) called the "Owner" or the "City"

AND

herein (and in the Specifications) called the "Contractor".

WITNESSETH: That the Owner and the Contractor agree as follows:

- (a) The Contractor shall provide all the materials and perform all the work shown on the drawings and described in the Contract Specifications titled:

Contract No: 2021-081201T

Title: Sea Wall Refurbishment

- (b) The Contractor shall do and fulfill everything indicated by this Agreement; and
- (c) The Contractor shall complete the Work as indicated on the Drawings to be complete by September 30, 2021 no later than **September 30, 2021**.
- (d) The Contractor shall Substantially Complete the Work no later than **August 30, 2022**.
- (e) The Contractor shall complete commissioning of the site no later than **September 30, 2022**.

5.2 CONTRACT DOCUMENTS

5.2.01 General Specifications

General Specifications, City of Saint John, New Brunswick, with all applicable divisions, as updated and as listed in the Table of Contents of the Contract Specifications.

5.2.02 Contract Specifications

Contract specifications for

Contract No: 2021-081201T

Title: Sea Wall Refurbishment

5.2.03 Drawings

S1	Existing Site Plan - Demolition
S2	Existing Sections
S3	Existing Sections and Detail
S4	Existing Sections, Plan and Detail
S5	Existing Elevations Stations #3-9 - Demolition
S6	Existing Elevations Stations #9-14 - Demolition
S7	Type 1-3 Concrete Removals
S8	Type 4-9 Concrete Removals
S9	New Site Plan
S10	New Wall Elevations - Stations #1-9
S11	New Wall Elevations - Stations #9-14
S12	Sections - New Steel Sheet Piling
S13	Refacing and Tieback System at Existing Concrete-faced SSP
S14	SSP Tieback Excavation Staging
S15	Section and Details - SSP and Tieback System
S16	Section and Details - SSP Toe Pinning, Anchor Wall, and Transitions
S17	Keyway Wall Extension
S18	Sections - Crib and Gravity Wall Refacing
S19	Details - Crib and Gravity Wall Refacing
S20	New Raised Wall
S21	Mooring Bollard and Cleat Sections and Details
S22	Expansion Joint and Safety Ladder
S23	Architectural Form Liner Treatment at North Wall (Stations #1-5)
S24	Architectural Form Liner Treatment at South Wall (Stations #10-14)
S25	Sewer Outfall Demolition Details
C1	Storm Sewer Outfall Plan & Profile Sta. 0+000 – 0+060
C2	Storm Sewer Outfall Details

5.3 ADDENDA

The Contractor agrees that he has received addenda ___ to ___ inclusive, and that the tender price includes the provisions set out in the addenda.

5.4 CONTRACT PRICE

The Owner shall pay to the Contractor, in lawful money of Canada for the performance of the Contract, the amounts determined for each of the items of work completed at the unit prices as listed in the Schedule of Quantities and Unit Prices, plus applicable taxes, submitted with the tender, which is to be attached with this Agreement, for the total tender price of:

If the Engineer orders in writing the performance of any work not covered by the drawings or included in the specifications that cannot be classified as coming under any of the contract units and for which a unit price can be agreed upon, then such additional work shall be paid for as described under the General Administration of Contract, Division 6.

5.5 PAYMENT

The Owner shall pay on account of thereof upon the Engineer's Certificate, as invoiced by the Contractor and approved by the Engineer, in the manner described in the Specifications.

5.6 AGREEMENT DOCUMENTS

The General Administration of Contract, Division 6 and the aforesaid Specifications and Drawings are all to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties and it shall inure to the benefit of and be binding upon them and their successors, executors, administrators, and subject to the General Administration of Contract, their assigns.



5.7 EXECUTION OF AGREEMENT

In Witness Whereof the parties hereto have executed this Agreement.

) SIGNED, SEALED AND DELIVERED
)
) this _____ day of _____, _____
)
) by _____
) (Contractor)
)
 _____)
 (Witness)) (Signature)
)
 _____)
 (Name and Title)) (Name and Title)
)
 _____)
) (Signature)
)
 _____)
) (Name and Title)
)
)
)
)
) PLACE SEAL HERE

)
)
) SIGNED, SEALED AND DELIVERED
)
) this _____ day of _____, _____
)
) by THE CITY OF SAINT JOHN.
)
)
)
 _____)
) MAYOR
)
 _____)
) COMMON CLERK
)
)
)
)
) PLACE SEAL HERE



5.8 AFFIDAVIT OF CORPORATE EXECUTION

CANADA
PROVINCE OF NEW BRUNSWICK
CITY OF SAINT JOHN

I, _____, of the _____
in the County of _____, and Province of New Brunswick

MAKE OATH AND SAY:

- (1) THAT I am the _____ of _____, and _____ is the _____ of the said Company, as such I am/we are duly authorized officer(s) of the said Company to execute the foregoing instrument.
- (2) THAT the signature _____ subscribed to the within instrument is my signature and in my own proper handwriting and that the signature _____ so subscribed is his signature made thereto by him in my presence.
- (3) THAT the Seal affixed to the said instrument purporting to be the Corporate Seal of the said _____ is the Corporate Seal of the said Company and was affixed to the said instrument by me and by order of the Board of Directors of the Company.

SWORN TO BEFORE ME at the _____)
 _____)
 of _____)
 _____)
 in the Province of _____)
 _____)
 this ____ day of _____ A.D., _____.)
 _____)
 _____)
 COMMISSIONER OF OATHS) CONTRACTOR
 _____)
 _____)

Note: The blank spaces are to be filled in with the name or names of the signing officer(s).

5.9 CHECKLIST FOR INSURANCE REQUIREMENTS

The insurance coverage required by the City is set out in General Administration of Contract, Division 6, of the General Specifications. An Insurance Certificate is to be deposited with the City.

The certificate of insurance should contain at least the following information:

- Be addressed to the City of Saint John.
- Be signed by an authorized representative on behalf of the insurance company.
- Contain a Wrap-up (Project Specific) Liability policy with inclusive limits of at least five million dollars (\$5,000,000.00).
- Show that the City of Saint John, the Contractor and Sub-Contractors, the Engineer and the Architect, are added as Additional Insured with respect to the operations of the Contractor.
- Confirm coverage for bodily injury and property damage and set forth the amount.
- Confirm that there is coverage for Contractual Liability with respect to this Contract.
- Confirm that the policy contains a cross liability clause.
- Confirm that there is Contingent Employer's Liability Coverage.
- Confirm that there is coverage for Broad Form Property Damage.
- Confirm that there is Completed Operations coverage with respect to this contract and that such coverage shall continue to be in force for the duration of the guarantee period (maintenance period) which is a period of twelve (12) months from the date of issuance of the Certificate of Final Completion.
- Confirm that there is coverage for Non-Owned Automobiles or licensed vehicles.
- Confirm that there is coverage for Owned Automobiles or licensed vehicles.
- Confirm that the indicated policies will not be cancelled, substantially amended, or allowed to lapse without the City first being given a thirty (30) day written notice.