



TENDER #3878

WASTEWATER TREATMENT PLANT REPLACEMENT

TANTALLON ELEMENTARY

Closing Date: THURSDAY JUNE 1ST, 2017
Closing/Opening Time: 2:00:00 P.M.

Closing Location: Halifax Regional School Board
33 Spectacle Lake Drive
Dartmouth, N.S. B3B 1X7

Substantial Completion Date:
AUGUST 23RD, 2017

HRSB Contacts:
Jennifer King, Buyer
Tel: (902) 464-2000 #2223
Fax: (902) 464-0161
Email: jlking@hrsb.ca

School Location:
TANTALLON SR ELEMENTARY
3 FRENCH VILLAGE STATION RD
UPPER TANTALLON NS, B3Z 1E4

Operations Contact:
Ron Curran, Manager – Regulatory Compliance
Tel: (902) 464-2000 #5114
Email: rcurran@hrsb.ca

A mandatory bidders' site meeting is scheduled for ***Wednesday May 24th 2017 at 9:30 a.m.*** Please meet at the front entrance of the school.

To obtain documents:
Download tender documents in .pdf format from the School Board's Website:
<http://www.hrsb.ca/about-hrsb/financial-services/purchasing/tenders/tender-listing>

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SECTION 00 00 15 - DESCRIPTION OF WORK & LIST OF DRAWINGS

1. General

- 1.1.** The work of this contract includes the provision of all materials, labour and equipment necessary to complete the **WASTEWATER TREATMENT PLANT REPLACEMENT** at **TANTALLON ELEMENTARY**, as per the documentation drawings and specifications prepared by **CBCL Limited**.
- 1.2.** Work involves supply and installation of a new Recirculating Sand Filter (RSF) system, including septic tank, recirculation tank, pumps, yard piping, sand filter, UV system, electrical wiring and controls, control building, connection to existing sanitary piping, maintaining sanitary service throughout duration of contract, clearing and grubbing, commissioning of installed equipment, operator training, providing operations and maintenance manual, environmental protection, decommissioning and removal of existing wastewater treatment plant, and complete site reinstatement.
- 1.3.** Work that affects the existing plant may only be performed between **July 1st, 2017 and September 1st, 2017**.
- 1.4.** It is the School Board's intent to have all work completed, to point of Substantial Performance, prior to **AUGUST 23RD, 2017**. The Building will be occupied during this time period. It is expected that an early award of this contract will enable the Contractor to facilitate shop drawing review and ordering of materials to allow commencement of work immediately following award of tender.
- 1.5.** The whole of the work shall agree in all particulars with the levels, measurements and details contained in the drawings accompanying this specification and with such other drawings or information as may from time to time be supplied by the School Board, or may be supplied by the Contractor and reviewed by the School Board.

2. List Of Drawings

<u>Drawing NO.</u>	<u>Drawing Title</u>
C00	Cover Sheet
C01	Site Plan
A01	Building Plan, Section and Elevations
A02	Miscellaneous Details
P01	WWTP Plan
P02	WWTP Sections
P03	Recirculating Sand Filter Plan
P04	RSF Sections and Miscellaneous Details
E01	Site Layouts
E02	Diagrams, Details and Schedules

END OF SECTION 00 00 15

SECTION 00 05 00 - LIST OF CONSULTANTS

Owner: HALIFAX REGIONAL SCHOOL BOARD
33 SPECTACLE LAKE DRIVE, DARTMOUTH NS

Consultant: Sarah Ensslin, P. Eng.
CBCL Limited
Phone: 902-421-7241 ext. 2238
Email: sensslin@cbcl.ca

END OF SECTION 00 05 00

SECTION 00 21 13 – INFORMATION FOR BIDDERS

Invitation:

1. Bid Call

- 1.1.** The HALIFAX REGIONAL SCHOOL BOARD (The Board/HRSB) will receive offers in the form of a bid from Contractors which is signed and received on or before the date and time specified on the cover sheet of this document. HRSB deems the correct time to be the time indicated on the phone clock on the Receptionist's desk at at 33 Spectacle Lake Drive.
- 1.2.** Offers submitted after the closing time/date shall be returned to the bidder unopened.
- 1.3.** Submit completed tender documents for above project in sealed envelope marked as follows: **TENDER #3878, WASTEWATER TREATMENT PLANT REPLACEMENT – TANTALLON SR. ELEMENTARY**
- 1.4.** Bids will be opened at the time indicated on the cover sheet of this document. As of April 1, 2014 Public tender openings are no longer held for any tenders relating to goods, services or construction for HRSB. A list of bidders and bid amounts will be posted on the Procurement Services website (<http://novascotia.ca/tenders/tenders/ns-tenders.aspx>) shortly following the closing of the tender. All bid submissions are subject to evaluation after opening and before award of contract. The winning bidder and award amount will be posted on the Procurement Services website (<http://novascotia.ca/tenders/tenders/ns-tenders.aspx>) after award.
- 1.5.** In the event that the HALIFAX REGIONAL SCHOOL BOARD office is closed due to inclement weather or any other reason on the date and at the time of closing, the Closing Date and Time will be extended one (1) business day. Proponents should note that closure of Schools does not necessarily mean closure of the Board's Regional Office.
- 1.6.** Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and executed the offer.
- 1.7.** Emailed/Faxed Bid Submissions **will not** be accepted.

2. Intent

- 2.1.** The intent of this bid call is to obtain an offer to perform all work associated with Tender #3878, **WASTEWATER TREATMENT PLANT REPLACEMENT**, at **TANTALLON ELEMENTARY** for a Stipulated Price Contract in accordance with the Contract Documents.

3. Scope of work

- 3.1.** Refer to Section 00 00 15 – Description of Work and List of Drawings.

4. Availability

- 4.1.** Bid Documents can be obtained as per the directions on the cover sheet of this document.
- 4.2.** Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not confer a license or grant for other purposes.
- 4.3.** The HALIFAX REGIONAL SCHOOL BOARD is not responsible for accuracy of documents and project postings obtained from any other source.

5. Examination

- 5.1.** Bid Documents are on display at the offices of the Nova Scotia Construction Association (CANS), Halifax, NS.
- 5.2.** Upon receipt of Bid Documents verify that documents are complete; notify the Board's Buyer by email to ilking@hrsb.ca, should the documents be incomplete, or upon finding discrepancies or omissions in the Bid Documents.
- 5.3.** Bidders shall become fully aware of the content of all tender documents for the preparation of the Bidder's offer.
- 5.4.** Bidders will be deemed to have familiarized themselves with the existing site and working conditions and all other conditions which may affect the performance of the work. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time.

6. Clarification and Addenda

- 6.1.** Notify Jennifer King, Buyer, by email to ilking@hrsb.ca no less than **five (5)** working days before Tender Closing of any questions, omissions, errors or ambiguities found in Contract Documents. If HRSB considers that correction, explanation or interpretation is necessary, a reply will be in the form of an addendum, a copy of which will be posted on the novascotia.ca/tenders and/or HRSB website as applicable, and it is the responsibility of the Bidder to ensure all addenda are received and acknowledged.

- 6.2. Addenda will be issued no less than three (3) business days before tender closing date and time, and will form part of the Contract Documents.
- 6.3. Verbal answers to queries are not binding. Information must be confirmed by written addenda. The Board and its representatives shall not be bound by or be liable for any representation or information provided verbally. Information obtained by any other source is not official and will not bind the HALIFAX REGIONAL SCHOOL BOARD.
- 6.4. Complete tender form (section 00 41 13) acknowledging that addenda have been received.

7. Product/System Options

- 7.1. Alternatives to specified products and systems will only be considered during the bidding period in the manner prescribed below.
 - 7.1.1. Where the Bid Documents stipulate a particular product, alternatives may be considered by the Consultant up to five (5) working days before tender closing date and time. Bidders must forward their written requests by email to: ilking@hrsb.ca. The Buyer will relay the requests to the appropriate person(s) for review.
- 7.2. The submission must provide sufficient information to enable the Consultant to determine acceptability of such products. Request for an alternate must be accompanied with:
 - 7.2.1. information about how the request affects other work in order to accommodate each alternate;
 - 7.2.2. the dollar amount of additions to or reductions from the Bid Price, including revisions to other Work.

A later claim by the bidder for an addition to the contract price because of changes in work necessitated by use of alternates shall not be considered.
- 7.3. When a request to substitute a product is made and pursuant to consultation with the Consultant, HRSB may approve or disapprove the substitution. The bidder making the request will be notified of the Board's decision and if the alternate is approved, HRSB will issue an Addendum.
- 7.4. Alternates must be submitted in above manner; otherwise, they will not be accepted.

8. Mandatory Bidders' Site Meeting (Site Assessment)

8.1. Bidders will be deemed to have familiarized themselves with existing project site and working conditions and all other conditions, which may affect performance of the Contract. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time.

8.1.1.A Mandatory Bidders' Site Meeting has been scheduled as per the information on the cover sheet of this document. All Bidders are required to attend. Representatives of HRSB and the Consultant will be in attendance;

9. Bidders Registration

9.1. The successful Contractor and Sub-contractors must comply with the Nova Scotia Corporations Registration Act or Partnerships and Business Name Registration Act, or equivalent, before a contract is awarded.

10. Qualifications

10.1. Sub-Contractors

10.1.1. HRSB reserves the right to reject a proposed sub-contractor for a reasonable cause.

10.1.2. Refer to Article GC 3.7.3 of CCDC-2 2008.

11. Bid Submission

11.1. Submissions

11.1.1. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.

11.1.2. Bids must be submitted on the **Bid Form** provided by HRSB (Section 00 41 13 – Bid Form). These forms are to be completely filled out in ink, with the signature in longhand, and corporate sealed as applicable, and the completed form shall be without interlineations, alterations or erasures. Electronic bid submissions sent by facsimile transmission or email will not be accepted.

11.1.3. Fully complete the Tender Bid Form and enter the contract price in both written words and numerals. Where this bid is requested in both words and numbers, and if the two (2) do not represent the identical amount, words shall prevail.

- 11.1.4. Submit the executed offer on the Bid Forms together with the required bid security in a closed opaque envelope, clearly identified with bidder's name, project name and tender number on the outside.
- 11.1.5. Improperly completed information, irregularities in the bid security, may be cause to declare the bid informal.

12. Accuracy of Referencing

- 12.1. Indexing and cross-referencing are for convenience only.

13. Conditions of Tendering

- 13.1. Take full cognizance of content of all Contract Documents in preparation of Tender. Refer to Section 00 41 13 – Tender Form, Subsection 5.0 for a complete list of Contract Documents.

14. Preparation of Tender

- 14.1. Complete Tender Bid Form (section 00 41 13) provided with Contract Documents in ink. Tender all items and fill in all blanks. Have corrections initialed by person signing Tender. Bidders' are required to provide all information as detailed.

15. Amendment or Withdrawal of Tender

- 15.1. Bids may be amended or withdrawn by post, hand or facsimile prior to date and time of closing.
- 15.2. A Tender Price Amendment Form is provided immediately following the Bid Form (section 00 41 73).
 - 15.2.1.1. The Tender Price Amendment Form provided is the standard Master form for submission of all tender price amendments for this project.
 - 15.2.1.2. Copy and complete form, as directed, for all tender price amendments submitted.
- 15.3. Amendments shall not disclose either original or revised total price.
- 15.4. Sign, execute and submit to HRSB Board Office or by facsimile to (902) 464-0161 prior to time of Tender Closing.

16. Bid Ineligibility (reason for rejection)

- 16.1. HRSB may reject a bid which has been received prior to the closing time where:
 - 16.1.1. The bid is not submitted on the required bid form (Section 00 41 13) included herein.
 - 16.1.2. The bid is submitted by electronic transmission.

- 16.1.3. There are omissions of information that HRSB in its sole discretion deems to be significant.
- 16.1.4. The bid is not signed as required.
- 16.1.5. The bid has conditions attached which are not authorized by the invitation to bid.
- 16.1.6. The bid fails to meet one or more standards specified in the invitation to bid.
- 16.1.7. All addenda have not been acknowledged.
- 16.1.8. Any other defect which, in the opinion of the HRSB brings the meaning of the bid into question.
- 16.1.9. A major irregularity is a deviation from the bid request which affects the price, quality, quantity, or delivery of the project and is material to the award, and is a reason for rejection.
- 16.1.10. A minor irregularity is a deviation from the bid request which affects form, rather than substance. The effect on price, quality, quantity or delivery is not material to the award, and may be waived by the HRSB.
- 16.1.11. The required bid security in the required form is not provided.
- 16.1.12. Bidder failed to attend Bidders' Mandatory Site Meeting.

17. Communications Affecting Bids

- 17.1. Electronic Transmissions, including, but not limited to facsimile transmission:
 - 17.1.1. Bid forms submitted by facsimile and/or e-mail etc. transmission are not acceptable and will be rejected.
 - 17.1.2. Electronic transmissions (facsimile only) modifying bidder supplied information are acceptable when signed by an authorized signatory of the original bid. Submission and receipt of such electronic transmissions is at the risk of the bidder. HRSB assumes no liability for the receipt of the electronic transmission or for their proper inclusion with original bid. There is no requirement for HRSB to follow up upon receipt of an electronic transmission. Electronic submissions will be considered binding on both parties. Electronic submissions must be submitted and received prior to closing time and date specified in the bid documents. HRSB Procurement Department Date and Time stamps will prevail. **HRSB Procurement facsimile number is 902-464-0161.**

18. Right to Accept or Reject any Tender

- 18.1.** The Board reserves the right to reject any bid in its sole and absolute discretion for any reason whatsoever.
- 18.2.** The Board specifically reserves the right to reject all bids if none is considered to be satisfactory in the Board's sole and absolute discretion and, in that event, at its option, to call for additional bids.
- 18.3.** Without limiting the generality of any other provision herein, the Board reserves the right to accept or reject any bid in accordance with bullet #16 above. (Bid Ineligibility)
- 18.4.** Notwithstanding the above, the Board shall be entitled, in its sole and absolute discretion, to waive any irregularity, informality or non-conformance with these instructions in any proposal received by the Board. HRSB reserves the right to reject any or all tenders, or to accept any tender, or portion thereof, deemed in its best interest.
- 18.5.** In the event that a number of Bidders submit bids in substantially the same amount, the Board may, at its discretion, call upon those Bidders to submit further bids or take into consideration any value added services being provide in determination of award.
- 18.6.** No term or condition shall be implied, based upon any industry or trade practice or custom or in a practice or policy of the Board or otherwise, which is inconsistent or conflicts with the provisions contained in these Instructions.

19. Construction Contract Guidelines

- 19.1.** The printed policies of the Nova Scotia Construction Guidelines, dated May 18, 2006 (or latest revisions) are applicable to these bid documents.

20. Bid and Security Forms – Signatures

- 20.1.** All bid forms, bid security forms and performance assurance forms **must** bear the Bidder's original signature and name HRSB as insured.

21. Bid Security

- 21.1.** Submit with Bid one of the following: Bid security in the form of a Certified Cheque, Irrevocable Letter of Credit, or Bid Bond on CCDC Form 220, in the amount of ten percent (10%) of the Bid Price made payable to, or naming HRSB (as obligee), must accompany the tender.

- 21.2.** Where bid bond is provided as bid security:
- 21.2.1.** Provide bond on the standard CCDC Bid Bond Form, latest version, in the amount of not less than ten percent (10%) of the Bid Price.
 - 21.2.2.** Bid Bonds, submitted by the general contractor bidder, signed and sealed by the principal (Contractor) and Surety and shall be with an established Surety Company satisfactory to and approved by HRSB.
 - 21.2.3.** Where Bid Bond is used as Bid Security, include the cost of providing the Bid Bond in the Bid Price.
- 21.3.** Where certified cheque or bank draft is provided as bid security:
- 21.3.1.** Provide a certified cheque or bank draft, endorsed in the name of HRSB, for a sum not less than ten percent (10%) of the amount of the Bid Price.
 - 21.3.2.** Where certified cheque or bank draft is used as Bid Security, include the cost in the Bid Price.
- 21.4.** Where the Irrevocable Standby Letter of Credit is used as bid security:
- 21.4.1.** Provide an Irrevocable Standby Letter, endorsed in the name of HRSB, for a sum not less than ten percent (10%) of the Bid Price
 - 21.4.2.** The Irrevocable Standby Letter of Credit shall be issued by a certified financial institution subject to the Uniform Custom and Practices for Documentary Credit (1993 revision or latest revision) International Chamber of Commerce (Publication No. 500).
 - 21.4.3.** Where Irrevocable Standby Letter of Credit is used as bid security, include the cost in the Bid Price.
- 21.5.** Return of Bid Security:
- 21.5.1.** The bid security of the unsuccessful bidders will be returned to them after the contract has been signed, or previous to such time, at the discretion of HRSB.
 - 21.5.2.** The above shall apply provided a contract is awarded within ninety (90) days from the closing date of the bid.
 - 21.5.3.** If no contract is awarded, all bid security will be returned.

22. Contract Security (Performance Assurance)

- 22.1.** All bid forms, bid security forms and performance assurance forms must bear the bidder's original signature and name HRSB as insured.

- 22.2.** Bidder shall maintain performance assurance in force for a period of not less than twelve (12) months after the issue of the substantial performance certificate certified by HRSB and until completion of the contract.
- 22.3.** Endorse Performance Assurance as specified for bid security.
- 22.4.** Should it become apparent that the final cost of the project will exceed the total amount payable by more than 20%, the bidder shall arrange to have their bonds reissued based on the projected final cost.
- 22.5.** Refer to Section 00 72 13 – General Conditions GC11.2 and Section 00 73 00 – Supplementary General Conditions for form of Contract Security. Refer to project documents for amount of Contract Security and alternate type of Contract Security if applicable.
- 22.6.** Submit as Performance Assurance one of the following:
- 22.6.1.** Where a Bid Bond was used as bid security:
- 22.6.1.1.** Within ten (10) days after notification of award of the Contract, provide a Performance Bond and a Labour & Material Payment Bond, each in an amount equal to fifty percent (50%) of the amount of the Contract, naming HRSB.
- 22.6.1.2.** Performance Bond and Labour and Material Payment Bonds, submitted by the bidders, shall be provided at the expense of the bidder and shall be with an established Surety Company satisfactory to and approved by HRSB.
- 22.6.1.3.** Include the cost of providing the Performance Bond and Labour and Material bond in the Contract price.
- 22.6.2.** Where a Certified Cheque or Bank Draft is used as Contract Security:
- 22.6.2.1.** The Certified Cheque or Bank Draft submitted during the bid period will be cashed and the amount retained by HRSB shall serve as Performance Assurance, including the payment of all obligations arising under the Contract.
- 22.6.2.2.** The Certified Cheque or Bank Draft will be held in lieu of the Performance Bond and Labour and Material Bonds, providing that, at Contract award, the successful Bidder shall supplement their Certified Cheque or Bank Draft to maintain an amount of ten (10%) of the total amount payable (Contract Price plus HST) under the contract.
- 22.6.2.3.** The amount remaining will be returned without interest after a period of not less than twelve (12) months after the issue of the substantial

- performance certificate certified by HRSB and shall serve as performance assurance and not until completion of the contract.
- 22.6.2.4.** Where certified cheque or bank draft is used as Performance Assurance, include the cost of providing the certified cheque in the Contract price.
- 22.6.3.** Where an Irrevocable Standby Letter or Credit is used as Contract Security:
- 22.6.3.1.** The Irrevocable Standby Letter of Credit submitted during the bid period will be retained by HRSB and shall serve as performance assurance, including the payment of all obligations arising under the contract. The irrevocable standby letter of credit shall be issued by a certified financial institution subject to the Uniform Customs and Practices for Documentary Credit (1993 revision) International Chamber of Commerce (Publication No. 500).
- 22.6.3.2.** Where irrevocable standby letter of credit is used as Performance Assurance, include the cost of providing and Irrevocable Standby Letter of Credit in the Contract Price. The contractor shall provide to HRSB documentation throughout the duration of the contract that the irrevocable standby letter of credit remains in full effect at all times as specified,
- 22.6.3.3.** Upon expiry of the Irrevocable Standby Letter of Credit, a separate Irrevocable Standby Letter of Credit shall be provided for work requiring extended warranties for such amounts as are required by the contract.
- 22.6.3.4.** The Irrevocable Standby Letter of Credit is to be in effect for a period of not less than twelve (12) months after the issue of the substantial performance certificate certified by HRSB and shall serve as performance assurance and not until completion of the contract.

23. Insurance

- 23.1.** Refer to Section 00 72 13 -General Conditions of Contract, GC 11.1 – Insurance and Section 00 73 00 – Supplementary General Conditions for form of Insurance. Refer to project documents for amount of insurance, duration of coverage and alternate type of Insurance if applicable.
- 23.2.** General Contractor shall secure and maintain at its expense during the term of the Insurance:
- 23.2.1.** Workers’ Compensation to meet Statuary requirements and/or Employers Liability.
- 23.2.2.** Wrap Up liability Insurance must insure the general contractor(s) and all sub-contractors on this project:
- 23.2.2.1.** including but not limited to, products liability and completed operations, contractual liability, owners and contractors liability, attached machinery extension endorsement, independent contractor, for a combined single limit of no less than \$5,000,000.00 per occurrence.
- 23.2.3.** Commercial Auto Liability insurance covering all owned, non-owned and hired vehicles for a minimum combined single coverage of \$2,000,000.00 per occurrence.
- 23.2.4.** Builders Risk – all risks – in the amount of the project contract stipulated bid price.
- 23.2.5.** Deliver a certificate of insurance evidencing the above prior to work being performed. It is also agreed that the above insurance coverage is primary and must be kept in force during the term of this agreement. Furthermore, HRSB must receive, in writing, at least thirty (30) days’ notice of cancellation or modification of the above insurances. All insurance policies or certification documents shall specify coverage being applicable to this contract. The Contractor shall not do or omit to do or suffer anything to be done or omitted to be done which will in any way impair or invalidate such policy or policies of insurance.
- 23.3.** Primary Insurance- Supplier agrees that the insurance as required above shall be primary and non-contributory.
- 23.4.** No limitation- Supplier is responsible for determining whether the above minimum insurance coverage’s are adequate to protect its interests. The above minimum coverage’s do not constitute limitations upon Supplier’s Liability.
- 23.5.** Endorsements – For the policies in para 23 above, there shall contain an endorsement naming HRSB and its Affiliates as an Additional Insureds, and eliminating and removing any exclusion of liability for:

- 23.5.1. injury, including bodily injury and death to an employee of the insured or of HRSB, or
- 23.5.2. any obligation of the insured to indemnify, hold harmless, defend, or otherwise make contribution to School Board because of damage arising out of injury, including bodily injury and death, to an employee of HRSB.

24. Proof of Competency of Bidder

- 24.1. Any bidder may be required to furnish evidence satisfactory to the owner that he and his proposed sub-contractors have sufficient means and experience in the types of work called for to assure completion of the contract in a satisfactory manner.
 - 24.1.1. The successful bidder **must** be a member in good standing with CRCA, RCANS; and
 - 24.1.2. Nova Scotia Construction Safety Association or approved recognized association or program.

25. Bid Form Requirements

25.1. Bid Submission

- 25.1.1.1. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- 25.1.1.2. Bids must be submitted on forms provided by the Board. These forms are to be completely filled out in ink or by typewriter, with the signature in longhand, and the completed form shall be without interlineations, alterations or erasures.
- 25.1.1.3. Submit the executed bid on the bid forms provided, signed and corporate sealed as applicable together with the required security in a closed opaque envelope, clearly identified with Bidders name, project name on the outside.
- 25.1.1.4. Improperly completed information, irregularities, in required enclosures may be cause to declare the bid informal.

25.2. Bid Signing

- 25.2.1. The bid form **Must** be signed and under seal (as applicable) by a duly authorized signing officer(s) in their normal signatures.

25.3. Contract Time

- 25.3.1. The bidder, in submitting an offer, agrees to achieve Substantial performance of the work by the date indicated in the contract documents. The Substantial Performance date in the agreement shall be as indicated on the cover sheet.

26. Offer Acceptance / Rejection

26.1. Duration of offer

26.1.1. Bids shall remain open to acceptance and shall be irrevocable for a period of ninety (90) days after the bid closing date.

26.2. Award/Selection/Acceptance of Offer

26.2.1. In the evaluation of a bid, HRSB will consider, but not be limited to, the following criteria:

26.2.1.1. Compliance with Bid requirements.

26.2.1.2. Bid price submitted.

26.2.1.3. The qualifications and experience of the bidder with similar projects in size and scope.

26.2.1.4. References.

26.2.1.5. Gantt chart (schedule of proposed scope of work for various disciplines).

26.2.1.6. Completion date.

26.2.2. The Owner's evaluation of any and all bid submission(s) will be final.

26.3. HRSB reserves the right to accept or reject any or all offers or to accept any offer deemed most satisfactory, HRSB reserves the right to waive any informality in any or all bids.

26.4. After acceptance HRSB will issue to the successful bidder, a written bid acceptance.

26.5. After acceptance by HRSB, the successful bidder shall be notified in writing of acceptance of the bid and will be issued an official purchase order.

27. Agreement

27.1. After acceptance by HRSB and the successful bidder will enter into a CCDC-2 –2008, standard form of contract for the execution of the work.

28. Post Bid Submissions

28.1. Provide after closing of bid period, but before award of Contract, when requested by HRSB, a copy of the following documents:

28.1.1. Current Certificate of Recognition or Letter of Good Standing:

28.1.1.1. Certificate of Recognition issued jointly by the Nova Scotia Department of Labour and an occupational health and safety organization approved by Nova Scotia Department of Labour, or a valid letter of Good Standing from an occupational health and safety organization approved by HRSB

indicating the Contractor is in the process of qualifying for the Certificate of Recognition. Contractor shall remain in good standing for the duration of the contract. In the event that any such certification during the term of the contract expires, the obligation remains with the contractor to provide the updated required certificates.

28.1.1.2. Worker's Compensation Coverage

28.1.1.2.1. Evidence of an account with the Workers' Compensation board, coverage under the Workers Compensation Act, R.S.N.S. and a clearance certificate indicating the bidder is in good standing and shall remain so for the duration of the contract. In the event that any such certification during the term of the contract expires, the obligation remains with the contractor to provide the updated required certificates.

28.1.1.3. Certificates of good standing with CRCA (Canadian Roofing Contractors Association) and RCANS (Roofing Contractors Association of Nova Scotia),

28.1.2. Submit Post-Bid Submissions requested by HRSB within forty-eight (48) hours of request in order to be eligible to receive award of contract.

28.1.3. Submit the following post award documents within ten (10) working days of notice of award:

28.1.3.1. Provide all required contract security and insurance documentation,

28.1.3.2. Schedule of Values,

28.1.3.3. Copy of safety plan,

28.1.3.4. Copy of Hot Work Permit system and procedures,

28.1.3.5. Shop drawings, as applicable, and

28.1.3.6. Applicable documentation as required by the Tender Documents.

28.1.4. All post bid submissions must be received by HRSB in the manner prescribed above, or prior to commencement of work and delivery of materials on-site, whichever occurs first.

29. Taxes

29.1. The General Conditions of the Contract state that the Contractor as of April 1, 1997 and thereafter, the Contractor is to pay all Harmonized Sales Tax.

- 29.2.** HRSB is not exempt for Harmonized Sales Tax (HST) purposes. As a result, the aggregate amount of the bid for contracts is subject to HST; however, **prices submitted shall not include HST.**
- 29.3.** The HST payable by the Board will be added as a separate item during the processing of progress payments and therefore **HST will not appear as a cost in the aggregate amount of the tender.**
- 29.4.** Bidders are advised that they may be eligible to claim an Input Tax Credit (ITC) for a portion of the HST paid in relation to the Contract requirement of the Government of Canada.
- 29.5.** Bidders are to note that prices indicated on the Bid Form and the appendices to the Bid Form shall not include Provincial Sales Taxes, the Federal Goods and Services Tax or the Harmonized Sales Tax.
- 29.6.** Exclude Harmonized Sales Tax in Tender Contract Price, unless requested to do otherwise.
- 29.7.** Refer to CCDC-2 - 2008 (Section 00 72 13) and Supplementary General Conditions (Section 00 73 00).

END OF SECTION 00 21 13

SECTION 00 41 13 - TENDER FORM

1. Salutation:

To: HALIFAX REGIONAL SCHOOL BOARD
33 SPECTACLE LAKE DRIVE, DARTMOUTH NS
Attn: JENNIFER KING, BUYER

For: #3878 WASTEWATER TREATMENT PLANT REPLACEMENT – TANTALLON ELEM

From:

Address:

E-Mail:

Phone:

Fax:

Person Signing for Firm:

Position:

2. Bidder Declares:

- 2.1. That this tender was made without collusion or fraud.
- 2.2. That the proposed work was carefully examined.
- 2.3. That the Bidder was familiar with local conditions.
- 2.4. That Contract Documents and Addenda were carefully examined.
- 2.5. That all the above were taken into consideration in preparation of this Tender.

3. Bidder Agrees:

- 3.1. To provide all necessary equipment, tools, labour, incidentals and other means of construction to do all the Work and furnish all the materials of the specified requirements which are necessary to complete the Work in accordance with the Contract and agrees to accept, therefore, as payment in full the Lump Sum Price stated in Subsection 6 hereunder.
- 3.2. Carefully examined the site of the work described herein; become familiar with local conditions and the character and the extent of the work; carefully examined every part of the proposed Contract and thoroughly understands its stipulations, requirements and provisions.
- 3.3. Determined the quality and quantity of materials required; investigated the location and determined the source of supply of the materials required; investigated labour conditions; and has arranged for the continuous prosecution of the work herein described

- 3.4. To be bound by the award of the contract and if awarded the contract on this bid to execute the required contract within ten (10) days after notice of award.
- 3.5. Noted that the Harmonized Sales Tax is excluded from his "Contract Price".
- 3.6. School/Work site access control: Contractor's employees shall always report to the main office of a school, indicate who they are and state their purpose on site prior to starting any work in the school. Contractor is not permitted to work on the school site without School Board's assigned representative on site unless authorized by School Board Operations representative. Typical hours of work are daylight hours. Working in occupied schools will be determined by the Operations representative. No work shall be conducted on weekends or holidays without specific approval of the Operations Representative.
- 3.7. Hours of work – All work shall be carried out during regular business hours unless otherwise indicated below or in writing by the Manager of Operations or designate. Hours of work shall comply with local ordinances and bylaws for each site.
- 3.8. As noted in Section 00 00 15 item 1.3 - Work that affects the existing plant may only be performed between July 1st, 2017 and September 1st, 2017.

4. Owner Agrees

- 4.1. To examine this bid and in consideration, therefore, the bidder hereby agrees not to revoke this bid:
 - 4.1.1. until some other bidder has entered into the contract with The School Board for the performance of the work and the supply of the materials specified in the notice inviting bids; or in the Information to Bidders, or
 - 4.1.2. until ninety (90) days after the time fixed in the Information to Bidders for receiving bids has expired,
 - 4.1.3. Whichever first occurs; provided, however, that the bidder may revoke this bid at any time before the time fixed in the Information to Bidders for receiving bids has expired upon receipt by the Board from the bidder of written notice of such revocation before said time has expired.
 - 4.1.4. The Bidder declares that he has obtained from the Subcontractors all Bid Security required to be provided by Subcontractors pursuant to the "Instructions to Bidders".

5. Contract Documents include:

- 5.1.1. Cover Page
- 5.1.2. Table of Contents – Section 00 00 01
- 5.1.3. Description of Work & List of Drawings – Section 00 00 15
- 5.1.4. List of Consultants – Section 00 05 00
- 5.1.5. Information for Bidders – Section 00 21 13
- 5.1.6. Tender Form – Section 00 41 13
- 5.1.7. Tender Price Amendment Form (if applicable) – Section 00 41 73
- 5.1.8. Agreement Between Owner and Contractor (CCDC 2 – 2008) – Section 00 52 00
- 5.1.9. Definitions (CCDC 2 – 2008) – Section 00 52 13
- 5.1.10. General Conditions of the Stipulated Contract Price (CCDC 2 -2008) – Section 00 72 13
- 5.1.11. Supplementary General Conditions – Section 00 73 00
- 5.1.12. HRSB General Terms & Conditions – Section 00 73 10
- 5.1.13. Specifications of Work (all applicable sections)
- 5.1.14. Drawing(s) – as applicable
- 5.1.15. Addendum/Addenda issued by HRSB.
- 5.1.16. Contract Sets (2)

6. Fee Submission - Contract Price:

6.1. The undersigned Bidder, having carefully read and examined the aforementioned Contract Documents prepared by the Consultant, for Halifax Regional School Board hereby accepts the same as part and parcel of the Contract herein referred to, and having carefully examined the locality and Site of Works and having full knowledge of the work required and of the materials to be furnished and used, does hereby Tender and offer to enter into a contract to perform and complete, the whole of the said works and provide all necessary labour, plant, tools, materials and equipment and pay all applicable taxes, as set forth and in strict accordance with the Specifications, Drawings and other Contract Documents and to do all therein called for on the terms and conditions and under the provisions therein set forth for the following:

6.2. LUMP SUM BID PRICE – WASTEWATER TREATMENT PLANT REPLACEMENT - TANTALLON

_____ /100 Dollars (\$ _____) (HST Excluded)

Contract Price to be completed in written form on the lines provided above, with cents expressed as numerical fraction of a dollar. Contract price to be completed in numerical form on the line bounded by parenthesis above, with cents expressed as a decimal of a dollar. WHERE THERE IS A CONFLICT, WRITTEN WORD WILL GOVERN.

6.3. Breakout Prices: Breakout prices requested in the Tender Document, as detailed below, **SHALL BE INCLUDED IN THE LUMP SUM TENDER PRICE** above (6.1 - Contract Price) and deleted only on the instruction at the sole discretion of the Owner, for which a credit will be offered by the Contractor, equal to the breakout pricing detailed below (price excludes HST):

Item No.	Description	Unit of Measurement	Credit Amount
1.	_____	_____	\$ _____
2.	_____	_____	\$ _____
3.	_____	_____	\$ _____
4.	_____	_____	\$ _____
5.	_____	_____	\$ _____

Total Credit Amount for ALL Breakout Items:

_____ /100 Dollars (\$ _____) (HST Excluded)

Separate Prices: Separate prices requested in the Tender Document, as detailed below **SHALL NOT BE INCLUDED IN THE LUMP SUM TENDER PRICE** above (6.1 - Contract Price) and added only on the instruction and at the sole discretion of the Owner, for which the contract will be adjusted, equal to the separate pricing detailed below (price excludes HST):

Listing of Separate Price Details Requested by Board:

Item No.	Description	Unit of Measurement	Unit Price
6.	_____	_____	\$ _____
7.	_____	_____	\$ _____
8.	_____	_____	\$ _____
9.	_____	_____	\$ _____
10.	_____	_____	\$ _____

7. Completion Time:

7.1. Bidder agrees to be substantially complete as follows:

7.1.1.1. **AUGUST 23RD, 2017**

7.1.1.2. The undersigned Bidder agrees if awarded the Contract on this Bid to achieve the Substantial Completion Date providing the contract is awarded within ten (10) business days of tender closing time.

7.2. Detailed breakdown of overall project specific phases (schedule of proposed scope of work for various disciplines) written and/or Gant Chart to be provided with bid documents or within five (5) business days of tender award.

8. Addenda Acknowledgement

I/We have received and noted the following addenda for Tender #3878 WASTEWATER TREATMENT PLANT REPLACEMENT TANTALLON SR ELEMENTARY:

Addendum #	Dated	# Of Pages
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

9. Supporting Information

9.1. References: (Minimum of three)

Bidder to furnish particulars of at least three (3) similar contracts successfully completed or currently being carried to completion. The projects quoted should preferably be approximate in nature to the work now tendered for and be of comparable or greater size. References are to be submitted with the bid prior to closing date and time.

Contact Name & Phone #	Date	Contract Value
_____	From _____ to _____	\$ _____
_____	From _____ to _____	\$ _____
_____	From _____ to _____	\$ _____
_____	From _____ to _____	\$ _____

9.2. Bid submission to include a minimum of two letters of endorsement from clients commenting upon the contractor’s ability to deliver quality projects, similar in scope and size, which met schedule and budget.

10. Proof Of Competency Of Bidder

10.1. Any bidder may be required to furnish evidence satisfactory to the Owner that he and his proposed sub-contractors have sufficient means and experience in the types of work called for to assure completion of the Contract in a satisfactory manner.

10.1.1. The Bidder acknowledges, as part of their bid submission, their responsibility and contract obligations to ensure that the proposed sub-contractors will fully perform the project requirements and meet the timings as detailed in this tender call.

10.2. **Sub-Contractors:** The Bidder to provide the name and address of each major sub-contractor used in making up this tender. This list of sub-contractors is to be submitted with the bid prior to closing date and time. Only one sub-contractor shall be named for each part of the work to be sublet.

<u>Subcontractor/Suppliers/Manufacturers</u>	<u>Service/Material</u>
Site Works	
Electrical	
Mechanical	
Roof	

10.2.1. **Project Personnel:** The Bidder to include below, the names, qualifications and previous experience of those people who will be directly involved with the project. The names shall, for example, include foremen, superintendent, project engineer and/or project manager, labourers and trade staff. This list of personnel is to be submitted with the bid prior to closing date and time.

Name	Position	Qualifications/Experience

Signature * The undersigned Bidder declares that this bid is made without connection with any other person(s) submitting bids for the same work and is in all respects fair and without collusion or fraud.

SIGNATURE:

SIGNED AND DELIVERED
in the presence of:

Witness

CONTRACTOR

Company name

Signature of Signing Officer

Name and Title (printed)

HRSB is directly responsible for the safety of its students and staff. Should contractors be required to work in or on school property while children are present, it is a MANDATORY SCHOOL BOARD REQUIREMENT that contractors assign the work to employees and/or sub-contractors who DO NOT have a CRIMINAL RECORD and who ARE NOT LISTED ON THE CHILD ABUSE REGISTRY. Failure to comply with this requirement may result in immediate contract termination.

By checking the "Agreed" box you are confirming that you understand and will abide by this mandatory School Board requirement.

Agreed

****Note: Bids submitted **Must** be signed by a duly authorized officer or agent.***

END OF SECTION 00 41 13

SECTION 00 41 73 - TENDER AMENDMENT FORM

#3878 WASTEWATER TREATMENT PLANT REPLACEMENT

Note: to be completed and forwarded for each Bid Price adjustment prior to bid closing time and date as detailed on the Cover Sheet of the tender document and related Addendum.

Lump Sum Price Adjustment – Section 00 41 13 Tender form, Article 6.1.1 Contract Price

Increase Bid by		Decrease Bid By	
Amount (excluding HST)	\$	Amount (excluding HST)	\$
HST	\$	HST	\$
Total Amount (including HST)	\$	Total Amount (including HST)	\$

It is the Bidder's responsibility to ensure the table above is legible

Attachments included: no yes (✓ one)

If **yes** above, check ✓ and complete information regarding attachments

Revised Bid Form: Dated _____ # of pages _____

Other, Specify _____

Dated _____ # of pages _____

Total number of pages (including this form) _____

Submitted by:

Company Name (please print as it appears on original tender envelope)

Authorized Bidder's Name (please print as it appears on Bid Form)

Authorized Bidder's Signature

END OF SECTION 00 41 73

***SECTION 00 52 00 - AGREEMENT BETWEEN OWNER AND CONTRACTOR
CCDC 2 – 2008***

(a copy of Section 00 52 00, Standard Construction Contract CCDC 2 – 2008 (5 pages) is available upon request, otherwise, will form part of the contract sets to the successful bidder)

END OF SECTION 00 52 00

***SECTION 00 52 13 - DEFINITIONS
CCDC 2 - 2008***

(A copy of section 00 52 13, Standard Construction Contract CCDC 2 – 2008 (2 pages) is available upon request, otherwise, will form part of the contract sets to the successful bidder)

END OF SECTION 00 52 13

***SECTION 00 72 13 - GENERAL CONDITIONS
OF THE STIPULATED PRICE CONTRACT
CCDC 2 - 2008***

(A copy of section 00 72 13, Standard Construction Contract CCDC 2 – 2008 (23 pages) is available upon request, otherwise, will form part of the contract sets to the successful bidder)

END OF SECTION 00 72 13

SECTION 00 73 00 - SUPPLEMENTARY GENERAL CONDITIONS CCDC2 – 2008

The Canadian Standard Construction Document for Stipulated Price Contract (CCDC 2, 2008 version), Definitions and General Conditions governing same, shall be used by the project. The following Supplementary General Conditions are intended to supplement or amend the General Conditions, and where conflicts occur, the Supplementary Conditions shall take precedence.

Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

ARTICLE A-5 PAYMENT

Delete paragraph 5.1 in its entirety and insert:

5.1 "Subject to applicable legislation and the provisions of the Contract Documents, and in accordance with legislation and statutory regulations respecting holdback percentages and, where such legislation or regulations do not exist or apply, subject to a holdback of ten percent (10%) including the HST (Harmonized Sales Tax), the Owner shall:"

- .1 Make progress payments to the Contractor on account of the Contract Price (work performed) when due in the amount certified by the Consultant together with Value Added Taxes as may be applicable to such payments, and
- .2 Upon Substantial Performance of the Work as certified by the Consultant, pay to the Contractor the unpaid balance of monies then due, excepting that amounts as certified by the Consultant to rectify deficiency items, or incomplete portions of individual work items may be retained by the Owner pending Total Performance of the work or other authorization for the release by the Consultant, and
- .3 Upon Total performance of the Work as certified by the Consultant pay to the contractor the unpaid balance of monies due together with such Value Added Taxes as may be applicable to such payment.

Change 5.3.1 (1) to read: "1% per annum above the prime rate."

Delete 5.3.2 (2) in its entirety.

DEFINITIONS

Add subparagraph 19a to definitions:

19a. Submittals

Submittals are documents or items required by the Contract Documents to be provided by the Contractor, such as:

- 1 Shop Drawings, samples, models, mock-ups to include details or characteristics, before the portion of the Work that they represent can be incorporated into the Work; and
- 2 As-built drawings and manuals to provide instructions to the operation and maintenance of the Work.

GC 1.1 CONTRACT DOCUMENTS

Add to the end of subparagraph 1.1.2.2:

1.1.2.2 Except where the Consultant shall be indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4, 9.5.3.4 and in 12.1.3.

Add subparagraph 1.1.7.5:

1.1.7.5 Should conflicts occur between Contract Documents and any work is done without consulting the Consultant for his decision, the Contractor shall assume full responsibility.

Add subparagraph to 1.1.7.6:

1.1.7.6 In case of discrepancies, noted materials and annotations shall take precedence over graphic indications in the Contract Documents.

Delete paragraph 1.18 in its entirety and insert:

1.18 "The Contractor will be provided with up to a maximum of ten (10) copies, without charge, of the Contract Documents or parts thereof for the performance of the work. Extra copies may be obtained for cost of printing and mailing."

GC 2.4 DEFECTIVE WORK

Add new subparagraphs 2.4.1.1 and 2.4.1.2:

2.4.1.1 The Contractor shall rectify, in a manner acceptable to the Owner and the Consultant, all defective work and deficiencies throughout the Work, whether or not they are specifically identified by the Consultant.

2.4.1.2 The Contractor shall prioritize the correction of any defective work which, in the sole discretion of the Owner, adversely affects the day to day operation of the Owner.

GC 3.1 CONTROL OF THE WORK

Add new paragraph 3.1.3:

3.1.3 Prior to commencing individual procurement, fabrication, and construction activities, the Contractor shall verify, at the Place of work, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the Work and shall further carefully compare such field measurements and conditions with the requirements of the Contract Documents. Where dimensions are not included or contradictions exist, or exact locations are not apparent, the Contractor shall immediately notify the Consultant before proceeding with any part of the affected work.

GC 3.4 DOCUMENT REVIEW

Delete paragraph 3.4.1 in its entirety and substitute new paragraph:

3.4.1 The Contractor shall review the Contract Documents and shall report promptly to the Consultant and error, inconsistency or omission the Contractor may discover. Except for its obligation to make such review and report the result, the Contractor does not assume any responsibility to the Owner or to the Consultant for the accuracy of the Contract Documents. The Contractor shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the Contract Documents, which the Contractor could not have reasonably have discovered. If the Contractor does discover any error, inconsistency, or omission in the Contract Documents the Contractor shall not proceed with the work affected until the Contractor has received corrected or missing information from the Consultant.

GC 3.7 SUBCONTRACTORS AND SUPPLIERS

Add the following paragraph 3.7.7:

- 3.7.7 A copy of the agreement between Contractor and any subcontractor(s) shall be provided to the Consultant if so requested.

GC 3.8 LABOUR AND PRODUCTS

Add the following paragraph 3.8.4:

- 3.8.4 The Contractor is responsible for the safe on-site storage of Products and their protection (including Products supplied by the Owner and other contractors to be installed under the Contract) in such ways as to avoid dangerous conditions or contamination to the Products or other persons or property and in locations at the Place of the Work to the satisfaction of the Owner and the Consultant. The Owner shall provide all relevant information on the Products to be supplied by the Owner.

GC 3.10 SHOP DRAWINGS

Add the words "AND OTHER SUBMITTALS" to the Title after SHOP DRAWINGS in GC 3.10.

Add "and submittals" after the words "Shop Drawings" in paragraphs 3.10.1, 3.10.2, 3.10.4, 3.10.7, 3.10.8, 3.10.8.2, 3.10.9, 3.10.10, 3.10.11 and 3.10.12.

Delete 3.10.3 in its entirety and substitute new paragraph:

- 3.10.3 Prior to the first application for payment, the Contractor and the Consultant shall jointly prepare a schedule of the dates for submission and return of Shop Drawings and any Submittals.

Add the following subparagraph 3.10.6.1:

- 3.10.6.1 The following paragraph shall apply to each shop drawing and submittals reviewed in connection with the project. This review shall not mean that the Consultant approved the detailed design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same. The Contractor is responsible for information that pertains solely to fabricated processes or to techniques of construction and installation, and for coordination of the work of all sub trades.

Delete and insert the words in paragraph 3.10.12

3.10.12 “with reasonable promptness so as to cause no delay in the performance of the Work” and replace with “within ten (10) working days or such longer period as may be reasonably required”

PART 3 EXECUTION OF THE WORK

Add new GC 3.14 as follows:

GC 3.14 CONTRACTOR RESPONSIBILITY FOR WATER TIGHTNESS

GC 3.14.1 The drawings and specifications are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the contractor is in the best position to verify that all construction is completed in a manner which will provide a watertight structure. The contractor has the sole responsibility for ensuring the watertight integrity of the structure.

Add new GC 3.15 as follows:

GC 3.15 PERFORMANCE BY CONTRACTOR

GC 3.15.1 In performing its services and obligations under the Contract, the Contractor shall exercise a standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The Contractor acknowledges and agrees that throughout the Contract, the Contractor’s obligations, duties and responsibilities shall be interpreted in accordance with this standard. The Contractor shall exercise the same standard of due care and diligence in respect of any products, personnel, or procedures which it may recommend to the Owner.

The Contractor further represents, covenants and warrants to the Owner that:

1. The personnel it assigns to the Project are appropriately experienced;
2. It has sufficient staff of qualified and competent personnel to replace its designated supervisor and project manager, subject to the Owner’s approval, in the event of death, incapacity, removal or resignation.

GC 4.1 CASH ALLOWANCES

Delete paragraph 4.1.4 in its entirety and substitute:

4.1.4 Where cost under a cash allowance exceed the amount of the allowances, unexpended amounts from other cash allowances shall be reallocated at the *Consultant's* direction to cover the shortfall.

Delete paragraph 4.1.5 in its entirety and substitute:

4.1.5 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the Contract Price by Change Order.

Delete paragraph 4.1.7 in its entirety and substitute:

4.1.7 At the commencement of the work, the Contractor shall prepare for the review and acceptance of the Owner and the Consultant, a schedule indicating the times, within the construction schedule referred to in GC 3.5, that items call for under cash allowances and items that are specified to be Owner purchased and Contractor installed or hooked up are required at the site to avoid delaying the progress of the Work.

Add new paragraph 4.1.8:

4.1.8 The *Owner* reserves the right to call, or to have the Contractor call, for competitive bids for portions of the Work, to be paid for from cash allowances.

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

Delete section GC 5.1 in its entirety.

GC 5.2 APPLICATION FOR PROGRESS PAYMENT

Add the following at the end of paragraph 5.2.2:

5.2.2 Such applications shall be accompanied by one or more of the following documents: a Statutory Declaration Waiver of Lien or receipt stating that the holdback monies claimed have been paid to the particular party or parties so named or referred to in the Declaration. Form of Statutory Declaration shall meet the approval of the Consultant.

Add the following paragraph 5.2.8:

5.2.8 The reference to payment for products delivered to the place of work in Article 5.2.7 shall not be construed as covering day-to-day financing of the project. Products delivered to the place of work shall be construed to mean major items of equipment or quantities of items that are essential for the expedient conduct of the work.

GC 5.3 PROGRESS PAYMENT

Supplement paragraph 5.3.1 by adding the following:

5.3.1 A holdback percentage of ten (10) percent (%) shall apply to progress payments. The sworn statement by the Contractor for release of holdback monies shall be in the form of a Statutory Declaration meeting the approval of the Consultant. Amounts as certified by the Consultant to rectify deficiency items, or incomplete portions of individual work items, may be retained by the Owner after Substantial Performance has been obtained, pending Total Performance of the work or other authorization for release by the Consultant.

Amend subparagraph 5.3.1.3 as follows:

5.3.1.3 Delete "20" and replace with "30."

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

Add the following paragraph 5.4.4:

5.4.4 Before the Contractor submits his application for Substantial Performance of the Work, all Operations and Maintenance Manual materials shall be submitted in accordance with the Contract Documents. The Certificate of Substantial Performance will not be issued until this requirement is met.

GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

Add the following subparagraphs 5.5.1.3 and 5.5.1.4:

5.5.1.3 Submit a certificate from barrister stating that there are no Builders' Liens filed relating to the Contract Works.

5.5.1.4 Submit a clearance letter from the Workers' Compensation Board.

GC 5.7 FINAL PAYMENT

Add the following subparagraphs 5.7.1.1, 5.7.1.2, 5.7.1.3, 5.7.1.4 and 5.7.1.5:

5.7.1.1 Contractor's application for final payment is considered to be valid when the following have been performed:

1. Work has been completed and inspected for compliance with Contract Documents, and the Consultant is satisfied that all the requirements of the Contract have been fulfilled by the Contractor.
2. Defects have been corrected and deficiencies have been completed.
3. Equipment and systems have been tested, adjusted and balanced and are fully operational, and written reports as outlined in the Contract Documents have been provided to the Consultant.
4. Certificates required by Utility companies, manufacturer's representative and inspectors have been submitted.
5. Spare parts, maintenance materials, warranties and bonds have been provided.

5.7.1.2 If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

5.7.1.3 If in opinion of the Consultant, it is not expedient to correct defective work or Work is not performed in accordance with the requirements of the Contract, the Owner may deduct from Contract Price difference in value between work performed and that called for by Contract Documents, amount of which shall be determined by the Consultant.

5.7.1.4 If, within sixty (60) days after the issue by the Consultant of the Certificate of the Substantial Performance, the Contractor has not corrected all the deficiencies, the Owner will retain sufficient money to cover the cost of completing said deficiencies, as determined by the Consultant, in addition to holding monies retained in accordance with the Contract and subject to the provisions of the Builders' lien legislation of Nova Scotia.

5.7.1.5 Neither the final certificate nor the payment thereunder, nor any provision in the Contract Documents shall relieve the Contractor from responsibility for faulty material or workmanship which shall appear within a period of one (1) year from the date of Substantial Performance of the Work and he shall remedy any defects due thereto and pay for any damage to other Work resulting therefrom which shall appear within such period of one year. The Owner shall give notice of observed defects promptly. This article shall not be deemed to restrict any liability of the Contractor arising out of any law in force in the Province of Nova Scotia.

GC 6.2 CHANGE ORDER

Add the following paragraphs 6.2.3, 6.2.4, 6.2.5, 6.2.5, 6.2.6 and 6.2.7:

- 6.2.3 All contemplated changes in the work shall be issued by the Consultant on a "Contemplated Change Order" form.
- 6.2.4 For lump sum pricing, the Contractor shall, upon receipt of the Contemplated Change Order, submit to the Consultant for approval within seven (7) days, a quotation for changes in the work.
- 6.2.5 Quotation for changes shall be priced in sufficient detail (GC6.6 applies).
- 6.2.6 Consultant shall, within five (5) working days, notify the Contractor whether estimates are accepted by Owner or further information required. Acceptance of Owner shall be indicated by writing, and a signed copy of form (Change Order) returned to Contractor.
- 6.2.7 Contractor shall take reasonable measures to stop work or minimize the work in areas affected by or related to the contemplated changes.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

Add new paragraph 6.4.5:

- 6.4.5 The *Contractor* confirms that, prior to bidding the *Project*, it carefully investigated the Place of the Work and applied to that investigation the degree of care and skill described in paragraph 3.15.1, given the amount of time provided between the issue of the bid documents and the actual closing of bids, the degree of access provided to the Contractor prior to submission of bid, and the sufficiency and completeness of the information provided by the Owner. The Contractor is not entitled to compensation or to an extension of the Contract Time for which could reasonably have been ascertained by the Contractor by such careful investigation undertaken prior to the submission of the bid.

GC 6.5 DELAYS

Delete the period at the end of paragraph 6.5.1 and substitute the following words:

- 6.5.1 “, but excluding any consequential, indirect or special damages.”

Add new paragraph 6.5.6:

6.5.6 If the Contractor is delayed in the performance of the Work by any act or omission of the Contractor or anyone employed or engaged by the Contractor directly or indirectly, or by any cause within the Contractor's control, then the Contract Time shall be extended for such reasonable time as the Consultant may decide in consultation with the Contractor. The Owner shall be reimbursed by the Contractor for all reasonable costs incurred by the Owner as the result of such delay, including all services required by the Owner from the Consultant as a result of such delay by the Contractor and, in particular, the cost of the Consultant's services during the period between the date of Substantial Performance of the Work stated in Article A-1 herein as the same may be extended through the provisions of these General Conditions and any later, actual date of Substantial Performance of the Work achieved by the Contractor.

Add new paragraph 6.5.7:

6.5.7 If the Contractor is delayed in the completion of the Work by any act or neglect of: The School Board, any employee or either any other Contractor employed by The School Board, changes ordered in the Work, strikes, lockouts, fire, unusual delay by common carriers, unavoidable casualties, any other cause of any kind whatsoever beyond the Contractor's control or by any cause within the Contractor's control which the Consultant shall decide as justifying the delay, then the time of completion shall be extended for such reasonable time as the Consultant may decide.

Add new paragraph 6.5.8:

6.5.8 No such extension shall be made for delay occurring more than seven (7) days before claim therefore is made in writing to the Consultant, provided however that in the case of a continuing cause of delay, only one (1) claim shall be necessary.

Add new paragraph 6.5.9:

6.5.9 If no schedule is made, no claim for delay shall be allowed on account of failure to furnish such schedule until two (2) weeks after demand for such schedule and not then unless such claim be reasonable.

Add new paragraph 6.5.10:

6.5.10 The Consultant shall not, except by written notice to the Contractor, stop or delay any part of the main Contract Work pending decisions or proposed changes.

GC6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

Amend paragraph 6.6.5 as follows:

6.6.5 Add the words “as noted in paragraph 6.6.3” after the words “of the claim” and add the words “and the consultant”, at the end.

GC 6.7 VALUATION OF CHANGES

Add the following Header and paragraphs 6.7.1, 6.7.2, 6.7.3 and 6.7.4 in their entirety:

GC 6.7 VALUATION OF CHANGES

6.7.1 The value of any change shall be determined in one or more of the following way as determined by the Consultant:

- (a) By estimate and acceptance in a lump sum, submitted with sub-contractors' and suppliers' signed quotations and breakdown estimates including itemized material and labour lists.
For changes where the individual trade cost is anticipated to be less than \$1000, the requirement for the detailed cost breakdown may be waived, but individual trade quotation must be supplied.
- (b) By unit prices agreed upon or as listed in the contract.
- (c) Cost of work and percentage or by cost and fixed fee.

6.7.2 In cases of additional work to be paid for under method "c", the Contractor shall keep and present in such form as the Consultant may direct, a correct account of the net cost of labour and materials, together with vouchers. In any case, the Consultant shall certify to the amount due to the Contractor including the profit and overhead. Pending final determination of value, payments on account of changes shall be made on the Consultant's certificate.

6.7.3 In determination of method ".1(a) or ".1(c) above, the labour costs to be calculated by the actual estimated hours at an hourly rate determined as follows:

The hourly labour rate to be total payroll costs including hourly wage, statutory contributions to UIC, WCB, CPP, Training Funds, Health Benefits and other applicable labour burdens paid directly by the employer such as vacation pay, holiday pay, pension plan etc.

The School Board reserves the right to verify the payroll cost by independent audit.

To the total payroll cost the following percentage factors will be recognized.

- small tools/expenditures 5% (on payroll costs)
- site supervision 5% (on payroll costs)

(d) In determination of methods ".1(a)" and ".1(c)" above, the material costs to be calculated as follows:

Contractors net costs, including contractor discounts from suppliers, FOB the project site plus applicable taxes.

(e) In determination of methods ".1(a)" and ".1(c)" above, equipment rental costs for major pieces of equipment required will be at local industry rates.

(f) In determination of methods “.1(a)” and “.1(c)” above, overhead and fees shall be calculated as follows:

The cost of any authorized change shall be determined by the net total of labour and material or equipment as outlined in “.3(a)”, “.3(b)” and “.3(c)” above on which the percentage markup shall be determined as follows:

For Extras Up to \$5,000:

Sub- Contractors Own Work	- Overhead & Fee – 15% total
General Contractors Own Work	- Overhead & Fee – 15% total
General Contractors on Sub Contractors work (no percentage markup shall be applied to deductions)	- 10% total

For Extras Above \$5,000:

Sub Contractors Own Work	- Overhead & Fee – 10% total
General Contractors Own Work	- Overhead & Fee – 10% total
General Contractors on sub contractor’s work (no percentage markup shall be applied to deductions)	– 8% total

6.7.4 Submit to the Consultant and The School Boards representative detailed breakdown of the hourly labour rate as defined in paragraph “.3(a)”.

GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

Add the following paragraphs 8.2.9, 8.2.10, 8.2.11, 8.2.12, 8.2.13, 8.2.14, and 8.3:

8.2.9 Within five days of receipt of the notice of arbitration by the responding party under paragraph 8.2.6, the Owner and the Contractor shall give the Consultant a written notice containing:

- a) a copy of the notice of arbitration;
- b) a copy of supplementary conditions 8.2.9 to 8.2.14 of this contract, and;
- c) any claims or issues which the Contractor or the Owner, as the case may be, wishes to raise in relation to the Consultant arising out of the issues in dispute in the arbitration.

8.2.10 The Owner and the Contractor agree that the Consultant may elect, within ten days of receipt of the notice under paragraph 8.2.9, to become a full party to the arbitration under paragraph 8.2.6 if the Consultant:

- a) has a vested or contingent financial interest in the outcome of the arbitration;

- b) gives the notice of election to the Owner and the Contractor before the arbitrator is appointed;
- c) agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.2.6, and;
- d) agrees to be bound by the arbitral award made in the arbitration.

8.2.11 If an election is made under paragraph 8.2.10, the Consultant may participate in the appointment of the arbitrator and, notwithstanding the rules referred to in paragraph 8.2.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the respondent receives a copy of the notice of arbitration.

8.2.12 The arbitrator in the arbitration in which the Consultant has elected under paragraph 8.2.10 to become a full party may:

- a) on application of the Owner or the Contractor, determine whether the Consultant has satisfies the requirements of paragraph 8.2.10, and;
- b) make any procedural order considered necessary to facilitate the addition of the Consultant as a party to the arbitration.

8.2.13 The provisions of paragraph 8.2.9 shall apply mutatis mutandis to written notice to be given by the Consultant to any sub-consultant.

8.2.14 In the event of notice of arbitration given by the Consultant to a sub-consultant, the sub-consultant is not entitled to any election with respect to the proceeding as outlined in 8.2.10, and is deemed to be bound by the arbitration proceeding.

8.3 An application for arbitration shall be accompanied by security in the amount of \$1000 to apply to the cost of arbitration. Any claims of excess costs must be submitted in writing to the Consultant within two weeks of completion or alleged completion of the work. No claims shall be accepted after this date and, also, no claims shall be accepted for disputed work unless the Consultant has been notified as specified.

GC 9.1 PROTECTION OF WORK AND PROPERTY

Delete subparagraph 9.1.1.1 in its entirety and substitute the following new paragraph 9.1.1.1:

9.1.1.1 errors in the Contract Documents which the Contractor could not have discovered applying the standard of care described in paragraph 3.15.1.

Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2:

9.12 Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in the Contract Documents, or that are discoverable by applying to an Inspection of the Place of Work exercising the degree of care and skill described in paragraph 3.15.1.

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

Add in paragraph 9.2.6 after the word “responsible”, the following new words:

9.2.6 Or whether any toxic or hazardous substances or materials already at the Place of Work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the Owner and others,

Add in subparagraph 9.2.7.4:

9.2.7.4 “and the Consultant” after “Contractor”:

Add in paragraph 9.2.8 after the word “responsible”, the following new words:

9.2.8 or that any toxic or hazardous substances or materials already at the Place of the Work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirement, or which threatens, humane health and safety or the environment, or material damage to the property of the Owner or others.

GC 9.5 MOULD

Add in subparagraph 9.5.3.4:

9.5.3.4 “and the Consultant” after “Contractor”

GC 10.1 TAXES AND DUTIES

Add the following paragraph 10.1.3:

10.1.3 The Contractor shall indicate on each application for payment as a separate amount, the appropriate Harmonized Sales Tax the Owner is legally obliged to pay. This amount will be paid to the Contractor in addition to the amount certified for payment under the Contract.

GC 10.2 LAWS, NOTICES, PERMITS AND FEES

Delete from the first line of paragraph 10.2.5 the word, “The” and substitute the words:

10.2.5 “Subject to paragraph 3.15.1, the”

GC 10.4 WORKERS' COMPENSATION

Add the following paragraphs 10.4.3, 10.4.4, and 10.4.5:

10.4.3 The contractor is referred to regulations, as applicable, under the Worker's Compensation Act of Nova Scotia.

10.4.4 Registration with Worker’s Compensation Board shall be continuous during the contract. Should registrations be scheduled to expire during the contract period, the Contractor shall submit a copy of registration renewal one month prior to the expiration of the current certificate.

10.4.5 The Contractor shall furnish evidence of coverage under the Worker’s Compensation Act, R.S.N.S. and a clearance Certificate providing proof of registration with Worker’s Compensation Board prior to commencement of work. (A photocopy of the Contractors registration certificate is acceptable proof). On-going proof of good standing with the Worker’s Compensation Board during the term of the contract is required.

GC 11.1 INSURANCE

Delete sentences and replace with the following in subparagraph 11.1.1.1:

- 11.1.1.1 "General liability insurance shall be maintained from the commencement of the work until one year from the date of Substantial Performance of the Work. Liability coverage shall be provided for completed operations hazards from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, on an ongoing basis for a period of 6 years following the Substantial Performance of the Work" **and replace with:** " General Liability Insurance or Wrap- Up Liability Insurance, (as detailed in the Information to Tenders section under "Insurance Requirements"), shall be maintained from the commencement of the work until final completion and acceptance of the work including the making good of faulty work or materials, except that coverage of completed operations liability shall in any event be maintained for twelve (12) months from date of Substantial Performance of the work as certified from the Consultant, and approved by the Owner".

Add the following subparagraphs 11.1.1.1.1, 11.1.1.1.2, and 11.1.1.2.1:

- 11.1.1.1.1 The general liability insurance to be maintained by the Contractor shall include Commercial General Liability Insurance covering Premises and Operations Liability, elevators, board form property damage, board from automobile, owners and contractors protective, blanket contractual, personal injury, completed operations liability contingent employers liability, cross liability clause, non-owned automobile liability, and a 30 day notice of cancellation clause.
- 11.1.1.1.2 All liability insurance policies shall be written in such terms as will fully protect the Contractor and
The School Board as an additional named insured.
- 11.1.1.2.1 Liability coverage of not less than two million dollars (\$2,000,000) is required with regard to operations of owned automobiles.

Delete subparagraph 11.1.1.4 in its entirety and insert the following subparagraphs:

- 11.1.1.4 Broad Form (All Risks) Builders Risk Coverage - Prior to the commencement of any Work the Contractor shall maintain and pay for Broad Form (All Risks) Builders Risk Coverage in the joint names of The School Board and the Contractor totalling not less than one hundred percent (100%) of the total value of the Work done and materials delivered on the site (contract value), so that any loss under such policies of insurance will be payable to The School Board and the Contractor as their respective interests appear. The Builders

Risk Insurance shall include all materials related to the work while in transit or at other locations.

- 11.1.1.4.1 Should a loss be sustained under the Builders Risk Coverage, the Contractor shall act on behalf of The School Board and Contractor for the purpose of adjusting the amount of such loss with the insurance companies. As soon as such adjustment has been satisfactorily completed, the Contractor shall proceed to repair the damage and complete the Work and shall be entitled to receive from The School Board in addition to any sum due under the Contract, the amount at which The School Board interest has been appraised in the adjustment made with the insurance companies as referred to above, said amount to be paid to the Contractor as the Work of restoration proceeds. Any loss or damage which may occur shall not affect the rights and obligations of either party under the Contract except as aforesaid and except that the Contractor shall be entitled to a reasonable extension of time for the performance of the Work, as The School Board may decide.
- 11.1.1.4.2 Upon approval by The School Board of the Substantial Performance certificate issued by the Consultant, the Contractor's obligation to maintain Builder Risk Insurance shall cease and The School Board shall assume full responsibility for insuring the whole of the Work against loss or damage.
- 11.1.1.4.3 "Broad form" property insurance in the joint names of the *Contractor*, the *Owner* and the *Consultant*. The policy shall include as insureds all *Subcontractors* The Broad form" property insurance shall be provided from the date of commencement of the *Work* until the earliest of:
- 11.1.4.3.1 Ten (10) Calendar days after the date of *Substantial Performance of the Work*;
 - 11.1.4.3.2 on the commencement of use or occupancy of any part or section of the *Work* unless such use or occupancy is for construction purposes, habitational, office, banking, convenience store under 465 square meter in area, or parking purposes, or for the installation, testing and commissioning or equipment forming part of the *Work*; and
 - 11.1.4.3.3 when left unattended for more than thirty (30) consecutive calendar days or when construction activity has ceased for more than thirty (30) consecutive calendar days.

Paragraph 11.1.2 is clarified as follows:

11.1.2 Submit Certified true copies of each insurance policy to the Owner's Contract Authority within seven (7) working days after notification of award or in any event prior to payment of the first progress claim. Such copies shall be exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. Prior to the commencement of any work, the Contractor shall file with the Owner a certified copy of each insurance policy and certificate required.

Delete 11.1.5 in its entirety and replace with the following:

11.1.5 Insurance contracts shall be procured from and the premiums paid to a resident agent of an insurance Company licensed to underwrite insurance in the Province of Nova Scotia.

Add the following paragraph 11.1.9:

11.1.9 All of the insurance policies shall contain a clause stating that no change in terms and conditions or cancellation may at any time be made without the full knowledge and consent of the owner.

GC 11.2 CONTRACT SECURITY

Add the following subparagraph 11.2.2.1:

11.2.2.1 "Bonds shall be procured from a Nova Scotia resident agent of an insurance company licensed to do business in Nova Scotia and shall be maintained in good standing and held by the Owner until one (1) year after Substantial Performance of the Work.

Add the following paragraph 11.2.3:

11.2.3 If a Certified Cheque is held as contract security it shall be in an amount equal to ten (10) percent (%) of the Contract Price. Supplement the Certified Cheque as necessary to maintain the amount equal to ten (10) percent (%) of the total amount payable (Contract Price plus HST).

- .1 The Certified Cheque will be deposited at the chartered bank holding The School Board deposits.
- .2 The School Board will return the cheque amount to the Contractor upon satisfactory completion of the contract and duration as specified in the Tender documents.
- .3 Should Contractor default, total amount payable under the Certified Cheque will be the face value of the cheque plus all accrued interest.

- .4 Payment for completion of work, due to failure of performance of the Contractor, shall include all reasonable obligations under the Contract, including architectural and engineering costs arising because of the default of the Contractor.
- .5 Payment for labour and materials shall be limited to those who have a direct contract with the Contractor for the provision of labour and/or material (which includes equipment rental).

GC 12.3 INDEMNIFICATION

Add the following paragraph 12.1.1.3:

- 12.1.1.3 The Contractor shall indemnify and hold harmless the Consultant, its agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceeding by third parties that arise out of, or are attributable to, the Contractor's performance of the Contract, provided such claims are attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable, and made in writing within a period of six (6) years from the date of Substantial Performance of the Work, or within such shorter such period as may be prescribed by any limitation statute or the province or territory of the Place of Work.

GC 12.3 WARRANTY

Delete from the first line the word, "The" and substitute the words in paragraph 12.3.2:

12.3.2 "Subject to paragraph 3.15.1, the..."

Add the following paragraph 12.3.7:

- 12.3.7 Warranty repairs or replacements which arise during warranty period which affect the operation of the system shall be attended to immediately upon notification from the Consultant.

END OF SECTION 00 73 00

SECTION 00 73 10 - HRSB GENERAL TERMS & CONDITIONS

1. General

- 1.1. These Terms and Conditions, shall apply only to those documents (Quotations, Request for Proposals and Tenders, herein referred to as Public RFX or RFX) that reference them specifically. In the event of any conflict or disagreement between these Terms and Conditions and the RFX documents, the RFX documents have precedence and will be assumed to be correct.
- 1.2. These Terms and Conditions are intended to cover a wide range of procurements, including goods and services. As such, not all clauses will be applicable in all situations. If Suppliers have questions regarding any of these Terms and Conditions, they should contact the Halifax Regional School Board (HRSB) Procurement Division. To satisfy special requirements, supplementary Terms and Conditions may also apply to some acquisitions. If this is the case, the RFX documents will reference any such documents, in addition to these Terms and Conditions.
- 1.3. For the purpose of these Terms and Conditions HRSB intends to only contract with responsible Suppliers who are in the business of providing the goods and/or services submitted upon, and can provide proof that they can furnish satisfactory performance based on past work experience with HRSB, other companies, or government agencies and have the financial managerial, and resource capabilities for the size of project bid upon. Satisfactory performance includes meeting all of the requirements of the various federal and provincial regulations and agencies for the completion of work and making payment to sub-contractors in a timely basis.
- 1.4. All of the terms, conditions and/or specifications stated or referenced in the Solicitation are assumed to be accepted by the Bidder and incorporated in the Bid.

2. RFX Documents

- 2.1. RFX Documents should be obtained as indicated on the Cover Sheet of the tender document.
- 2.2. While HRSB has tried to ensure accuracy in the RFX documents, it is not guaranteed or warranted by HRSB to be accurate, nor is it necessarily comprehensive or exhaustive.
- 2.3. HRSB cannot ensure the accuracy of RFX documents obtained from any other source. (i.e. Construction Association of Nova Scotia (CANS), Nova Scotia Electronic Tendering Bulletin Board, Project Consultants, etc.).
- 2.4. All inquiries to this RFX are to be directed, in writing, to HRSB Procurement Division representative indicated in the RFX documents. Information obtained from any other source is not official and will not bind HRSB.
- 2.5. HRSB will assume that all Suppliers have resolved any questions they might have about the RFX and have informed themselves as to existing conditions and limitations, site restrictions, etc. before providing a RFX submission.
- 2.6. Nothing in the RFX is intended to relieve Suppliers from forming their own opinions and conclusions with respect to the matters addressed in the RFX or its associated documents.
- 2.7. In the event that HRSB Regional Office (33 Spectacle Lake Drive, Dartmouth) is closed (this includes partial day closures) due to inclement weather on the date and time of the RFX closing, the closing date and time will be extended one (1) business day. Bidders should note that closure of Schools does not necessarily mean the closure of the Board's Regional Office. Closures are detailed on HRSB website.

- 3. Verbal instructions:** Any changes to RFX call, specifications, terms and conditions shall be stated in writing. Verbal statements made by employees or representatives of HRSB, whether or not they appear to have the proper authority, shall not be binding on HRSB.

- 4. Addenda:** HRSB reserves the right to modify the terms of the RFX documents prior to closing, at its sole discretion by addenda.

- 4.1. HRSB Procurement Division will make every effort to ensure the information provided on HRSB.ca is complete and accurate, please report any omissions or discrepancies to the Procurement Division immediately. **Any**

questions or requests for clarification arising from omissions, discrepancies, or ambiguities, must be made in writing no later than five(5) working days prior to the closing date, not including the closing date. Replies to requests for clarification, if required, will be made in the form of written addenda, copies of which will be posted on www.HRSB.ca/tender no later than three (3) working days prior to the date of closing, not including the closing date.

4.2. By downloading files from the www.hrsb.ca, you will automatically become registered for the applicable RFX. HRSB Procurement Division will make reasonable efforts, strictly as a courtesy, to directly inform registered Suppliers of any addenda, however it is the sole responsibility of each registered Supplier to ensure that they have all the documents associated with any RFX and, to this end, every registered Supplier should review HRSB Tender Web Site daily. These documents must be downloaded from the www.hrsb.ca/tender or obtained from HRSB Procurement Division, as applicable. Suppliers must acknowledge receipt of all addenda(s) with their RFX Submission.

5. **Suppliers Responsibility:** Suppliers are solely responsible for their own expenses in preparing, delivering or presenting a RFX and for subsequent negotiations, if any, with HRSB. It will be the responsibility of the Supplier to acquire at the Suppliers cost, any RFX documents as indicated on the Cover Sheet of the tender document.

6. **Existing Conditions:** Suppliers will be deemed to have familiarized themselves with the existing conditions which may affect the performance of required goods, services and construction. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time. Suppliers are to ensure that they understand the expected use for the requested goods, service and construction and submit their RFX submission accordingly.

7. **RFX Submissions**

7.1. RFX will close at the time, date and location specified in the RFX documents (Atlantic Time Zone).

7.2. All RFX submissions must be received in their entirety on or before the closing time specified. Suppliers are responsible for ensuring that their RFX submission, however submitted, is received on time and at the location specified.

7.3. RFX Submissions must be submitted on the forms provided or in such format as directed in the RFX documents. These forms must be legible, complete, filled out in ink, or by typewriter, with the signature in longhand and the completed form shall be without interlineations, alterations or erasures.

7.4. If an electronic transmission (i.e. Facsimile, e-mail or HRSB.ca upload) can be accepted, as detailed in the applicable RFX documents, it is the responsibility of the Supplier:

7.4.1. to ensure that the submissions are delivered on or before the closing time and date shown on the RFX documents;

7.4.2. that the correspondence is legible and properly transmitted; and

7.4.3. that the name and number of the RFX is clearly displayed.

7.5. Electronic transmission of a RFX submission cannot be used where original documents are required, e.g. bid bonds, certified cheques, samples, etc., or as may be otherwise stated in the RFX documents.

7.6. **Sealed RFX submissions** must be delivered to HRSB Receptionist, 1st floor, 33 Spectacle Lake Drive, Dartmouth, Nova Scotia, on or before the closing time and date shown on the RFX documents. The RFX Submission is to be submitted on the provided forms, signed (together with the required RFX security as applicable) in a sealed opaque envelope, clearly identified with Suppliers name, RFX identification number and name, and closing date on the outside of the envelope. RFX Submissions are date and time stamped upon receipt at the Procurement Division (not at any other location) by the Procurement date time stamp. Any submission received after the closing date and time shown on the RFX documents will not be accepted and will be returned to the Supplier unopened and deemed non-compliant.

7.7. Facsimile submissions received are date and time stamped by the Procurement Division Facsimile, no other time stamp will be considered. A facsimile submission received after the closing date and time shown on the RFX documents will not be accepted and shall be deemed non-compliant. **The facsimile number for the Procurement Department of HRSB is (902) 464-0161. Do not send RFX correspondence to any other fax number.**

7.7.1. Where specified, facsimile submissions are accepted for the convenience of the Supplier; HRSB cannot ensure the confidentiality or error-free receipt of facsimile submissions.

7.8. Amendments/Withdrawn Submissions

7.8.1. Submissions may be withdrawn or amended by written request (on company letterhead or equivalent), prior to RFX closing date and time, but cannot be altered or changed in any way after the RFX closing.

7.8.2. Facsimile transmissions modifying supplier provided information are acceptable when signed by a duly authorized officer or agent. Submission of such electronic transmissions is at the risk of the Supplier. HRSB assumes no liability for the receipt of the electronic transmissions or their proper inclusion with original RFX submission. An electronic submission must be submitted prior to closing time and date specified in the RFX documents.

7.8.3. An amendment to a RFX submission replaces any other RFX submission amendment previously submitted by the supplier; only the last of any RFX submission amendment received will be accepted.

7.9. All RFX submissions must be signed by an authorized representative of the entity.

7.10. HRSB's time clocks will be assumed to be correct in the event of dispute.

7.11. HRSB reserves the right in its sole discretion to clarify any RFX submission after closing by seeking further information from that Supplier, without becoming obligated to clarify or seek further information from any or all other Supplier. However, Suppliers are cautioned that any clarifications sought will not be an opportunity either to correct errors or change their Bids in any substantive manner.

8. Brand Name: Some terminology may be used that would imply or denote a particular supplier. Brand names may be utilized to designate the type and quality of the product requested. Such usage shall not to be construed as restrictive in any way. Suppliers must be prepared to provide samples if required.

9. Substitute

9.1. If the Supplier is offering an equivalent (similar) substitute product to those specified, unless a specific product is requested, the supplier must clearly identify this substitution and supply the manufacturer's name, product number and provide any technical information required so that HRSB can determine the acceptability of the substitute.

9.2. HRSB reserves the right to inspect or test any product bid to determine equivalency, and may require demonstrator or sample items in order to be able to evaluate the items proposed.

9.3. HRSB shall be the sole judge of the acceptability of any substitute or proposed equivalent.

9.4. Specifications may, for technical or logistical reasons, require that the items specified be supplied without substitution.

10. Warranty

- 10.1.** The supplier must describe the duration, type (e.g. on-site, depot, ship-in or carry-in) and terms of the manufacturer's warranty on all goods. If the supplier provides any additional/supplementary warranty coverage, describe this as well.
- 10.2.** If warranties can be upgraded or extended, identify the upgrade costs separately. Do not include warranty upgrade or extension costs in the price unless the RFX documents specifically states that the upgrade is a mandatory requirement.

11. Pricing

- 11.1.** All prices must be extended and totaled, where practical to do so. RFX Submission may be rejected as incomplete if total figures are not provided. In the case of an error in the extension of prices, the unit prices shall prevail.
- 11.2.** Prices must be in Canadian funds, and shall include all shipping, handling, freight, offloading, duty, insurance and any other charges, which are applicable at time RFX is awarded (FOB – Destination). HRSB will not assume responsibility for any goods or services until they have been delivered to the destination(s) specified in the Solicitation. It is the responsibility of the Supplier to find out from the appropriate authorities what rates and charges are applicable to this RFX. No extra charges will be paid by HRSB.
- 11.3.** In the event that a number of Suppliers provide submission in substantially the same amount, HRSB may, at its discretion, call upon those Suppliers to submit further bids.

12. Permits and Taxes: It is the responsibility of the Supplier to ensure that quotations include all taxes, permits, and other charges required to supply the goods, services and construction. The successful Supplier is to comply with all codes, regulations, and by-laws and all government and applicable standards pertaining to the work and job-site including, and not limited to, the Nova Scotia Occupational Health and Safety Act and Regulations. HRSB is required to pay a Harmonized Sales Tax (HST) at a rate specified by the Province of Nova Scotia. This tax is to be shown as a separate line item.

13. Standards

- 13.1.** All goods, services and construction supplied to HRSB shall, when standards are available, be certified in accordance with the applicable code(s), but not limited to:
 - 13.1.1. Canadian Standards Association;
 - 13.1.2. Canadian Government Standards HRSB;
 - 13.1.3. Underwriters Laboratories of Canada; and
 - 13.1.4. And all applicable Federal, Provincial and Municipal regulations and acts.
- 13.2.** HRSB reserves the right to discontinue the purchase of any product/service that does not continue to meet the applicable standard(s).

14. Inspection: HRSB reserves the right to inspect any goods, services or construction supplied either during or after manufacture and delivery, and shall be the sole judge as to the acceptability of goods, services and construction to meet the needs of HRSB and fulfills the requirements as specified.

15. Rejection of RFX Submissions/Compliance:

- 15.1.** Failure to comply with any of the mandatory terms or conditions contained or referenced in the RFX documents shall result in the rejection of the RFX submission.
- 15.2.** HRSB specifically reserves the right to accept or reject any or all RFX submission and implies no obligation on HRSB to accept any RFX submission, a portion of any RFX submission or any RFX submission. HRSB reserves the right to cancel any RFX in its entirety and shall not be responsible, in any manner, for expenses incurred by the

Supplier for preparing a RFX submission. HRSB may award all or a portion of the work to one or more Suppliers. Without limiting the generality or any other provision hereof, HRSB reserves the right to reject or accept any RFX submission:

- 15.2.1. that contains any irregularity or informality;
- 15.2.2. that is not accompanied by the security documents required;
- 15.2.3. that contains an alteration in the quoted price that is not initialed by the or on behalf of the Supplier;
- 15.2.4. that is incomplete or ambiguous;
- 15.2.5. contains clauses additional to the RFX that are "qualified" or "conditional"; and/or
- 15.2.6. that does not strictly comply with the requirements contained in these instructions.

15.3. HRSB reserves the right to waive minor non-compliance where such non-compliance is not of a material nature in its sole and absolute discretion, or to accept or reject in whole or in part any or all RFX submissions, with or without giving notice. Such minor non-compliance will be deemed substantial compliance and capable of acceptance. HRSB will be the sole judge of whether a RFX submission is accepted or rejected.

15.4. HRSB reserves the right to accept or reject any or all RFX submission, not necessarily accept the lowest priced RFX submission, or to accept any RFX submission which it may consider to be in its best interest.

16. Evaluation criteria: If applicable, award of the RFX will be based on "Best Value" (which includes, but not limited to; price, discounts, product specifications, warranty, delivery, reference checks, etc.

17. Cancellation/no award

17.1. Issuing a RFX implies no obligation on HRSB to accept any submission, or a portion of any submission. The lowest or any RFX submission will not necessarily be accepted.

17.2. RFX's may be cancelled in whole or in part by HRSB in its sole discretion when:

- 17.2.1. the RFX submission price exceeds the funds allocated for the purchase;
- 17.2.2. there has been a substantial change in the requirements after the RFX has been issued;
- 17.2.3. information has been received by the RFX after the RFX has been issued that the RFX believes has substantially altered the procurement;
- 17.2.4. there was insufficient competition in order to provide the level of service, quality of goods or pricing required.

17.3. If no compliant RFX submission is received in response to a RFX, the RFX reserves the right to enter into negotiations with one or more suppliers in order to complete the procurement.

17.4. HRSB will be the sole judge of whether there is sufficient justification to cancel any RFX.

17.5. No action or liability will lie or reside against HRSB in its exercise of its rights under this section.

18. Eligibility and Conflict of Interest

18.1. A RFX Submission may not be eligible for acceptance if current or past corporate or other interests of the Bidder may, in HRSB's opinion, give rise to a conflict of interest in connection with a project.

18.2. Suppliers are cautioned that acceptance of their RFX submission may preclude them from submitting a response on subsequent phases where a conflict of interest may arise. Suppliers should study the project implementation strategy to determine whether or not they plan to submit response on subsequent phases.

18.3. If the RFX submission covers the first phase of what may prove to be a multi-phased project, the successful Supplier on the initial phase may be permitted to respond on subsequent phases as long as, in HRSB's opinion, no conflict of interest would be created in performance of the work by that Supplier.

18.4. Sub-contracting to any firm or individual whose current or past corporate or other interests may, in HRSB's opinion, give rise to a conflict of interest in connection with this bid will not be permitted. This includes, but is not limited to, any firm or individual involved in the preparation of the RFX documents.

- 19. Disputes:** In case of dispute as to whether or not an item or service quoted or delivered meets RFX requirements, the decision of HRSB, or its authorized representative, shall be final and binding on all parties.
- 20. Exceptions:** A RFX submission shall be considered an agreement to all terms and conditions provided herein and in various RFX documents, unless specifically noted otherwise in the RFX documents.
- 21. Irrevocable Offer:** A RFX submission represents an irrevocable offer, unless otherwise stated in the RFX documents and shall be valid for a period of ninety (90) days following the closing date for RFX submissions.
- 22. Patent right and royalties:** The successful Supplier shall pay all royalties and patent license fees required for the performance of the work. The successful Supplier shall hold HRSB harmless from and against claims, demands, losses, costs, damages, action suits or proceedings arising out of the successful Supplier's performance of the Contract which are attributable to an infringement or an alleged infringement of a patent of invention by the successful Supplier or anyone for whose acts the successful Supplier may be liable.
- 23. Assignment:** The successful Supplier shall not assign the Contract (or portion thereof) nor sub-contract without the prior written consent of HRSB, consent shall not be unreasonably withheld.
- 24. Purchase Order:** Work by the Supplier will begin only with the issuance of HRSB's official purchase order and/or any Contract Documents as applicable. The purchase order number must appear on any/all invoices covering same. No work is authorized until the successful Supplier has received an official HRSB purchase order and/or required Contract Documents. HRSB accepts no responsibility for any work performed prior to the issuance of a purchase order and/or required Contract Documents.
- 25. Delivery**
- 25.1.** Where the RFX Document includes a mandatory delivery schedule, HRSB will assume that the Supplier can meet the requested schedule and is satisfied that the goods or services required will be available for delivery on the requested date(s).
- 25.2.** If Suppliers wish to specify a delivery schedule different from that requested in the RFX document, they must provide specific delivery dates or a schedule in calendar days from the date a Purchase Order is issued. RFX Submission that do not meet the delivery schedule as requested in the RFX documents may be rejected.
- 25.3.** Time is of the essence, and supplier's delivery schedule is legally binding. HRSB reserves the right to assess penalties or cancel awards to Suppliers who fail to meet their stated delivery or completion dates.
- 26. Invoices**
- 26.1.** All invoices are to be submitted quoting the Purchase Order number (as applicable). The H.S.T. number must be shown on each invoice. Invoices must include a description of the goods, services and construction provided with HRSB Work Order Numbers (where applicable). Invoices must also clearly indicate list price, discounts offered and net price, if applicable. All invoices are to be forwarded to:
- Halifax Regional School Board
33 Spectacle Lake Drive
Dartmouth, NS, B3B 1X7
Attn: Accounts Payable**
- 26.2.** All Suppliers are required to maintain their tax status in good standing. In this regard, Suppliers are advised that verification of good standing with the Nova Scotia Minister of Finance and Revenue Canada (GST/HST) may be carried out prior to the award of a contract to a successful Supplier.

26.3. In order to maximize efficiencies, as well as to be more environmentally friendly, vendor payments are now being paid via EFT (Electronic Funds Transfer) direct deposit to vendor bank accounts. A vendor direct deposit form must be filled out with banking information for EFT payments.

27. Payment:

27.1. HRSB's normal payment terms are thirty (30) days from acceptance that the goods, services and construction meet the specifications. Alternative payment schedules may be proposed and are to be shown as an option and list any additional discounts to HRSB. Early payment discount terms (minimum period ten (10) days) may be considered in the evaluation of the RFX response. Payment of term discount invoices will be calculated from the date of the invoice or goods have been received, whichever is later. Discount terms must appear on the invoice.

27.2. The Supplier shall make application for payment at least monthly with the application based on progress or services provided during that month. HRSB will hold back ten percent (10%) of any payment until the lien periods have expired and the Supplier has provided HRSB with a complete release of any lien registered as a result of any work carried out by the Supplier, or any sub-contractor or supplier to the Supplier.

28. Right to offset: The successful Supplier agrees that HRSB may apply payments for goods, services and construction to any amount owing to HRSB by the Supplier or supplier including any related administration fees.

29. Confidentiality: The Supplier shall keep private, treat as being confidential, and not make public or divulge during, as well as after, the term on this Agreement, any information or material to which the Supplier or staff becomes privy as a result of acting under this Agreement without having first obtained HRSB's consent in writing.

30. Freedom of Information and Protection of Privacy (FOIPOP) Act and Personal Information International Disclosure Protection Act (PIIDPA)

30.1. As a public body, HRSB is subject to provincial legislation, Freedom of Information and Protection of Privacy (FOIPOP) Act. RFX submissions and associated documents are subject to disclosure and protection under this legislation. In the event an application for disclosure of information is made under FOIPOP, HRSB is subject to the disclosure and protection of information in accordance with that legislation. Suppliers are recommended to visit the following websites for more information on the Act: <http://www.gov.ns.ca/just/IAP/default.asp> and <http://www.foipop.ns.ca/>

30.2. The Province of Nova Scotia is required to comply with the Personal Information International Disclosure Protection Act (PIIDPA)(S.N.S 2006, c.3). The act creates obligations for the Province of Nova Scotia and its service providers when personal information is collected, used or disclosed. Requirements include limiting storage, access and disclosure of personal information to Canada, except as necessary or otherwise required by law. Suppliers are recommended to visit the following PIIDPA websites for more information on the Act: http://nslegislature.ca/legc/bills/60th_1st/3rd_read/b019.htm and <http://www.gov.ns.ca/just/IAP/PIIDPAquest.asp#p01>

30.3. The Supplier acknowledges and confirms that it is a "service provider" as defined in the Personal Information International Disclosure Protection Act, SNS 2006 c. 3 ("PIIDPA"), that the Supplier has read and understands its obligations as a service provider thereunder and that as a service provider It is legally bound by the obligations imposed on it by PIIDPA. It is a condition precedent to HRSB entering into the Agreement with the Supplier that the Supplier irrevocably undertakes covenants and agrees to be bound by and comply with the obligations imposed on it as a service provider under PIIDPA.

30.4. The Supplier further covenants, warranty and represents to HRSB that it will not at any time provide or allow the release of personal information to which it has access in its capacity as a service provider to HRSB in response to any "foreign demand for disclosure" or permit or allow the "unauthorized disclosure of personal information" as each of those terms are defined in PIIDPA.

- 30.5.** The Supplier shall implement and strictly enforce security arrangements that will ensure that all personal information that it collects or uses on behalf of HRSB is protected at all times from unauthorized access or disclosure and shall confirm in writing to HRSB, upon request, the details of such security arrangement. The Supplier also agrees to implement and enforce any additional security procedures as may be required by HRSB from time to time to protect the personal information that the Supplier collects on behalf of HRSB. HRSB shall be authorized, upon giving prior written notice to the Supplier, to enter the premises of the Supplier during normal business hours for the purpose of conducting an audit of the security arrangement referenced herein.
- 30.6.** All personal information that the Supplier obtains or becomes aware of while providing services to HRSB is not and shall not be or be deemed to be the property of the Supplier. The Supplier acknowledges and agrees that it will not, either directly or indirectly, acquire any rights to use or own any such information other than the right to use it for the sole purpose of fulfilling its obligations to HRSB under the Agreement.
- 30.7.** All RFX submissions become the property of HRSB. By providing a RFX submission, the supplier hereby grants HRSB a license to distribute, copy, print or translate the RFX submission for the purposes of the RFX. Any attempt to limit HRSB's right in this area may result in rejection of the RFX submission.
- 30.8.** Suppliers RFX submission may be subject to disclosure under the Province's "freedom of information" legislation. By submitting a RFX submission, the Supplier agrees to the appropriate disclosure of the information supplied, subject to the provisions of the governing law. HRSB cannot guarantee the confidentiality of the complete content of any RFX submissions after the procurement has been awarded to the successful supplier.
- 30.9.** During the delivery and installation of goods and/or services, the supplier or supplier's staff may have access to confidential information belonging to HRSB. Should this occur, the supplier must ensure that such information is not released to any third parties or unauthorized individuals; failure to comply may result in legal action being taken and/or the supplier's disqualification from any further RFX's issued by HRSB.
- 31. Indemnification:** The Supplier shall indemnify and hold harmless HRSB, their agents, representatives and employees from and against all claims, demands, losses, costs, damages, actions, suits or proceedings arising out of, or resulting from the performance of this work, provided that any such claim is caused in whole or in part by the negligent act or omission of the Supplier, and sub-contractor, supplier, licensee, anyone directly or indirectly employed by any one of them or anyone for whose act any of them is liable, regardless of whether or not it is cause in part by a party indemnified hereunder.
- 32. Insurance:** Unless otherwise stated, Commercial General Liability Insurance with policy limits of not less than two (2) million dollars (\$2,000,000.00) must be filed with the Procurement Department of HRSB; such insurance shall be in the name of the Supplier and HRSB. The insurance must include non-owned automobile liability with policy limits of not less than two (2) million dollars (\$2,000,000.00). All insurances are to be maintained in good standing for the duration of the Contract.
- 33. Termination for convenience:** HRSB may terminate a contract, in whole or part, whenever HRSB determined that such termination is in the best interest of HRSB, without just cause giving sixty (60) days written notice to the proponent. However, in no event shall the proponent be paid an amount that exceeds the submitted price for the work performed.
- 34. Termination for default:** When the proponent has not performed or has unsatisfactorily performed the contract, HRSB may terminate the contract for default. Upon termination for default, outstanding payment will be withheld at the discretion of HRSB. Failure on the part of the proponent to fulfill the contract obligations shall be considered just cause for termination of the contract. The proponent will be paid for work satisfactorily performed prior to termination, less any excess costs incurred by HRSB in re-procuring and completing the work.
- 35. Workers Compensation:** Prior to commencing the work, the Supplier shall provide a current clearance letter from the Workmen's Compensation HRSB (WCB) and must maintain this coverage during the whole term of the Contract.

- 36. WHMIS:** All controlled products supplies to HRSB must have approved Workplace Hazardous Materials Information System (WHMIS) supplier labels; Material Safety Data Sheets must also be supplied. Failure to comply with this requirement may result in rejection of any shipment, and may result in cancellation of the order and the return of goods to the supplier at the supplier's expense.
- 37. Health and Safety Act:** The Supplier shall take every precaution to ensure that every employee, self-employed person and employer performing work in respect of the project complies with the latest revisions of the Nova Scotia Occupational Health and Safety Act and the Regulations. Halifax Regional School HRSB Occupational Health and Safety Policy BP 303.1, and all other safety measures as required by authorities having jurisdiction.
- 38. Site Safety Plan:** Before being permitted access to the site to commence construction the Supplier may be requested provide HRSB with a written Project Specific Site Safety Plan. The Site Safety Plan provided shall be a written course of action that, through a pre-job evaluation, identifies and sets out specific actions to be taken to eliminate or control hazards associated with the work to be performed and to also deal with concerns or hazards that may develop during the course of the project. This Plan shall include, but not be limited to, identification of safety hazards anticipated during the project, solutions to those hazards, safety procedures, identification of designated safety officers and provision for safe access to the site for HRSB staff and or Consultants. Receipt and acceptance of the safety plan shall be mandatory prior to commencement of work.
- 39. Extension to the Broader Public Sector**
- 39.1.** HRSB may choose to allow the Broader Public Sector to purchase goods or services from some RFX's. The Broader Public Sector are generally permitted to purchase from "Standing Offers", which are contracts resulting from a RFX. Other RFXs may also be available to the Broader Public Sector; if so, the Solicitation documents will state this.
- 39.2.** By submitting a response to a RFX, the Supplier agrees to extend the same pricing to other eligible Broader Public Sector institutions as per the terms and specifications in the Solicitation
- 40. Governing Laws and Trade Agreements**
- 40.1.** Unless the RFX documents specifically state otherwise, the RFX, all submissions, and any subsequent contracts will be construed and interpreted in accordance with the laws of the Province in which the Solicitation was issued.
- 40.2.** RFX's subject to the Atlantic Procurement Agreement, the Agreement on Internal Trade, any other inter-provincial trade agreements, or any international trade agreements, will be specifically identified as such in the public notice and/or the Solicitation documents.
- 40.3.** Information of any applicable trade or procurement agreements and/or legislation can be obtained by contacting HRSB Procurement Department.
- 40.4.** Suppliers agree to comply with all applicable laws, regulations and standards, including all labour, occupational health & safety, and worker compensation requirements of the Province.
- 40.5.** HRSB may consider and evaluate any RFX submission from other jurisdictions on the same basis that the purchasing authorities in those jurisdictions would treat a similar RFX submission from a supplier located in this Province. HRSB will be the sole judge of whether these conditions will be used and the extent to which they will be applied.
- 40.6.** Suppliers registered to do business in any Atlantic Province can bid on RFX issued by any other Atlantic Province without having to satisfy any local registration or residency requirements.
- 40.7.** Under Canadian law (and international agreements), your RFX submission must be arrived at separately and independently, without conspiracy, collusion or fraud; see:
<http://www.competitionbureau.gc.ca/internet/index.cfm?itemid=1243&lg=e> for further information.

41. Other General Conditions

- 41.1.** No RFX submissions shall be accepted from any person or corporation who, or which, has a claim or has instituted a legal proceeding against HRSB or against whom HRSB has a claim or has instituted a legal proceeding with respect to a previous contract, without prior approval of HRSB.
- 41.2.** The Supplier shall perform the obligations of this Contract in a good and workmanlike manner in compliance with all applicable legislation in effect in Nova Scotia, and in accordance with industry standards and practice.
- 41.3.** The Supplier shall be solely responsible for all means, methods, techniques and procedures necessary for performing the work required under this Contract.
- 41.4.** All Suppliers must comply with the Nova Scotia Corporations Registration Act (CRA) or the Partnerships and Business Names Registration Act (PBNRA) as one of the conditions of doing business with the Province of Nova Scotia. In this regard, Suppliers are advised that verification of registration and good standing may be carried out prior to the final award of a contract to a successful Supplier. Suppliers residing outside Nova Scotia (which are not otherwise carrying on business in Nova Scotia) are expected to be registered in an equivalent manner in their respective jurisdictions.
- 41.5.** Unless otherwise specified, all materials installed by the Supplier as part of this Contract shall be new and shall comply with the specifications and any applicable building codes. The Supplier is, at all times, responsible for correcting any defective work or materials at the Supplier's cost, and payment by HRSB to the Supplier does not relieve the Supplier of that responsibility.
- 41.6.** Where applicable, the end user must be provided with complete operation manuals, warranty registration forms, user licenses/ authentications and/or other associated documentation normally provided by the manufacturer, reseller, installer and/or consultant.
- 41.7.** The Supplier shall, at all times, keep HRSB premises free from accumulations of waste and rubbish. Disposal of all waste and rubbish shall be at approved waste disposal sites.
- 41.8.** If the Supplier files for bankruptcy, becomes insolvent or fails to perform the Supplier's obligations under this Contract in a timely and workmanlike manner, HRSB may, by written notice, immediately terminate the employment of the Supplier and the Supplier shall be entitled only to the value of work performed and materials supplied up to the date of the termination.
- 41.9.** The Supplier shall not permit smoking by any of its employees or sub-contractors on HRSB property and will act in accordance to the Halifax Regional School HRSB policy BP101.3 Tobacco-Free Schools and Workplaces.
- 41.10.** The Supplier warrants its work and materials for a minimum of twelve (12) months after the date of substantial completion.
- 41.11.** The Supplier, if performing work on HRSB property may be required to provide a safety program certified with the Nova Scotia Construction Safety Association or with an approved alternate safety association and/or program.
- 41.12.** HRSB reserves the right to split an award amongst Suppliers as deemed in the best interests of HRSB.

END OF SECTION 00 73 10

SECTION 01 11 00 - HRSB SUMMARY OF WORK

1. Project Location & General Scope

1.1. TANTALLON ELEMENTARY, 3 FRENCH VILLAGE STATION RD

1.2. Scope: Refer to Section 00 00 15 for scope and schedule information.

2. Contract Documents

2.1. Work will be performed under CCDC-2, 2008 contract.

3. General Conditions

3.1. Halifax Regional School Board and CCDC-2, 2008, form an integral part of this Project Manual, a copy of which is bound herein.

4. Project Manual

4.1. Sections of the Project Manual are numbered in conformance with the Master List of Section Titles and Numbers, CSC Document 004E, published jointly by Construction Specifications Canada and The Construction Specifications Institute (USA). Sections are arranged in their standard format.

4.2. Sections are written as units of the Work which have been assigned numbers in conformance with the CSC/CSI system. They are arranged in sequence for this Manual. Gaps in the order of numerical sequence do not indicate that a section has been inadvertently omitted from this Manual, but, rather that a Section is not required for completion of the Work.

4.3. Wherever the project location building name occurs in the Contract Documents it shall be taken to mean all work included in the Contract.

4.4. Wherever in the Contract Documents the words "approval", "approved", "direction", "directed", "selection", "selected", "request", "requested", "report", and similar words are used, such approvals, directions, selections, requests and reports shall be given by the HRSB unless specifically stated otherwise.

4.5. Wherever in the Contract Documents the word "provide" is used in any form, it shall mean that the Work concerned shall include both supply and installation of the products required for completion of that part of the Work.

4.6. Wherever in this Project Manual it is specified that Work is to proceed or to meet approval, direction, selection or request of jurisdictional authorities or others, such approval, direction, selection or request shall be in writing.

5. Errors & Omissions

- 5.1.** If errors or omissions are observed in the Contract Documents, immediately notify the HRSB Procurement in writing of all such errors or omissions. In the event no such notice is given, the Contractor will be held responsible for the results of any such error or omission and the cost of rectifying the same.

6. Division 1

- 6.1.** The provisions of all Sections of **Division 1** shall apply to each Section of this Specification.

7. Wage Rates

- 7.1.** Pay all employees engaged on the Work a wage not less than the minimum wage per hour as set out by the Province of Nova Scotia. For overtime work beyond 48 hours in any one week, pay no employee at a rate of less than one and one-half times the minimum wage per hour noted above. Provide for these wage rates in tendered contract amount.

8. Work Performed Under Separate Contracts

- 8.1.** Work not to be included in the Contract, as noted "NIC" on the Drawings, shall be governed by Article 37, Separate Contracts, of General Conditions of Contract.
- 8.2.** Furniture installation will be carried out by others.
- 8.3.** Computer installation will be carried out by others.

9. Project Schedule

- 9.1. Refer to Section 00 00 15 Description of Work.**
- 9.2.** Existing services (mechanical & electrical) will need to be maintained through the renovations.
- 9.3.** During construction, all life safety systems as well as mechanical and electrical systems must be in active, usable condition to permit the school to operate or alternate methods used to ensure the safe operation of the school as directed by HRSB project representative.
- 9.4.** As construction progresses revise the schedule to compensate for any delays or unforeseen activities so as to maintain the contract completion date. Each schedule submission is to be complete with a statement indicating the changes made, the reason they were changed and confirmation that the project completion date will not change. The above schedule information is to be submitted monthly or more often if necessary.

10. Site Progress Records

- 10.1. Maintain at site a permanent written record of progress of Work. Make the record available at all times with copies provided when requested. Include in record each day:
 - 10.1.1. Commencement and completion dates of the Work of each trade in each area of Project.
 - 10.1.2. Attendance of Contractor's and Subcontractor's Work forces at Project and a record of the work they perform.
 - 10.1.3. Visits to site by representatives of the Owner, Engineer, jurisdictional authorities, Contractor, Subcontractors, and suppliers.
- 10.2. Maintain a progress chart in approved format. Show on chart proposed Work schedule and progress of Work by Contractor and Subcontractor.

11. Examination

- 11.1. Site:
 - 11.1.1. Examine site, and ensure that site conditions have been examined, that all are fully informed on all particulars which affect Work thereon and at the place of construction, and in order that construction proceeds competently and expeditiously.
 - 11.1.2. Ensure by examination that all physical features, and working restrictions and limitations which exist are known.
- 11.2. Previously Completed Work:
 - 11.2.1. Verify dimensions of existing Work in place before construction of Work to be incorporated with it.
 - 11.2.2. Verify that previously executed Work and surfaces are satisfactory for construction, and that performance of subsequent Work will not be adversely affected.
 - 11.2.3. Commencement of Work will constitute acceptance of site conditions and previously executed Work as satisfactory.
 - 11.2.4. Report to Engineer defects in prior Work which will affect quality of subsequent Work, or construction schedule.
- 11.3. Construction Measurements:
 - 11.3.1. Before commencing installation of Work, verify that its layout is accurate in accordance with intent of Drawings, and that locations, elevations, and clearances to adjacent infrastructure are maintained.
 - 11.3.2. If Work is installed in wrong location, rectify it before other Work concerned proceeds.

12. PROTECTION OF WORK, PROPERTY & PERSONS

- 12.1.** Include in Work necessary methods, materials, and construction to ensure that no damage or harm to Work, materials, property and persons results from the Work of this Contract. Temporary facilities relating to protection are specified in Section 01 52 00.
- 12.2.** Protect, and if damaged make good, adjacent private and public property.
- 12.3.** Keep surfaces, on which finish materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.
- 12.4.** Protect finished surfaces of completed Work from damage by restriction of access or by use of physical means suitable to the material and surface location. Establish with each Subcontractor the suitability of such protection in each case.
- 12.5.** Protect existing underground infrastructure, mechanical, electrical, telephone and similar services from damage. If necessary, relocate active services to ensure that they function continuously in safety and without risk of damage.
- 12.6.** Cap off and remove unused utility services encountered during Work after approval is given by the utilities concerned or jurisdictional authorities, whichever may apply. Relocation, removal, protection and capping of existing utility services shall be performed only by the applicable utility and of other services by licensed mechanics.
- 12.7.** To prevent soiling or damage to finish flooring where pedestrian traffic occurs after the flooring has been installed, install and maintain 6 mil. polyethylene membrane or reinforced kraft paper temporary protection, secured in place and with joints sealed by reinforced pressure sensitive tape.
- 12.8.** Install plywood panels of minimum ¼" thickness over completed finish flooring materials, on which further construction Work is performed by other trades or delivery of products is made, or both. Seal joints between panels with reinforced pressure sensitive tape.
- 12.9.** Prevent spread of dust beyond the construction zone by wetting, or by other approved means, as it accumulates.
- 12.10.** Outside work areas shall be appropriately demarked and/or surrounded by rigid chain link panels or fencing to prevent unauthorized entry to the work area. Any area of roof having work completed is to be covered below with this fencing approximately 10' from the edge of the building. It is to be maintained at all times throughout the project. All waste disposal bins are to be fenced in using the same type of fencing as indicated above during working hours. After working hours, all waste disposal bins shall be located a minimum of 25 feet from any structure. Any windows where the debris chute is located are to be covered. All entrances below the roof area are to have covered scaffolding erected to ensure a safe travel path to a distance of ten

feet from edge of building. All workers shall contain their activity to the work site area. Access to the school shall only be allowed as planned in coordination with HRSB Operations and the school administration.

- 12.11.** The contractor is responsible for security of all project materials and access to the project site and/or the school through the project site at all times until completion of work and acceptance of the finished project by HRSB. Such additional security costs for security personnel or other means of security as deemed necessary by the contractor will be the sole responsibility of the contractor. The HRSB will provide security personnel up to and including the Substantial Completion date as noted on the bid submission documents.
- 12.12.** The contractor shall keep the work site free from accumulated debris caused by the employees or work and shall remove all debris at the end of each work shift. Debris shall not be deposited in HRSB controlled garbage and/or recycling containers.
- 12.13.** All waste materials and debris created during demolition and/or construction shall be disposed of in a dumpster provided by the contractor, to be removed at the end of the construction project, using a methodology that is in compliance with the applicable HRM solid waste by laws. Otherwise, the material must be removed and disposed of off site at the end of each working day. The waste materials may not be stored on site unless they are held in an approved project dumpster no closer than twenty five (25) feet from any structure.
- 12.14.** All temporary structures such as portable washroom facilities, materials storage trailer, work trailer, debris dumpster, vehicles, etc., shall be located a minimum of (25) twenty-five feet from the school building.
- 12.15.** Where applicable, a hot work permit will be required to be completed prior to commencement of work and all conditions of the permit must be maintained until completion of hot work. A copy of the hot work permit signed by the contractor representative shall be provided to HRSB upon completion of each hot work session. Contractor must assign a designated fire watch as noted on the permit document who shall remain on site for three hours after completion of each hot work session.
- 12.16.** A school washroom will be designated for use where appropriate. However, protection of the surfaces as indicated above must be maintained. It should also be noted that access to the building during summer months will be limited for security reasons. Contractor is responsible to provide temporary portable washroom facilities for general use of contractor staff.
- 12.17.** Access to Interior of School - All interior access is to be scheduled with the PM. This will allow for notice to the school admin., custodial and possible scheduling of a security guard for after hour access.
- 12.18.** Adhesives / Torch Work - All adhesive use and torch work must be completed after school

hours.

13. Cleaning

- 13.1.** Ensure that during and after construction the public streets and existing asphalt parking lot are cleaned as required.

14. Salvage

- 14.1.** Unless otherwise specified, salvaged material resulting from construction, and surplus materials and construction debris shall become property of Contractor, who must dispose of it away from Site.

15. Site Limitations

- 15.1.** Since the existing building will be occupied during the Work (in accordance with the Phasing Schedule) the Consultant will designate the precise areas on the site which may be utilized for work and storage, and where personnel will be permitted to be present. Refer also to Drawings. Allow for hoarding to secure construction areas from occupied portions of the Building and Site.
- 15.2.** All access to the construction site is to be coordinated with the Project Manager for HRSB and communicated at the pre-construction meeting.
- 15.3.** Any Work carried out in the building is to be carried out during hours approved by the School Administration.
- 15.4.** Any disruption to services within the building must occur during hours approved by School Administration.
- 15.5.** Any Work which may have an adverse affect on the occupancy functions, must have prior approval of the School Administration and **may** require scheduling during off-hours.

16. Security Regulations

- 16.1.** Perform Work in conformance to the security regulations of the building as directed by the Project Manager for HRSB.

17. Project Identification

- 17.1.** No project sign is required on this Project.

18. Owner's Occupancy

- 18.1.** The Owner reserves the right to occupy and use portions of the Project, whether partially or

entirely completed, or whether completed on schedule or not, provided such occupancy does not interfere with the Contractor's continuing Work.

- 18.2.** Partial occupancy or installation by the Owner of his equipment shall not imply acceptance of the Project in whole, or in part, nor shall it imply acknowledgement that terms of the Agreement are fulfilled.

END OF SECTION 01 11 00

SECTION 01 11 25 - PRICES

1. General

- 1.1. Prices included in the Contract shall be complete for the applicable Work, and shall include for each price:
 - 1.1.1. Expenditures for wages and for salaries of workmen, engineers, superintendents, draftsmen, foremen, timekeepers, accountants, expeditors, clerks, watchmen and such other personnel as may be approved, employed directly under the Contractor and while engaged on the applicable Work at the site and expenditures for travelling and board allowances of such employees when required by location of the applicable Work or when covered by trade agreements and when approved; provided, however, that nothing shall be included for wages or salary of the Contractor if an individual, or of any member of the Contractor's firm if the Contractor is a firm or the salary of any officer of the Corporation if the Contractor is a corporation, unless otherwise agreed to in writing.
 - 1.1.2. Expenditures for material used in or required in connection with the construction of the applicable Work including material tests and required by the laws or ordinances of any authority having jurisdiction and not included under Subparagraph .9.
 - 1.1.3. Expenditures for preparation, inspection, delivery, installation and removal of materials, equipment, tools and supplies.
 - 1.1.4. Temporary facilities as required for the applicable Work.
 - 1.1.5. Travelling expenses properly incurred by the Contractor in connection with the inspection and supervision of the applicable Work or in connection with the inspection of materials prepared or in course of preparation for the applicable Work and in expediting their delivery.
 - 1.1.6. Rentals of all equipment whether rented from the Contractor or others, in accordance with approved rental agreements including any approved applicable insurance premiums thereon and expenditures for transportation to and from the site of such equipment, costs of loading and unloading, cost of installation, dismantling and removal thereof and repairs or replacements during its use on the applicable Work, exclusive of any repairs which may be necessary because of defects in the equipment when brought to the Work or appearing within thirty (30) days thereafter.
 - 1.1.7. The cost of all expendable materials, supplies, light, power, heat, water and tools (other than tools customarily provided by tradesmen) less the salvage value thereof at the completion of the applicable Work.

- 1.1.8. Assessments under the Workmen's Compensation Act, the Unemployment Insurance Act, Canada Pension Act, statutes providing for government hospitalization, vacations with pay or any similar statutes; or payments on account of usual vacations made by the Contractor to his employees engaged on the applicable Work at the site, to the extent to which such assessments or payments for vacations with pay relate to the Work covered by the specified price; and all sales taxes or other taxes where applicable.
- 1.1.9. The amounts of all Subcontracts related to the specified price.
- 1.1.10. Premiums on all insurance policies and bonds called for under this Contract as related to the specified price.
- 1.1.11. Royalties for the use of any patented invention on the applicable Work.
- 1.1.12. Fees for licences and permits in connection with the applicable Work. No Building Permit is required for the project.
- 1.1.13. Duties and taxes imposed on the applicable Work.
- 1.1.14. Such other expenditures in connection with the applicable Work as may be approved.
- 1.1.15. Provided always that except with the consent of the Owner, the above items of cost shall be at rates comparable with those prevailing in the locality of the Work.

END OF SECTION 01 11 25

SECTION 01 11 41 - PROJECT COORDINATION

1. Requirements Included

- 1.1. Each Trade Contractor's responsibilities include the coordination of Work within his own Contract and with the Work of other Contracts.

2. Related Requirements

- 2.1. Project Meetings: Section 01 31 19
- 2.2. Submittals: Section 01 33 00

3. Description

- 3.1. Coordinate Work on which subsequent Work depends to facilitate mutual progress, and to prevent conflict between parts of the work.
- 3.2. Ensure that each Section makes known for the information of the Construction Manager and other Sections, the environmental and surface conditions required for the execution of its Work, and the sequence of others Work required installation of its Work.
- 3.3. Ensure that each Section, commencing Work, and that each Section is assisted in the execution of its preparatory Work by Sections depending upon its preparation.
- 3.4. Deliver materials supplied by one Section to be installed by another well before the installation begins.
- 3.5. Sections giving installation information in error, or too late to incorporate in the Work, shall be responsible for having Work done which was thereby additionally made necessary.
- 3.6. Coordinate warranty conditions of interconnected Work to ensure that full coverage is obtained.
- 3.7. Remove work installed in error which is unsatisfactory for subsequent Work.

4. Cutting And Patching

- 4.1. Include under Work of this Section all cutting and patching of asphalt required by the Work.
- 4.2. Finish new surfaces flush with existing surfaces.
- 4.3. Cut and patch as required making work fit.
- 4.4. Make cuts with clean, true, smooth edges.
- 4.5. Patching of existing or new asphalt shall be performed only by workmen with expertise in that particular trade and who normally perform that Trade.
- 4.6. Replace, and otherwise make good, damaged or defective Work. If required by the Construction Manager.

- 4.7. Do not endanger Work or property by cutting, digging, or similar activities. No Section shall cut or alter the Work of another Section unless approved by the Section which has installed it.
- 4.8. Cut and drill with true smooth edges and to minimum suitable tolerances.
- 4.9. If required, before cutting, drilling, or sleeving structural load bearing elements, obtain approval of location and methods.
- 4.10. Cutting, drilling and sleeving of Work shall be done only by the Section which has installed it. The Section requiring drilling and sleeving shall inform the Section performing the Work of the location and other requirements for drilling and sleeving. The Contractor shall directly supervise performance of cutting and patching.
- 4.11. Cutting and Patching for Holes Required by Mechanical & Electrical Work:
 - 4.11.1. Include under Work of Mechanical Divisions cutting or provision of holes up to 8" in diameter and related patching.
 - 4.11.2. Include under Work of this Section holes and other openings required by the work of Mechanical Divisions which are larger than 8" in diameter or least dimension, and chases, bulkheads, furring and required patching. This Section shall be responsible for determination of Work required for holes in excess of 8" diameter or least dimension.
 - 4.11.3. Include under the Work of Electrical Divisions all cutting or provision of holes and related patching for the Work of that Division.
- 4.12. Include under Work of this Section all other cutting and patching required by the Work except as described in Clause .11 above.
- 4.13. Patching or replacement of damaged Work shall be done by the Subcontractor under whose Work it was originally executed, and at the expense of the Subcontractor who caused the damage.
- 4.14. Make patches invisible in final assembly.

5. Quality Assurance

- 5.1. Requirements of Regulatory Agencies:
 - 5.1.1. Make known and coordinate the requirements of jurisdictional authorities, as made explicit by the Contract Documents, and by representatives of such authorities
- 5.2. Source Quality Control:
 - 5.2.1. Ensure that Work meets specified requirements
 - 5.2.2. Schedule, supervise and administer inspection and testing as specified in Section 01 45 00.
- 5.3. Job Records:
 - 5.3.1. Maintain job records and ensure that such records are maintained by subcontractors.

6. Submittals

- 6.1. Prepare a Project schedule in accordance with Section 01 33 00, and ensure that all subcontractors and suppliers are aware of the details of this schedule, and progressively of their general compliance with the schedule.
- 6.2. Become aware of the required submittals specified in each Section, and expedite submission of such submittals so as not to hinder the Project Schedule.
- 6.3. Review submittals and make comments as specified in Section 01 33 00.

7. Job Conditions

- 7.1. Ensure that Work proceeds under conditions meeting specified environment and job safety requirements
- 7.2. Ensure that protection of adjacent property and the Work is adequately provided and maintained to meet specified requirements.

8. Product Delivery, Storage And Handling

- 8.1. Site has limited spaces for storage, only delivery of materials agreed upon by the Construction Manager will be allowed. Comply with Construction Manager's allocations. Any requirement for modifications to the building in order to allow delivery and storage of the materials to complete this work is the responsibility of the contractor.
- 8.2. Schedule delivery of products & removal of material with Construction Manager.
- 8.3. Make available areas for storage of products and construction equipment to meet specified requirements, and to ensure a minimum of interference with progress of the Work and relocations.
- 8.4. Trade Contractor to provide flag persons, traffic signals, barricades and Flares/lights/lanterns as required to perform the Work and to protect the public.
- 8.5. Material and Waste - Deliveries and Removals - Must be coordinated to be completed 30 minutes after school dismissal where applicable.

END OF SECTION 01 11 41

SECTION 01 31 19 – PROJECT MEETINGS

1. Pre-Award Meeting

- 1.1.** A Pre-award meeting will be held at which time the following will be addressed:
 - 1.1.1.** Owner and HRSB's functions.
 - 1.1.2.** The Consultant and the Consultant's functions.
 - 1.1.3.** The General Contractor and the General Contractor's functions.
 - 1.1.4.** Documentation requirements from the General Contractor.
 - 1.1.5.** Obligees for Performance and Payment Bonds from Sub-contractors.
 - 1.1.6.** Progress Claims.
 - 1.1.7.** CO's & CCO's.
 - 1.1.8.** Construction Schedule.
 - 1.1.9.** Project Start-up.
 - 1.1.10.** Job Meetings.
 - 1.1.11.** Superintendent – General Contractor's Representative.
 - 1.1.12.** Design / Administration authority.
 - 1.1.13.** Owner's Representative.
 - 1.1.14.** Special Consultants.
 - 1.1.15.** Quality of Workmanship.
 - 1.1.16.** Accountability.
 - 1.1.17.** Harmonized Sales Tax.
 - 1.1.18.** Contract Close-out Documentation.

2. Preconstruction Meeting

- 2.1.** Within fifteen (15) days after award of Contract, arrange a meeting between the, Consultant, Subcontractors, Project Superintendents, Inspection and Testing Company Representatives, and representatives of others whose coordination is required during construction.
- 2.2.** Discuss at the meeting the means by which full cooperation and coordination of the participants during construction can be achieved.
- 2.3.** Document the responsibilities and necessary activities of the participants during construction as discussed, and distribute to each participant.
- 2.4.** Establish procedures for maintenance and completion of Project record drawings specified in Section 01 77 00.
- 2.5.** Review and establish methods of maintaining life safety and egress for the school occupants. Communicate these methods thoroughly with the School Principal.

3. Progress Meeting

- 3.1.** Invite representatives of HRSB, to attend twice monthly site meetings called by the Contractor during the progress of the Work.

- 3.2. Inform HRSB of each meeting and of proposed agenda a minimum of five (5) days before meeting.
- 3.3. Submit proposed schedule of site meetings to Engineer and Owner.
- 3.4. Record, prepare and distribute minutes of each meeting to HRSB and to each other participant within 72 hours of meeting.
- 3.5. Ensure that all representatives who attend meetings have the authority to conduct business on behalf of firms they represent.
- 3.6. Details of Progress Meetings to be discussed at the project start-up meeting.

4. Suggested Agendum (Preconstruction Meeting)

- 4.1. Distribution and discussion of:
 - 4.1.1. List of major subcontractors and suppliers.
 - 4.1.2. Projected Construction Schedules.
- 4.2. Critical work sequencing.
- 4.3. Major equipment deliveries and priorities.
- 4.4. Project Coordination:
 - 4.4.1. Designation of responsible personnel.
- 4.5. Procedures and Processing of:
 - 4.5.1. Field decisions
 - 4.5.2. Proposal requests
 - 4.5.3. Submittals
 - 4.5.4. Change orders
 - 4.5.5. Applications for Payment.
- 4.6. Adequacy of distribution of Contract Documents.
- 4.7. Procedures for maintaining Record Documents.
- 4.8. Use of premises:
 - 4.8.1. Office, work and storage areas.
 - 4.8.2. Owners requirements.
- 4.9. Construction facilities, controls and construction aids.
- 4.10. Safety/Tool Box Meetings.
- 4.11. Security procedures.
- 4.12. Housekeeping procedures.
- 4.13. Egress/life safety procedures

5. Suggested Agendum (Progress Meetings)

- 5.1. Review and approval of minutes of previous meeting.
- 5.2. Safety meeting minutes.
- 5.3. Review of work progress since previous meeting.
- 5.4. Field observations, problems, conflicts.

- 5.5. Problems which impede Construction Schedule.
 - 5.6. Review of off-site fabrication, delivery Schedules.
 - 5.7. Corrective measures and procedures to regain projected schedules.
 - 5.8. Revisions to Construction Schedules.
 - 5.9. Maintenance of quality standards.
 - 5.10. Pending changes and substitutions and effect on Construction Schedule.
 - 5.11. Other Business.
-
- 6. Attend, with representatives of HRSB twice monthly meetings with the School Administration to review construction activities and concerns of Building Occupants.
 - 7. Quarterly meetings with Contractor and School Board / User during Warranty Period including major sub-trade contractors.
 - 8. Dates for meetings will be set at time of completion.

END OF SECTION 01 31 19

SECTION 01 33 00 – SUBMITTAL PROCEDURES

1. General Requirements

- 1.1. Make submittals specified in this Section to Consultant unless otherwise specified, with additional submissions made, in manner he directs, to other parties involved with construction of the Project as their interests are concerned. These parties are, but shall not be restricted to, consultants, jurisdictional authorities, and Subcontractors whose Work must be coordinated with Work related to Submittals.
- 1.2. Ensure that submissions are made to allow sufficient time for review without the construction schedule being delayed.

2. Document Submissions Required

- 2.1. At Commencement of Contract:
 - 2.1.1. Performance and Payment Bonds.
 - 2.1.2. Public Liability and Property Damage Insurance Certificates.
 - 2.1.3. List of Subcontractors by firm name.
 - 2.1.4. Construction Schedule and other required schedules and estimates.
 - 2.1.5. Site Specific Safety Plan/Safety Policy.
 - 2.1.6. Workers' Compensation Board status.
- 2.2. During Construction:
 - 2.2.1. Bi-weekly progress reports.
 - 2.2.2. Job meeting reports and minutes.
 - 2.2.3. Updated construction schedules.
 - 2.2.4. Shop drawings as required.
 - 2.2.5. Inspection and test reports.
 - 2.2.6. Daily communication of Hot Work Permits as needed.
- 2.3. Submissions at completion of Work are specified in Section 01 77 00, Contract Closeout.

3. Administrative

- 3.1. Submit to Consultant 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 no claim for extension by reason of such default will be allowed.
- 3.2. Do not proceed with Work affected by submittal until review is complete.
- 3.3. Present shop drawings, product data, samples and in Imperial units.
- 3.4. Review submittals prior to submission to Consultant. 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.

- 3.5. Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- 3.6. Verify field measurements and affirm that affected adjacent work is co-ordinated.
- 3.7. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
- 3.8. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
- 3.9. Keep one review copy of each submission on site.

4. Construction Schedules

- 4.1. Submit proposed construction schedule at beginning of Project, as specified in Project Documents.
- 4.2. As construction progresses, submit up-dated construction schedules as specified in Project documents.

5. Shop Drawings And Product Data

- 5.1. 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.
- 5.2. Submit drawings stamped and signed by professional consultant registered or licensed in Province of Nova Scotia of Canada.
- 5.3. 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.
- 5.4. Allow seven (7) days for Consultant's review of each submission. Do not proceed with work involving relevant products until completion of shop drawing review.
- 5.5. Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Consultant prior to proceeding with work.

- 5.6.** Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

Accompany submission with transmittal letter, in duplicate, containing:

- 5.6.1.** Date
 - 5.6.2.** Project title and number
 - 5.6.3.** Contractor's name and address
 - 5.6.4.** Identification and quantity of each shop drawing, product data and sample.
 - 5.6.5.** Other pertinent data.
- 5.7.** Submission to include:
- 5.7.1.** Date and revision dates.
 - 5.7.2.** Project title and number.
 - 5.7.3.** Name and address of:
 - 5.7.3.1.** Subcontractor.
 - 5.7.3.2.** Supplier.
 - 5.7.3.3.** Manufacturer.
 - 5.7.4.** Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - 5.7.5.** Details of appropriate portions of Work as applicable:
 - 5.7.5.1.** Fabrication.
 - 5.7.5.2.** Layout, showing dimensions, including identified field dimensions, and clearances.
 - 5.7.5.3.** Setting or erection details.
 - 5.7.5.4.** Capacities.
 - 5.7.5.5.** Performance characteristics.
 - 5.7.5.6.** Standards.
 - 5.7.5.7.** Relationship to adjacent work.
- 5.8.** After Consultant's review, distribute copies.
- 5.9.** Submit for review one electronic copy in PDF file format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- 5.10.** Submit electronic copies of product data sheets for brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- 5.11.** Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.

- 5.11.1. 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.
- 5.11.2. Testing must have been within three (3) years of date of contract award for project.
- 5.12. Documentation of testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- 5.13. Delete information not applicable to project.
- 5.14. Supplement standard information to provide details applicable to project.
 - 5.14.1. If upon review by Consultant, 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.
 - 5.14.2. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of work of sub-trades.

6. SAMPLES

- 6.1. Submit for review samples in duplicate as requested in respective specification Sections, as requested by the Consultant. Label samples with origin and intended use.
- 6.2. Deliver samples prepaid to Consultant's business address.
- 6.3. Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- 6.4. Adjustments made on samples by Consultant are not intended to change.
- 6.5. Make changes in samples which Consultant may require, consistent with Contract Documents.
- 6.6. Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

7. Record Drawings

- 7.1. Record, as the Work progresses, changes and deviations in the location of Work concealed by the finished Work, and such other approved changes that occur during progress of Work, to ensure that an accurate record is provided for future maintenance and alterations.

- 7.2. White prints will be provided by the School Board for use in preparing record drawings. Record changes in the Work on these prints in red ink.
- 7.3. Dimension location of concealed Work in reference to building walls, and elevation in reference to floor elevation. Indicate at which point dimension is taken to concealed Work. Dimension all terminations and offsets of runs of concealed work.
- 7.4. Record work constructed differently than shown on Contract Documents, changes in the work caused by site conditions, by Owner, Consultant, Contractor and Subcontractor originated changes, and by site instructions, supplementary instructions, field orders, change orders, addenda, correspondence and directions of jurisdictional authorities.
- 7.5. Record location of mechanical and electrical services, piping, valves, conduits, pull boxes, junction boxes and similar work not clearly in view, and position of which is required for maintenance, alteration work and future additions. Do not conceal critical work until its location has been recorded.
- 7.6. Identify record drawings as a "Project Record Copy". Maintain in good condition, do not use for construction purposes and make available to Consultant at all times.
- 7.7. Submit record drawings at completion of Work. Final acceptance of the Work will be predicated on receipt and approval of record drawings.

8. Extra Stock

- 8.1. Supply extra stock at completion of Project as specified in other Sections of the Project Manual.
- 8.2. Deliver extra stock as directed by the Consultant to location he designates.
- 8.3. Extra stock is specified to be supplied in the following Sections:

Section 09 30 13 Ceramic Tile

Section 09 51 13 Acoustical Ceiling Units

Section 09 65 19 Resilient Tile Flooring

Section 09 91 23 Painting

Refer to Mechanical & Electrical Divisions for Extra Stock requirements in those Trades.

9. Maintenance Manual & Operating Instructions

- 9.1. Submit three (3) copies of Maintenance Manual with application for completion certificate.
- 9.2. Include in Maintenance Manual one (1) copy of each final approved shop drawing issued for Project on which have been recorded changes made during fabrication and installation caused by unforeseen conditions.
- 9.3. Submit extended guarantees together in one (1) report binder.
- 9.4. The Manuals shall:
 - 9.4.1. Consist of a hard-cover, black, vinyl-covered, loose-leaf, letter-size binder.

- 9.4.2. Have a title sheet, or sheets preceding data on which shall be recorded Project name, Project number, date, list of contents, and Contractor's and Subcontractors' names.
- 9.4.3. Be organized into applicable Sections of Work with each Section separated by hard paper dividers with plastic covered tabs marked by Section.
- 9.4.4. Contain only typed or printed information and notes, and neatly drafted drawings.
- 9.4.5. Contain maintenance and operating instructions on all building, and mechanical and electrical equipment.
- 9.4.6. Contain maintenance instructions as specified in various Sections.
- 9.4.7. Contain brochures and parts lists on all equipment.
- 9.4.8. Contain sources of supply for all proprietary products used in the Work.
- 9.4.9. Contain lists of supply sources for maintenance of all equipment in Project of which more detailed information is not included above.
- 9.4.10. Contain finished hardware schedule.
- 9.4.11. Contain charts, diagrams and reports specified in Mechanical & Electrical Divisions.

10. Extended Warranties

- 10.1. Submit the extended warranties listed in this Article and as specified in each applicable Section of this Project Manual.
- 10.2. Extended warranties shall commence on termination of the standard one-year warranty granted in this Contract.
- 10.3. Submit each extended warranty on a standard Form of Warranty, a sample of which is included in this Section.
- 10.4. Secure each extended Warranty by a Maintenance Bond in an amount indicated.

11. Inspection Laboratory Reports

- 11.1. Submit copies of inspection and test reports obtained by the Contractor and Subcontractors for their Work or for Jurisdictional Authorities, if requested by Consultant.
- 11.2. Submit reports in accordance with requirements specified in Section 01 41 00.

12. Documentation On Suppliers & Manufacturers

- 12.1. Provide information under headings identifying the following: Associated Technical Section, Manufacturer, Supplier, Contact Name, and Phone Numbers.

SAMPLE FORM OF WARRANTY FOLLOWS THIS PAGE

Sample Form for Warranty

Date

Client

Project
.....

Warranty
(title of work)

We hereby undertake to warrant all materials supplied and installed under our Contracts and include the providing of necessary materials and labour to cover the result of faulty materials or workmanship. Upon written notification from Client or the Consultant that the above work is defective any repair or replacement work required shall be to the Consultant's satisfaction at no cost to the Client. This Warranty shall not apply to defects caused by the work of others, maltreatment of materials, negligence or Acts of God. This Warranty shall remain in effect for the total period from the acceptance of the Work to (....date....), irrespective of the date of completion or the beneficial use by the Owner.

Signature

Authorized Signing Officer

Name of Firm

Address

END OF SECTION 01 33 00

SECTION 01 35 13 – APPENDIX A - SPECIAL PROJECT PROCEDURES

1. Introduction

- 1.1.** School construction, renovation and maintenance projects are scheduled every year as a normal and necessary course of business by operations departments in each Nova Scotia School Board. Building modifications, repairs and additions/demolitions to buildings may impact the school environment without appropriate controls. With increased controls based primarily on the CSA standards implementation, proper scheduling and clear communication on adequate controls can be put into place to eliminate/minimize the impact to all occupants.
- 1.2.** Projects of this nature may generate varying levels of dusts, noises and odors. It is possible, unknown/unforeseeable environmental contaminants, such as spills, mould, fumes, lead or asbestos exposure maybe identified.
- 1.3.** To successfully complete work within the school environment, it is necessary to plan and implement appropriate containment and control strategies. This document is developed to provide a minimum standard for contaminant controls for various types of projects in schools. These standards are in addition to and should complement all legislated protocols for working with regulated materials such as asbestos, lead paints, PCB's etc.
- 1.4.** Executing a successful project will depend primarily on clear, concise communication. This may involve a number of parties (Project Manager, Operations staff, School Administration and Health & Safety staff and Joint Occupational Health & Safety Committee).

2. Communication Plan

- 2.1.** The most critical element of any project management plan is effective communication between all stakeholders. Communication between the Operations project manager/supervisor, the contractor and school administrators before the start of a project is very important. This meeting is meant to explain the scope, schedule and risk assessment for the project. The meeting will also help establish clear expectations when managing planned and unplanned exposure risks associated with contaminant controls.
- 2.2.** The communication plan shall include:
 - 2.2.1.** A description of potential contaminants, which may include but is not limited to:
 - 2.2.1.1.** Particulates (dirt, concrete/silica, steel, fiberglass, wood dust, ash, cellulose, etc.)
 - 2.2.1.2.** Moisture: external water infiltration, internal system leaks (domestic water, sanitary, storm, sprinkler)
 - 2.2.1.3.** Noise from equipment/tool operation,
 - 2.2.1.4.** Fumes/odors from equipment exhaust, boiler exhaust, septic waste, chemical/adhesives, etc.
 - 2.2.1.5.** Hazardous materials including, asbestos, PCB, mercury, lead, fuel oil, fungi/mould, etc.
 - 2.2.1.6.** Excessive heat/cold

- 2.2.2. A description of the control measure which may include but not be limited to:
 - 2.2.2.1. Isolation within an enclosure (water, noise, hazardous materials)
 - 2.2.2.2. Ventilation and filtration
 - 2.2.2.3. Dehumidifiers/blowers (moisture)
 - 2.2.2.4. Personal protective equipment
 - 2.2.2.5. Schedule outside or inside school hours
 - 2.2.2.6. Sound dampeners
 - 2.2.2.7. Monitoring
 - 2.2.2.8. Security
- 2.2.3. Other Hazards created by the work, including but not limited to fire safety and the need to alter fire safety plans.
- 2.3. For small routine work orders the communication plan may only involve one tradesperson and the school principal or designate. This communication is equally as important for management of contaminant controls.

3. Contaminant Control Management

- 3.1. Regardless of the contaminant or control measure used, the following procedures shall apply for every project:
 - 3.1.1. Every project, including all routine work requests, shall be assessed, as per this document, by appropriate personnel for potential contaminant risk.
 - 3.1.2. Clear lines of communication must be established between project personnel, site supervisor or project manager and the school administration.
 - 3.1.3. Control strategies as per this document, shall be, communicated to workers as well as the site JOHSC and implemented prior to starting the work.
 - 3.1.4. Where isolation is used as a control, all entry points must be clearly posted to describe the purpose of the enclosure and limitations of access.
 - 3.1.5. During the execution of the project, the control measures must be regularly inspected and maintained before the start of each work shift, and throughout the shift as required.
 - 3.1.6. A process for stop work and remediation orders must be established to ensure the project manager; site supervisor and school administrator have a means to cease project operations when a contaminant control breach may impact the school environment. Breached control measures must be reported immediately to the board project manager upon discovery. He/she will be responsible to communicate to the school principal or designate. Work shall be stopped immediately until the control measures are re-established.
 - 3.1.7. Access to the controlled work site is only permitted by authorized personnel. The project supervisor or designate shall determine appropriate personal protective equipment (PPE) and necessary worker orientation.

4. Particulate Control

- 4.1.** Exposure to minimal levels of dust is a normal condition in most outdoor and indoor environments and is typically controlled inside a building through building ventilation, filtration and routine housekeeping measures. However, as noted, construction projects generally create elevated dust levels in work areas, whether inside or outside of a building.
- 4.2.** Operational Services Managers must ensure maintenance staff and contracted service providers implement dust control measures appropriate for the type and scope of work being performed. This will include assessing the type and amount of dust being created as well as the location of the work being conducted.
 - 4.2.1.** Interior Construction Projects:
 - 4.2.2.** Construction projects may be described as projects that may include window replacement, wall creation/demolition, etc.
- 4.3.** As a minimum for these types of construction projects, all interior entry points into a construction zone must be effectively sealed. The barrier must prevent contaminants from the work area to be distributed to other areas of the school. Appropriate signage must be posted to indicate only authorized persons are permitted access.
- 4.4.** Entrance design could range from a two flap plastic tarp door to a fully constructed sealed entry door with negative hepa-filtered ventilation on the construction side of the barrier.
- 4.5.** Exterior Construction Projects:
 - 4.5.1.** Exterior work shall be performed so as not to affect the safety of building occupants. It will also provide controls to avoid impact to adjacent properties. Depending up on the results identified in the risk assessment, at a minimum consideration must be given to prevent dust from entering into the school environment. This may be controlled through isolation, dampening application, closing building AHU and window/door openings.

5. Noise Control

- 5.1.** Hearing plays an essential role in communication, speech and language development and learning within a school environment. During construction the contractor is responsible for ensuring acceptable noise levels will be adhered to for school board staff and students within the building. Noise related to a project may prove to be very distracting for staff and students. To minimize distractions and interruptions in student learning the following are important to consider:
 - 5.1.1.** Contractors are responsible to ensure appropriate noise control measures are taken
 - 5.1.2.** "No work" periods may need to be incorporated into construction schedules
 - 5.1.3.** Work causing a noise disruption may need to take place during unoccupied times and/or during pre-determined acceptable times of the day (i.e. before and after class times)

- 5.1.4. It may be necessary for the School Administrator to make a request to the Board Project Manager or the Contractor to exclude undertaking certain noisy activities during particular periods and/or activities.

6. Moisture Control

- 6.1. Moisture levels are to be controlled during construction and maintenance activities. Moisture levels above normal may impact the air in the room and/or building and may also penetrate building materials giving the potential to lead to mould growth.
- 6.2. Certain activities (i.e. tape and mud of drywall, painting, pressure washing, concrete cutting with water or other water based dust-suppression) introduce high amounts of moisture into the room environment and ventilation and or drying is required to control local moisture.
- 6.3. An enclosure properly set-up to contain other contaminants will similarly contain/control high levels of airborne moisture. A wet-vac should be available on-site for activities which have a risk of water spillage of more than 5 gallons at any instance.
- 6.4. Standing and or stagnate water must be avoided on construction sites, for a number of reasons, including, but not limited to; insects breed in these bodies of water, the water may give off odours, it is a nuisance to walk through, and it may be an ice hazard in cold weather.
- 6.5. It is important that all water leaks and flooding are reported immediately to the board's project manager and building supervisor. Where works to existing "plumbing" is to occur the water lines (potable, heating, fire suppression) must be isolated and drained (de-energized/de-pressurized) following Lock Out - Tag Out procedure. Adequate supplies such as buckets and absorbents should be present when drains are not available to drain a line.
- 6.6. When an interruption to the water supply, potable or service, is to occur then the "owner's representative" and building supervisor should be notified 24 hours in advance. Bottled water provision may be required.
- 6.7. Materials used in the construction and or maintenance activities are to be stored in dry areas. The introduction of materials to the activities with moisture levels above the acceptable (XXX%)CNBC states for wood, on dry weight basis, a max of 19%, I can't find info on drywall but assume it is much lower range is prohibited as these materials are highly susceptible to colonization by mould spores.

7. Fumes

- 7.1. Fumes may be produced on a project site for a variety of reasons such as use of motorized equipment, off gassing of sealants, adhesives and finish products, cutting/torching processes, exposure of sanitary systems, process ignition gases such as propane and acetylene, proximity of project temporary washrooms, radon, etc.
- 7.2. The impact of fumes on occupants may range from discomfort to health risk, to life safety risk.

- 7.3. The project manager or supervisor must ensure that all potential fume sources are identified and remedial or control measures included in the scope of work by the contractor.
- 7.4. Monitoring equipment may be required to determine for example radon exposure or safety of confined space access.

8. Activity Assessment

- 8.1. Activities that may produce contaminants which require control may be considered as low, medium and high impact.
- 8.2. Low impact activities include routine maintenance and repairs that may create localized dust or odors or brief periods of noise which are not considered harmful to occupants but may be a nuisance which requires minimal control. These may include activities such as opening ceiling tiles or gyproc walls, replacing a plumbing fixture, paint touch ups, drilling through a wall, etc.
- 8.3. Medium impact activities include larger repair jobs or longer duration projects that will create more wide spread levels of contaminant which must be controlled to prevent exposure to building occupants. Boiler cleaning, ceiling replacement, long periods of hammer drilling, etc.
- 8.4. High impact activities include large demolition and construction projects, or jobs with exposure to contaminants that are a risk to health or life safety such as asbestos remediation, mould abatement, lead paint clean up, etc.

9. Hazard Assessment

- 9.1. A hazardous assessment is required to be completed for each job to ensure hazards are identified and corresponding controls are implemented. Depending upon the circumstances at the site it may be necessary to upgrade and/or add other precautions.
- 9.2. Determine the most appropriate hazard classification and apply the corresponding protocols. The attached hazard assessment identifies the minimum controls that must be in place during the corresponding activities. Depending on the specific circumstances at a site further controls may be required. When the hazards are deemed to be in the C or F category the form including specific controls must be submitted to the board for review, prior to commencing work. The contractor may still be required to complete their own hazard assessment of the job/work.

10. Contaminant Controls Procedure for initiating work for all Contaminant Controls:

10.1. Contaminant Control I

- 10.1.1. The tradesperson or project manager for the board will discuss the details, including the scope and any impacts of the job/project with the principal.

- 10.1.2. Ensure fire exiting requirements and life safety systems are addressed or adequate mitigating plans are implemented for the building, construction staff and building occupants.
- 10.1.3. Presence of lead paint or ACM's (Asbestos Containing Materials) must be determined prior to the start of any job. Specific protocols or Codes of Practice may apply.
- 10.1.4. Consideration will be given for work that is anticipated to generate significant noise, odours or VOC's (Volatile Organic Compounds) and this will be scheduled outside of school hours or during times when the noise will not disrupt occupant activities. This will require coordination with the Principal.
- 10.1.5. The work area shall be isolated where possible. This may be achieved at varying levels, by closing doors and opening outside windows for ventilation or by installing appropriate hoarding and negative pressure units to ensure contaminants are not circulated throughout the school causing further health and safety concerns.
- 10.1.6. Dust shall be minimized during the activity. When drilling, sanding or cutting is taking place, wetting the area may be necessary to reduce dust.
- 10.1.7. Good housekeeping practices shall be maintained at all times on the work site. Bag and remove dust and debris from the building as soon as possible.
- 10.1.8. Possible environmental impacts shall be managed and minimized. If work uncovers environmental contaminants or suspected contaminants such as oil spills (current or historic) or potentially friable asbestos materials (check the school asbestos audit) that may be disturbed, this information shall be brought to the attention of the Board's employee responsible for the project so that appropriate actions can be taken.
- 10.1.9. When the activity is completed the work area shall be inspected and cleaned. Dust and debris shall be removed from the area and all efforts will be made to return items to their pre-maintenance activity location.
- 10.1.10. The Principal shall be notified that the work is completed.
- 10.2. **Contaminant Control II** - All Contaminant Control I measures shall apply, as well as;
 - 10.2.1. Cover furniture, bookshelves and teaching materials with plastic sheets.
 - 10.2.2. Water misting while performing dust generating activities may be required.
 - 10.2.3. Seal un-used doors. Seal wall penetrations, electrical outlets, or any other source of air leaks in the construction area.
 - 10.2.4. Seal exhaust air vents in construction area and open the windows. If possible shut down air handling system in the area for duration of project.
 - 10.2.5. A walk out mat at exterior of exit door to trap dust may be required.
- 10.3. **Contaminant Control III** - All Contaminant Control I and II measures shall apply, as well as;
 - 10.3.1. Install an impermeable dust barrier from the true ceiling to the floor consisting of two layers of 6 mil fire retardant polyethylene or solid wall and sealed door. The wall shall remain in place until the job is finished and the clean-up is completed.

- 10.3.2. Seal all wall penetrations
- 10.3.3. Seal off all return and supply air handling ducts and close all windows.
- 10.3.4. Turn off the air handling system in the area of construction.
- 10.3.5. Maintain negative air pressure in the construction area using HEPA filter equipped exhaust ventilation. The pressure differential between the project area of contamination and the building's occupied areas shall be demonstrable by a means approved by the Board employee responsible for the project.
- 10.3.6. Ensure that the air is exhausted directly outside and away from intake vents.
- 10.3.7. Vacuum all horizontal surfaces including drop cloths with a hepa vacuum.
- 10.3.8. Remove drop clothes
- 10.3.9. Vacuum again all horizontal surfaces with HEPA Vacuum.
- 10.3.10. Restore ventilation.
- 10.3.11. Remove enclosure and equipment.
- 10.4. **Control IV: (External Work)**
 - 10.4.1. External work may impact building interior or occupants.
 - 10.4.2. To reduce the impact to building interior or occupants, it may be necessary to contain the work area from impacting building interior. This may include closing or opening windows, tarping ceilings to capture debris or water, temporary relocation of occupants or ventilation controls.
 - 10.4.3. The job supervisor shall consider weather conditions and forecast to reduce the effect of any weather impacts to the building materials or building occupants.
 - 10.4.4. It may be necessary to use protective tarps and ground cover sheets below equipment and work areas to contain building debris such as paint chips, materials, dust or oil from equipment.
 - 10.4.5. When the job is completed and the tarps have been lifted, inspect the ground around the job for debris and clean as necessary.

Fire Protection

10.5. Type V: General Fire Protection

- 10.5.1. Ensure fire exiting requirements and life safety systems are addressed or adequate mitigating plans are implemented for the building, construction staff and building occupants. Staff must be aware of temporary modifications to fire safety plans.
- 10.5.2. MSDSs for all materials to be used must be reviewed and available on site.
- 10.5.3. Construction materials stored outside must be a minimum distance of ten feet from the building and be in a secured area.
- 10.5.4. Flammable or Combustible liquids must be stored as per Fire Code requirements. All flammable and combustible liquids or materials must be kept in a secure area at all times.

10.6. Control VI: Fire Protection (minor hot work) - All Contaminant Control V shall apply as well as;

- 10.6.1. Notify the Principal that a risk of fire has increased and the area in which the hot work will occur.
- 10.6.2. Refer and implement the board's hot work permit process. At a minimum the following should be considered;
 - 10.6.2.1. Sweep the work area and remove all unnecessary materials in the vicinity; particularly all combustible and flammable materials and liquids shall be removed from the area (35 feet).
 - 10.6.2.2. Have an appropriate size fire extinguisher available.
 - 10.6.2.3. Inspect the work location for areas (such as a hole in the wall) where hot material or sparks could fall and smolder and close them off so that any hot debris can only fall within your field of view.
 - 10.6.2.4. If it is possible that the flame will go past the object being welded or soldered and excessively heat a flammable or combustible material then either protect that material with a non-flammable material or wet the material and keep it wetted during the use of heat or grinding.
 - 10.6.2.5. Remain in the area while the joint and/or heated materials cool to room temperature (ambient) while checking for the smell or appearance of smoke in the area.
 - 10.6.2.6. Stay in the area for at least Y2 hour and then re-inspect for any smell or appearance of smoke.
 - 10.6.2.7. Ask another staff person to inspect the area for the smell or appearance of smoke. Record who you asked to do the final inspection.

10.6.3. Type VII: Fire Protection (hot work w fire watch) - All Contaminant Control V and VI shall apply as well as;

- 10.6.4. Notify the Principal that a risk of fire has increased and the area in which the hot work will occur. If any life safety system components (sprinkler, detectors, fire alarms) are not functioning, hot work should not proceed until these systems are

functioning unless fire watch procedures for life systems are followed. See Activation of Fire Watch for Life Safety Systems checklist. Appendix...XX

- 10.6.5.** Refer and implement the board's hot work permit process. At a minimum the following should be considered;
- 10.6.5.1.** Cover all floor openings with fire stop material. Seal duct work openings with metal covers or blankets and close all doors.
 - 10.6.5.2.** Ensure that there are no potentially explosive atmospheres in the area.
 - 10.6.5.3.** Hot work on vessels, pressure tanks or boilers, use only contractors who are qualified by nationally or internationally recognized boiler and pressure vessel code.
 - 10.6.5.4.** Notify the local fire department of the type of work and the work schedule.
 - 10.6.5.5.** Before hot work is started, designate one employee responsible to complete the fire watch: while work is in progress, during lunch breaks and other breaks and for one hour after all flames are extinguished for the day and monitor the area for an additional two hours. After three hours after the last flame has been extinguished, have a second employee do a final survey of the area for smells or evidence of smoldering or fire and record the inspection.

APPENDIX
Fire Watch Activation Checklist

1. Documentation (identify locations to be checked on an hourly basis, provide contact information for relevant board staff and outside agencies} Board provided template to be used for documentation.
2. Procedure reviewed with Custodian or individual responsible for fire watch. Any high risk areas shall be identified to be highlighted on the documentation page and checked during the rounds.
3. Staff working in the building have been notified of the Fire Watch and that they are responsible to monitor areas for signs of fire or smoke and have been reminded of required actions to take according to the school fire safety plan.
4. Staff responsible for fire watch have been trained in how to use a fire extinguisher. (PASS)
5. Staff responsible for the fire watch have a means of communication (cell phone or walkie-talkies)
6. Staff responsible for the fire watch are aware of the procedure for initiating fire alarm and what systems are functioning. i.e. systems (sprinklers, alarm panel or if school has monitoring company or if calling 911 is required)
7. The School Insurance Program (SIP) Emergency Information Line has been notified 1-902-448-2840
8. All relevant information has been documented in the school's fire books. Including date, time and reason for fire watch.

Fire Watch De-Activation Checklist

1. Document the date, time and actions taken to remedy the deficiency requiring the fire watch.
2. School Insurance Program (SIP) has been notified
3. Copy of the Fire Watch documentation is kept in the fire book and the original is sent to the HRSB Project Representative.

END OF SECTION 01 35 13

SECTION 01 35 29 - OCCUPATIONAL HEALTH & SAFETY REQUIREMENTS

1. References

- 1.1.** CSA S269.1-1975 Falsework for Construction Purposes.

2. CONSTRUCTION SAFETY MEASURES

- 2.1.** Observe construction safety measures of:

2.1.1. National Building Code 2010, Part 8

2.1.2. National Fire Code of Canada

2.1.3. Provincial Government, including but not limited to the:

2.1.3.1. Occupational Health & Safety Act revised Statutes of Nova Scotia 1996, Chapter 7 and regulations.

2.1.3.2. Workers' Compensation Act

2.1.3.3. Fire Protection Act

2.1.3.4. Dangerous Goods Transportation Act

- 2.2.** In case of conflict or discrepancy the more stringent requirement shall apply.

- 2.3.** Ensure that employees working on this specific project have met training requirements as legislated by the Nova Scotia Occupational Health & Safety Act and its regulations.

- 2.4.** Where reference is made to jurisdictional authorities, it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of the building.

3. Equipment & Tools

- 3.1.** Each user of equipment or tools shall be responsible to examine for sufficiency before use. Make equipment and tools safe if necessary.

4. WHMIS

- 4.1.** 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.

- 4.2.** Have a copy of WHMIS data sheets available at the workplace on delivery of materials.

5. Hazardous Material

- 5.1. Should material resembling hazardous materials other than those identified with the Contract Documents, including but not limited to spray or trowel applied asbestos, be encountered in course of work; stop work immediately. Do not proceed until written instructions have been received from Consultant.
- 5.2. Where work entails use, storage, or disposal of toxic or hazardous materials, chemicals and or explosives, or otherwise creates a hazard to life, safety, health, or the environment; work shall be in accordance with the Jurisdictional Authority.

6. Site Cleaning

- 6.1. Except where special permission is obtained, maintain clear access on public sidewalks and roads.
- 6.2. Maintain walks and roads clear of construction materials and debris, including excavated material. Clean walks and roads as frequently as required to ensure that they are cleared of materials, debris and excavated material.

7. Fire Safety Requirements

- 7.1. Enforce fire protection methods, good housekeeping and adherence to local and Underwriter's fire regulations including, but not limited to, Fire Protection Act and the Provincial Building Code Act. Provide UL approved fire extinguishers, and other fire-fighting services and equipment, except where more explicit requirements are specified as the responsibility of individual Sections.
- 7.2. Smoking is not permitted on school property.
- 7.3. Advise Fire Chief in the area of Work of any work that would impede fire apparatus response, including but not limited to violation of minimum overhead clearance prescribed by the fire chief, erecting of barricades and digging of trenches and in areas where work is being done.
- 7.4. Ensure nothing subverts the integrity of fire protection provided for the building structure.

8. Reporting Fires

- 8.1. Know the location of the nearest fire alarm box and telephone, including the emergency phone number.
- 8.2. Report immediately all fire incidents to the fire department as follows:
 - 8.2.1. Activate nearest fire alarm box, or
 - 8.2.2. Telephone local fire department
 - 8.2.3. Where fire alarm box is exterior to building, the person activating the fire alarm box shall remain at the box to direct Fire Department to scene of the fire.

- 8.2.4.** When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

9. Safety Document Submission

- 9.1.** Ensure Safety Document Submission applies to Work of this specific project and site.
- 9.2.** Submit two (2) copies of Project Safety Document at the Pre-Construction Meeting. Do not commence Work nor deliver material on-site prior to submission.
- 9.3.** Include in Safety Document submission specific information detailing the methods and procedures to be implemented ensuring adherence to the acts, regulations, codes and policies specified in this section and to:
- 9.3.1.** Ensure the Health & Safety of persons at or near the Work; including, but not limited to, the Public.
- 9.3.2.** Ensure the measures and procedures of the regulatory agencies specified are carried out.
- 9.3.3.** Ensure every employee, self-employed person and employer performing Work under this contract complies with the regulatory agencies specified.
- 9.3.4.** Where changes to the methods and procedures in the execution of work change submitted safety methods and procedures, modify submitted Safety Documentation and submit modifications, in writing to the Consultant and Owner prior to implementation.

10. Safety Document Organization

- 10.1.** Organize information in the form of an instructional manual as follows:
- 10.1.1.** Place in binders of commercial quality, accommodating 8½" x 11" paper size.
- 10.1.2.** Cover: Identify binder with typed or printed title 'Project Safety Document' and list the title of project.
- 10.1.3.** Provide tabbed fly leaf for each separate heading, with typed heading on tab.
- 10.1.4.** Where drawings are within the safety document, provide with reinforced punched binder tab. Bind in with text; fold in larger drawings to size of text pages.
- 10.1.5.** Arrange content under Safety Document headings specified herein.

11. Safety Document Headings

11.1. Employee Safety Training

11.1.1. Place, under this heading, a statement indicating employees working on this specific project have met specified training requirements, if required.

11.2. Company Safety Policy

11.2.1. Place, under this heading, information pertaining to the company's policy and commitment to Occupational Health & Safety, including the responsibilities of management, supervisors and workers.

11.3. Company Safety Rules in General Terms

11.3.1. Place, under this heading, information of a general, global nature, applying to every work environment where the company has staff and pertaining to rules directing compliance to policy. For example state company safety rules with respect to use of hard hats, safety glasses, safety foot ware, CSA approval on such items, use of alcohol or non-prescription drugs.

11.4. Hazard Assessment

11.4.1. Place, under this heading, information identifying possible hazards specific to this project and identify safe methods and procedures for the execution of work to ensure safety in the work place.

11.4.2. Arrange contents of this heading by technical section number of the project manual.

11.5. Emergency Action Plan

11.5.1. Place, under this heading, information detailing action to be taken in the event of various emergencies.

11.5.2. Arrange content under the following sub-headings:

11.5.2.1. First Aid

11.5.2.1.1. Include information concerning establishment of a First Aid Station, related supplies, staff awareness of location and staff training in First Aid Care of Casualties.

11.5.2.2. Contact of Emergency Support Groups:

11.5.2.2.1. Include relative information including phone location for emergency use, the emergency telephone numbers and their location for the various organizations which must be contacted in case of an emergency, and staff training in procedures.

11.5.2.3. Cessation of Work:

11.5.2.3.1. Include relative information how work cessation during emergencies is handled and communicated to persons present on site.

11.6. Joint Occupational Health & Safety Committee/Representative:

11.6.1. Place under this heading information detailing membership and terms of reference.

OCCUPATIONAL HEALTH & SAFETY SUMMARY FOLLOWS THIS PAGE

Occupational Health & Safety Summary (to be submitted with each monthly Progress estimate)

The following information summarizes Occupational Health & Safety activities on the project conducted by the Contractor during the month and includes activities of Subcontractors. Activities include all matters prescribed by the Occupational Health & Safety Act and Regulations and the submitted Occupational Health & Safety Document for the Project.

Indicate the applicable # number below:

List new Contractors on Site below:

____ new contractors on site,

____ orientations

____ toolbox talks

____ safety meetings

____ Joint Occupational Health
and Safety Committee meetings

____ hazard assessments

____ formal written inspections

____ warnings issued to employees or subcontractors

____ other, explain _____

The Contractor certifies that the above noted activity list is accurate and that during the month:

Check

All activities on the Project were found to be in compliance with the Occupational Health & Safety Act and Regulations

Some activities on the Project were not found to be in compliance with the Occupational Health & Safety Act and Regulations but were adequately corrected in an appropriate time frame.
Explain _____

Prepared by

Certified by

(Contractor Project Manager)

(Contractor Senior Management)

END OF SECTION 01 35 29

SECTION 01 37 00 - SCHEDULE OF VALUES

1. Related Documents

- 1.1. General Conditions of Contract.

2. General

- 2.1. Submit to the Consultant, and Owner, Schedule of Values, within twenty (20) days after signing Agreement.
- 2.2. Use Schedule of Values as basis for Contractor's Progress Claim.

3. Form Of Submittal

- 3.1. Form included at end of this Section.
- 3.2. **The form included below is a suggested guide but might not be appropriate for all projects. Contractors may submit their own template to the Owner for review/approval.**

4. Preparing Schedule Of Values

- 4.1. Itemize separate line item cost for work required.
- 4.2. Round off figures to nearest ten (10) dollars.
- 4.3. The sum of all values listed in the schedule shall equal the total contract sum.

5. Review And Submittal

- 5.1. After review by Consultant and Owner, revise and resubmit Schedule as directed.
- 5.2. The form shall be completed and supported by such evidence as to its correctness as the Consultant may reasonably direct.

Schedule Of Values

Project Name WASTEWATER TREATMENT PLANT REPLACEMENT #3878

Contract Number _____

Consultant _____

Contractor _____

Date _____

Item	Description	Item Amount
1. General Requirements		
1.1.	Mobilization & Initial Expenses	
1.2.	Site Overhead & Fee	
1.3.	Bonds	
1.4.	Certificates	
1.5.	Testing	
1.6.	Construction Facilities & Temporary Controls	
1.7.	Other (Specify)	
	Total (Items 1.1 to 1.7)	_____

2. Excavation, Backfill, Sitework		
	Total (Item 2.)	_____

3. Concrete		
	Total (Item 3.)	_____

Item	Description	Item Amount
4. Masonry		
	Total (Item 4.)	_____
5. Metals		
	Total (Item 5.)	_____
6. Wood & Plastics		
6.1.	Rough Carpentry	
6.2.	Finish Carpentry	
6.3.	Architectural Woodwork	
	Total (Items 6.1 to 6.3)	_____
7. Thermal & Moisture Protection		
7.1.	Insulation	
7.2.	Air Vapour Barrier	
7.3.	Aluminum Composite Panels	
7.4.	Preformed Metal Siding	
7.5.	Fire Stopping	
7.6.	Roofing	
	Total (Item 7.1 to 7.6)	_____

8. Doors And Windows

- 8.1. Metal Doors & Frames
- 8.2. Wood Doors
- 8.3. Hardware
- 8.4. Windows

Total (Items 8.1 to 8.4) _____

<u>Item</u>	<u>Description</u>	<u>Item Amount</u>
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9. Finishes

- 9.1. Acoustic Ceiling Systems
- 9.2. Gypsum Board and Support Systems
- 9.3. Hard Tile
- 9.4. Resilient Tile
- 9.5. Painting

Total (Items 9.1 to 9.5) _____

10. Specialties

- 10.1. Tackboards, Communication Boards
- 10.2. Toilet & Bath Accessories
- 10.3. Manufactured Specialties
- 10.4. Food Service Equipment

Total (Items 10.1 to 10.4) _____

11. Mechanical

- 11.1. As per Sections

Total (Item 11.) _____

12. Electrical

- 12.1. As per Sections

Total (Item 12.) _____

TOTAL (Items 1 - 12) _____

END OF SECTION 01 37 00

SECTION 01 41 00 - REGULATORY AGENCIES

1. Jurisdictional Authorities

- 1.1.** Where reference is made to jurisdictional authorities, it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of building.

2. Definitions

- 2.1.** The "Constructor" named in the Construction Safety Act, Chapter 52, Revised Statutes of Nova Scotia, as amended by 1972, Chapter 25; and Construction Safety Regulations, pursuant to Chapter 52 R.S.N.S., including any amendments, shall mean the "Contractor" for the Work performed under this Specification.

3. Fire Prevention, Safety & Protection

- 3.1.** General Construction Safety Measures:
- 3.1.1.** Observe safety measures of the
 - 3.1.1.1.** National Building Code 2010, Part 8.
 - 3.1.1.2.** National Fire Code of Canada.
 - 3.1.1.3.** Provincial Government, including but not limited to the Occupational Health & Safety Act Revised Statutes of Nova Scotia 1996, Chapter 320, and the Construction Safety & Industrial Safety Regulations made pursuant to the Occupational Health and Safety Act, 1996.
 - 3.1.1.4.** Workers'/Workmen's Compensation Board.
 - 3.1.2.** In case of conflict or discrepancy the more stringent requirement shall apply.
 - 3.1.3.** Maintain clear emergency exit paths for personnel.
- 3.2.** Except where special permission is obtained, maintain clear access on public sidewalks and roads.
- 3.3.** Maintain walks and roads clear of construction materials and debris, including excavated materials. Clean walks and roads as frequently as required to ensure that they are cleared of materials, debris and excavated materials.
- 3.4.** WHMIS:
- 3.4.1.** 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 & Welfare Canada.

- 3.4.2. Have a copy of WHMIS data sheets available at the workplace on delivery of materials.

Blockage Of Roadways

- 3.5. Advise Fire Chief of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by fire chief, erecting of barricades and the digging of trenches.

4. Smoking Precautions

- 4.1. Observe, at all times, smoking regulations.

5. Rubbish And Waste Materials

- 5.1. Rubbish and waste materials are to be kept to a minimum.
5.2. The burning of rubbish is prohibited.

6. Flammable And Combustible Liquids

- 6.1. The handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.
6.2. Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes, requires the permission of the Fire Chief.
6.3. Transfer of flammable and combustible liquids is prohibited within buildings or jetties.
6.4. Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.
6.5. Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.
6.6. Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and the Fire Department is to be notified when disposal is required.

7. Hazardous Substances

- 7.1. Work entailing the use of toxic or hazardous materials, chemicals and/or explosives, otherwise creates a hazard to life, safety or health, will be in accordance with the National Fire Code of Canada.

- 7.2. Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. The Fire Chief is to be informed prior to and at the cessation of such work.

8. Questions and/or Clarification

- 8.1. Direct any questions or clarification on Fire Safety in addition to above requirements to Fire Chief.

9. Fire Inspection

- 9.1. Site inspections by Fire Chief will be coordinated through AVRSB Project Manager.
- 9.2. Allow Fire Chief unrestricted access to the work site.
- 9.3. Co-operate with the Fire Chief during routine fire safety inspection of the Work site.
- 9.4. Immediately remedy all unsafe fire situations observed by the Fire Chief.

10. Reference Standards

- 10.1. Where edition date is not specified, consider that references to manufacturer's and, published codes, standards and specifications are made to the latest edition, (revision) approved by the issuing organization, current at the date of this Specification.
- 10.2. Reference standards and specifications are quoted in this Specification to establish minimum standards. Work which in quality exceeds these minimum standards shall be considered to conform.
- 10.3. Should the Contract Documents conflict with specified reference standards or specifications the General Conditions of the Contract shall govern.
- 10.4. Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.
- 10.5. Have a copy of each code, standard and specification, and manufacturer's directions, instructions and specifications, to which reference is made in this Specification, always available at construction site.
- 10.6. Standards, specifications, associations, and regulatory bodies are generally referred to throughout the specifications by their abbreviated designations:

AA	The Aluminum Association
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASTM	American Society for Testing & Materials
CCA	Canadian Construction Association
CGSB	Canadian General Standards Board
CSA	Canadian Standards Association
NSDTIR	Department of Transportation & Infrastructure Renewal, Province of Nova Scotia
IAO	Insurers Advisory Organization
NBC	National Building Code
NFPA	National Fire Protection Association
CANS	Construction Association of Nova Scotia
ULC	Underwriters Laboratories of Canada
WHMIS	Workplace Hazardous Materials Information System

END OF SECTION 01 41 00

SECTION 01 45 00 - QUALITY CONTROL

1. Section Includes

- 1.1. Inspection and testing, administrative and enforcement requirements
- 1.2. Tests and mix designs.
- 1.3. Mock-ups.
- 1.4. Mill tests.
- 1.5. Equipment and system adjust and balance.
- 1.6. Verification by affidavits and certificates that specified products meet requirements of reference standards: In applicable Sections of the Specification.
- 1.7. Testing, balancing and adjusting of equipment: In applicable Mechanical and Electrical Sections of the Specification.
- 1.8. Cutting & Patching: Section 01 11 41.

2. Related Sections

- 2.1. Section 01 33 00 Submittal Procedures: Submission of samples to confirm product quality.
- 2.2. Section 01 61 00 Material & Equipment: Material and workmanship quality – reference standards.
- 2.3. Section 01 77 00 Contract Closeout.

3. REVIEW OF WORK

- 3.1. The Owner shall have access to the Work. If part of the Work is in preparation at locations other than the Place of the Work, access shall be given to such work whenever it is in progress.
- 3.2. Give timely notice to the Owner's Representative, requesting review of the Work as indicated in the Contract Documents.
- 3.3. If the Contractor covers or permits to be covered Work that has been designated for review by the Owner before such is made, uncover such Work, have the review satisfactorily completed and make good such Work at no extra cost to Owner.

4. Inspection, Special Tests, Approvals

- 4.1. Engage the services of appropriate inspection testing agencies ensuring the Work meets codes, acts and regulations, and laws in force at the place of Work. Include such costs in the Contract Price.

- 4.2. Give timely notice requesting inspection to those required to provide inspections, special tests, or approvals, where Work is designated, by the Owner's instructions or the law of the place of Work, for special tests.
- 4.3. If the 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 the inspections or tests satisfactorily completed and make good such Work at no extra cost to the Owner.
- 4.4. The Owner may order any part of the Work to be examined if the Work is suspected to be not in accordance with the Contract Documents. If, upon examination such Work is found not in accordance with the Contract Documents, correct such Work and pay the cost of examination and correction. If such Work is found in accordance with the Contractor Documents, the Owner shall pay the cost of examination and replacement.

5. Independent Inspection Agencies

- 5.1. Independent Inspection/Testing Agencies may be engaged by the Owner for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Owner.
- 5.2. Provide access to the Work, and equipment required for executing inspection and testing by the appointed agencies.
- 5.3. Employment of inspection/testing agencies does not relax the Contractor's responsibility to perform Work, or carry out his own inspections and testing in accordance with the Contract Documents.
- 5.4. If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Owner at no cost to the Owner. Pay costs for retesting and reinspection.

6. Access To Work

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

7. Procedures

- 7.1.** Notify the appropriate agency and Owner in advance of the requirement for tests, in order that attendance arrangements can be made.
- 7.2.** Submit samples and/or materials required for testing, at specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.
- 7.3.** Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

8. Rejected Work

- 8.1.** Remove defective Work, whether the result of poor workmanship, use of defective products or damage and whether incorporated in the Work or not, which has been rejected, including (but not limited to) defective Work rejected by the Owner as failing to conform to the Contract Documents. Replace or re-execute in accordance with the Contract Documents.
- 8.2.** Make good other Contractor's work damaged by such removals or replacements promptly.
- 8.3.** If in the opinion of the Owner, it is not expedient to correct defective Work or Work not performed in accordance with the Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work performed and that called for by the Contract Documents, the amount of which shall be determined by the Owner.

9. Reports

- 9.1.** Submit four (4) copies of inspection and test reports to the Owner.
- 9.2.** Provide copies to Contractor's Consultant and Subcontractor of Work being inspected or tested.

10. Tests and Mix Designs

- 10.1.** Furnish test results and mix designs as may be requested.
- 10.2.** The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by law of the Place of Work shall be appraised by the Owner and may be authorized as recoverable.

11. Mock-Up

- 11.1.** Prepare mock-up for Work for each finish in the Work and other work specifically requested in the specifications. Include for Work of all Sections required to provide mock-ups.
- 11.2.** Construct in all locations as specified in specific Section.
- 11.3.** Prepare mock-up for Owner's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in the Work.
- 11.4.** Failure to prepare mock-up in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- 11.5.** If requested the Owner will assist in preparing a schedule fixing the dates for preparation.
- 11.6.** Mock-ups may remain as part of the Work, unless specified otherwise in the Contract Documents.

12. Mill Tests

- 12.1.** Submit mill test certificates as may be requested.

13. Equipment And Systems

- 13.1.** Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- 13.2.** Refer to Contract Documents for definitive requirements.

END OF SECTION 01 45 00

SECTION 01 52 00 – CONSTRUCTION & TEMPORARY FACILITIES

1. General

- 1.1. Include in the Work construction and temporary facilities required as construction aids or by jurisdictional authorities or as otherwise specified. Install to meet needs of construction as Work progresses. Maintain construction and temporary facilities during use, relocate them as required by the Work, remove them at completion of need and make good adjacent Work and property affected by their installation.
- 1.2. Include in the Work construction and temporary facilities to provide for construction safety such as: fences, barricades, bracing, supports, storage, sanitation and first aid facilities, fire protection, stand pipes, electrical supply, construction equipment with its supports and guards, stairs, ramps, platforms, runways, ladders, scaffolds, guardrails, temporary flooring, rubbish chutes, and walkway, morality and guard lights, and as otherwise required of the Constructor by the Construction Safety Act, of the Province of Nova Scotia, as well as all other applicable regulations or jurisdictional authorities.
- 1.3. Construct temporary Work of new materials unless use of second-hand materials is approved.
- 1.4. Ensure that structural, mechanical, and electrical characteristics of temporary facilities are suitable and adequate for use intended. Be responsible that no harm is caused to persons and property by failure of temporary facilities because of placing, location, stability, protection, structural sufficiency, removal, or any other cause.
- 1.5. Locate temporary facilities as directed and coordinated with School Administration and HRSB.
- 1.6. Relocate construction and temporary facilities as required by the Progress of the Work, and remove at completion of Work.
- 1.7. Do not permit construction personnel to use new washroom and toilet facilities.
- 1.8. Interior work zones to be complete with temporary negative air ventilation units to be functioning at all times to control dust migration to occupied areas.
- 1.9. Refer also to HRSB Policies & Guidelines contained in Appendix A of Section 01 35 13.

2. Services

- 2.1. Temporary Electric Power:
 - 2.1.1. The Contractor will provide a source of electric power for all construction purposes.
 - 2.1.2. Coordinate with the Building Operator locations of power sources and arrange to connect under his direction.
 - 2.1.3. Install electric service distribution conductors and necessary components. Determine anticipated demand which will be placed on service during normal peak

periods and obtain approval on this basis before making installation. Supply power of characteristics required by the Work. Install a power centre for miscellaneous tools and equipment for each major building floor area with distribution box, a minimum of four 20 amp grounded outlets, and circuit breaker protection for each outlet. Make connections available to any part of the Work within distance of a 100'-0" extension.

2.2. Temporary Lighting:

2.2.1. Install lighting for

2.2.1.1. emergency evacuation, safety and security throughout the Project at intensity levels required by jurisdictional authorities.

2.2.1.2. performance of Work throughout Work areas as required, evenly distributed, and at intensities to ensure that proper installations and applications are achieved.

2.2.1.3. performance of finishing Work in areas as required, evenly distributed and of an intensity of at least 15 foot candles.

2.2.2. Permanent fluorescent lighting may be used during construction, provided that fixtures, lamps and lenses are completely cleaned. Incandescent sources may be used during construction to the extent of 20% of the total. Electrical Division Contractor to provide 20% spare lamps to the Owner for replacement purposes.

2.3. Temporary Sanitary Facilities:

2.3.1. Provide sanitary facilities for persons on the Work site. Facilities in areas of the building are only to be used under extraordinary circumstances and with prior approval.

2.4. Maintain fire protection as required by jurisdictional authorities. The Contractor is responsible for de-activating and re-activating Fire Alarm zones as required by the Work of the Contract and to maintain protection in the existing building.

3. Construction Aids

3.1. Hoists & Cranes:

3.1.1. Select, operate and maintain hoisting equipment and cranes as may be required. Operate such equipment only by qualified hoist or crane operators. Make hoist available for Work of each Section.

3.2. Building Enclosure:

3.2.1. Include in Work temporary enclosure for building as required to protect it, in its entirety or in its parts, against the elements, to maintain environmental conditions

required for Work. Design enclosures to withstand wind pressures required for the building by jurisdictional authorities. Erect enclosures to allow complete accessibility for installation of materials during the time enclosures remain in place.

3.3. Scaffolding:

- 3.3.1. Each user of scaffolding shall be responsible for its examination and testing for sufficiency before using it. He shall make it secure if necessary, or shall notify the Contractor in writing that he will not commence work until it is made secure; otherwise he will be held responsible for accidents due to its insufficiency.

4. Barriers

- 4.1. Install barricades for traffic control, and to prevent damaging traffic over exterior and interior finished areas, as well as safety barricades and otherwise, as may be required.
- 4.2. Construct hoardings and walkways as required by HRSB or jurisdictional authorities.

5. Protection

- 5.1. Protect roofs and podiums by substantial temporary construction to ensure that no damage occurs. Provide protection by materials of sufficient thickness to prevent all damage to structure and finish, and to waterproofing qualities of membranes, whenever each of these individual components are exposed. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations. Positively secure protection to prevent displacement from any cause.
- 5.2. Box with wood or otherwise protect from damage, by continuing construction, finished sills, jambs, corners, and the like.

END OF SECTION 01 52 00

SECTION 01 61 00 - MATERIAL & EQUIPMENT

1. General

- 1.1.** Products refer to materials, manufactured components and assemblies, fixtures and equipment incorporated in the Work.
- 1.2.** Use only products of Canadian manufacture unless such products are not manufactured in Canada, are specified otherwise, or are not competitive.
- 1.3.** Products for use in the Project and on which the Tender was based shall be in production at that time, with a precise model and shop drawings available for viewing.
- 1.4.** Where equivalent products are specified, or where alternatives are proposed under "substitution of products", these products claimed by the Contractor as equivalent shall be comparable in construction, type, function, quality, performance, and, where applicable, in appearance, as approved. Where specified equivalents are used in the tendered bulk sum price for the Work, they shall be subject to final approval.
- 1.5.** Incorporate products in the Work in strict accordance with manufacturers' directions unless specified otherwise.
- 1.6.** Products delivered to the Project site for incorporation in the Work shall be considered the property of the Owner. Maintain protection and security of products stored on the site after payment has been made for them.
- 1.7.** Do not install permanently incorporated labels, trademarks and nameplates, in visible locations unless required for operating instructions or by jurisdictional authorities.

2. Specified Products

- 2.1.** Products specified by manufacturer's name, brand name or catalogue reference shall be the basis of the bid and shall be supplied for the Work without exception in any detail, subject to allowable substitutions as specified.
- 2.2.** Where several proprietary products are specified, any one of the several will be acceptable.
- 2.3.** For products specified by reference standards, the onus shall be on the supplier to establish that such products meet reference standard requirements. The Consultant may require affidavits from the supplier, as specified in Section 01 33 00, or inspection and testing at the expense of the supplier, or both, to prove compliance. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such products are compatible with and harmless to Work with which they are incorporated.

3. Substitution Of Products During Progress Of Work

- 3.1.** Products substituted for those specified or approved, or both, shall be permitted only if the listed product cannot be delivered to maintain construction schedule and if the delay is caused by conditions beyond the Contractor's control.
- 3.2.** Obtain approval for substitutions. Application for approval of substitutions shall be made only by Contractor. Process proposals for substituted Work in accordance with procedures established for changes in the Work.
- 3.3.** Submit, with request for substitution, documentary evidence that substituted products are equal to, or superior to, approved products, and a comparison of price and delivery factors for both specified or approved products, and proposed substitute.
- 3.4.** Ensure that substituted products can be both physically and dimensionally incorporated in the Work with no loss of intended function, performance, space or construction time, and that spare parts and service are readily available. The Contractor shall be responsible for additional installation costs, including architectural and engineering fees, required by incorporation of substituted products, and for adaptations made otherwise necessary to ensure that above requirements are satisfied.

4. Product Handling

- 4.1.** Manufacture, pack, ship, deliver and store products so that no damage occurs to structural qualities and finish appearance, nor in any other way detrimental to their function or appearance, or both.
- 4.2.** Ensure that products, while transported, stored or installed, are not exposed to an environment which would increase their moisture content beyond the maximum specified.
- 4.3.** Schedule early delivery of products to enable Work to be executed without delay. Before delivery, arrange for receiving at site.
- 4.4.** Deliver package products, and store until use, in original unopened wrapping or containers, with manufacturer's seals and labels intact.
- 4.5.** Label packaged products to describe contents, quantity and other information as specified.
- 4.6.** Product handling requirements may be repeated and additional requirements specified, in other Sections.

5. Storage & Protection

- 5.1. Coordinate material delivery to ensure that areas within or on building are available to receive them.
- 5.2. Store manufactured products in accordance with manufacturer's instructions, when such instructions are attached to products or submitted by him.
- 5.3. Store finished products and woodwork under cover at all times.
- 5.4. Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous materials in bulk within the Project.
- 5.5. Storage and special protection requirements may be repeated, and additional requirements specified, in other Sections.

6. Defective Products & Work

- 6.1. Products and Work found defective; not in accordance with the Specifications; or defaced or injured through negligence of the Contractor, his employees or subcontractors, or by fire, weather or any other cause will be rejected for incorporation in the Work.
- 6.2. Remove rejected products and Work from the premises immediately.
- 6.3. Replace rejected products and Work with no delay after rejection. Provide replacement products and execute replacement Work precisely as required by the Specification for the defective Work replaced. Previous inspection and payment shall not relieve the Contractor from the obligation of providing sound and satisfactory Work in compliance with this Project Manual.

7. Workers, Suppliers & Subcontractors

- 7.1. Assign Work only to workers, suppliers, and Subcontractors who have complete knowledge, not only of the conditions of this Project Manual, but of jurisdictional requirements, and reference standards and specifications.
- 7.2. Give preference to use of local workers, suppliers, and Subcontractors wherever possible.

8. Workmanship

- 8.1. Unless otherwise specified in a more detailed manner, workmanship shall be of the highest quality recognized by trade executing the Work in accordance with standard practices, by the best methods recommended by the manufacturer of the Product, and as approved by the Consultant.

END OF SECTION 01 61 00

SECTION 01 77 00 – CONTRACT CLOSEOUT

1. Section Includes

- 1.1. Final cleaning.
- 1.2. Spare parts and maintenance materials.
- 1.3. Take over procedures.

2. Related Sections

- 2.1. Individual Specifications Sections: Specific requirements for operation and maintenance data.

3. Final Cleaning

- 3.1. Refer to the General Conditions of Contract.
- 3.2. Before final inspection, replace glass and mirrors broken, damaged and etched during construction, or which are otherwise defective.
- 3.3. In addition to requirements for cleaning-up specified in General Conditions of the Contract, include in Work final cleaning by skilled cleaning specialists on completion of construction.
- 3.4. Remove temporary protections and make good defects before commencement of final cleaning.
- 3.5. Remove waste products and debris other than that caused by the Owner, other contractors or their employees, and leave the Work clean and suitable for occupancy by Owner.
- 3.6. Remove surplus products, tools, construction machinery and equipment. Remove waste products and debris other than that caused by the Owner or other Contractors.
- 3.7. Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- 3.8. Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors and ceilings.
- 3.9. Vacuum clean and dust building interiors, behind grilles, louvres and screens as affected by Work.
- 3.10. Wax, seal, shampoo, buff or prepare floor finishes, as recommended by the manufacturer. Use products compatible with products used by building maintenance staff.
- 3.11. Broom clean and wash all horizontal and vertical surfaces as affected by Work.
- 3.12. Clean up and make good exterior grades, lawns, planting and surfaces after removal of temporary access and facilities.
- 3.13. Removing of visible labels left on materials, components, and equipment.

3.14. Maintain cleaning until Owner has taken possession of building or portions thereof.

4. Spare Parts And Maintenance Materials

- 4.1. Spare parts and maintenance materials provided shall be new, not damaged or defective, and of the same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.
- 4.2. Defective Products will be rejected, regardless of previous inspections. Replace products at own expense.
- 4.3. Store spare parts and maintenance materials in a manner to prevent damage, or deterioration.
- 4.4. Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification Sections.
- 4.5. Provide items of same manufacture and quality as items in the Work.

5. Demonstration Of Systems & Equipment

- 5.1. Give a complete demonstration of all systems and equipment in the presence of the Consultant at the following times:
 - 5.2. When each is 100% completed at the request of the Contractor.
 - 5.3. At time of inspection to validate final completion.
 - 5.4. At final completion for the benefit of the maintenance staff for the Project.
 - 5.5. Responsible personnel representing the Subcontractor responsible for the Work being demonstrated shall be present at each demonstration.

6. Submittals

- 6.1. Submit with application for substantial performance certificate.
 - 6.1.1. Certificate of substantial completion inspection report from electrical utility or inspection.
 - 6.1.2. Certificate of verification of fire alarm system.
 - 6.1.3. Certificate from the Fire Marshal's Office and I.A.O. of final inspection of sprinkler system.
 - 6.1.4. Air balance reports.
 - 6.1.5. Other reports required or specified.
 - 6.1.6. Maintenance Manuals and Operating Instructions.
- 6.2. Submit with application for release of final payment:
 - 6.2.1. Final project record drawings.
 - 6.2.2. Extra stock.

- 6.2.3. Performance bonds which shall remain in effect for one (1) year after take-over date.
- 6.2.4. Completed Liability Insurance Policy extended for one (1) year from take-over date.
- 6.2.5. Written guarantee covering all workmanship and materials used in the Work.
- 6.2.6. Maintenance bonds as specified.
- 6.2.7. Extended Warranties as specified
- 6.2.8. Certificate from Workers' Compensation Board.
- 6.2.9. Certificate from Health Services Tax Division.

7. Final Inspection Procedures

- 7.1. Schedule, make arrangements for and administer final inspections and close out in the following stages.
- 7.2. Contractor's Inspection:
 - 7.2.1. Determination that Project meets requirements for substantial performance and inspection is the responsibility of the Contractor.
 - 7.2.2. The Contractor and all Subcontractors shall conduct an inspection of the work, identify deficiencies and defects; repair as required. Notify the Consultant in writing of satisfactory completion of the contractor's Inspection and that corrections have been made. Request a Consultant's Substantial Performance Inspection.
- 7.3. Consultant's Inspection: Consultants and the Contractor will perform an inspection of the Work to identify obvious defects or deficiencies. The contractor shall correct Work accordingly.
- 7.4. Substantial Performance Inspection:
 - 7.4.1. When the items noted above are complete, request a substantial performance inspection of the Work by the Consultant, and the Contractor. If Work is deemed incomplete by the Consultant, complete the outstanding items and request a re-inspection.
 - 7.4.2. Substantial performance inspections shall be scheduled to begin within eight working days of the Contractor's request.
 - 7.4.3. Present at the substantial performance inspection will be:
 - 7.4.3.1. The Consultant and his Sub-consultants that he requires and notifies.
 - 7.4.3.2. The Owner's representatives, upon notification by the Consultant.
 - 7.4.3.3. The Contractor and such Subcontractors that he considers are required.
 - 7.4.3.4. The Contractor will compile a substantial performance deficiency list at this inspection and issue it to the Consultant and Owner.
 - 7.4.3.5. The Contractor shall correct substantial performance deficiencies before a date agreed upon by the Contractor and Consultant.

- 7.4.3.6. Upon the Consultant's approval of substantial performance, the Contractor shall submit an application for a substantial performance certificate.
- 7.4.3.7. When the Contractor has satisfied himself that these corrections have been completed in a satisfactory manner by his inspection he shall schedule a final Contractor's inspection by the Consultant, and the Owner's representatives if required, within five working days of the Contractor's request.
- 7.4.3.8. Upon the Consultant's approval of completion, the Contractor shall submit an application for a completion certificate.

8. Substantial Performance

- 8.1. The Consultant will issue a Certificate of Substantial Performance when satisfied outstanding deficiencies noted during inspections prior to the substantial completion inspection have been corrected, the Work is substantially complete and is so certified by the Owner.
- 8.2. A list of remaining deficiencies to be rectified before final acceptance will be attached to the Certificate of Substantial Performance.
- 8.3. Make submissions specified in Subparagraph 1.06 of this Section.

9. Certificate For Release Of Amount Due At Substantial performance

- 9.1. The Consultant will issue to the Owner a certificate for release of money in an amount equal to the amount due the Contractor under the Agreement providing he is satisfied the Work has been substantially completed.
- 9.2. The certificate shall indicate the date of substantial performance.
- 9.3. Payment shall be due upon date of substantial performance.

10. Completion Certificate

- 10.1. The Consultant will issue a Certificate of Completion (DSS Document DC670-92) when he is satisfied that outstanding deficiencies noted during inspections have been corrected and the Work is completed and is so certified by the Owner.
- 10.2. The date of the completion certificate will commence the required sixty (60) day period before release of final payment.

11. Certificate For Release Of Final Payment

- 11.1. The Consultant will issue to the Owner a certificate for release of final payment sixty (60) days after date of completion certificate providing he is satisfied the Work has been completed.

- 11.2. The certificate will be in an amount equal to the remaining money due the Contractor under the Contract, and shall indicate the date of final completion.
- 11.3. Payment shall be due upon date of final completion.

12. Warranties

- 12.1. Establishment of Warranties:
 - 12.1.1. Warranties shall commence on date of substantial performance certificate.
- 12.2. Warranty Period:
 - 12.2.1. The Owner will advise the Consultant of defects observed during warranty periods.
 - 12.2.2. The Consultant will notify the Contractor of defects observed during warranty period and request him to remedy the defects in accordance with the Contractor documents.
 - 12.2.3. Thirty (30) days before expiration of warranties the Owner's representatives, the Consultant and the Contractor will inspect the Work as arranged by the Contractor noting defects of products and workmanship.
 - 12.2.4. The Contractor shall immediately remedy such noted defects.

END OF SECTION 01 77 00

CONTRACTOR'S CHECKLIST

Enclose the following documents with your bid:

- ***Bid Security as required in section 21.1(Information for Bidders)*** - in the amount of 10% of the Contract Price (before HST).
- ***Contract Security for bids over \$100,000 as required in section 22.6.1.1(Information for Bidders)*** – required upon award)
- ***Certificate of Insurance*** indicating a minimum of ***\$5,000,000 Commercial General Liability Insurance*** per occurrence and ***Commercial Auto Liability Insurance*** covering all owned, non-owned and hired vehicles for a minimum combined single limit of ***\$2,000,000*** per occurrence and ***Builder's Risk Insurance*** in the amount of the contract price.
- ***Tentative Work Schedule (Timelines)*** – Subsequently, within five (5) business days of tender award the successful bidder shall provide a schedule clearly indicating timelines for completion of all aspects of the project.
- ***Workers' Compensation Board Letter*** of Good Standing
- ***Certificate of Recognition from one of the seven safety audit companies that jointly sign with the WCB:***
 - East Coast Mobile Medical Inc.
 - HSE Integrated
 - Nova Scotia Construction Safety Association
 - Nova Scotia Trucking Safety Association
 - Occupational Health & Educational Services (2002) Inc.
 - Safety Services Nova Scotia
 - Stantec Inc.

This list can be found on WCB's website: www.wcb.ns.ca.
- ***Completed HRSB Safety Plan***
- ***Applicable Warranty Information***



Project Safety Plan Outline

During the planning of each project, environmental and occupational health and safety issues will be assessed like any other key project component.

Prior to beginning a new project, tendering contractors shall examine the work area to identify potentially hazardous site specific situations.

Once identified, these hazards should be prioritized on this Hazard Assessments/Project Safety Plan Outline and corrective *actions* noted to eliminate or control each hazard. The dates of when and names of the persons who are responsible for completing the *action* should also be assigned.

Copies of the completed Safety Plan Outline shall be submitted as part of the tender document submittal, sent to the HRSB Operations Services Regional Manager, made available on the job site and communicated to the workers.

Project Name: _____

Project Location: _____

Project Start date: _____

Project End date: _____

Company Name: _____

Completed by: _____

(Contractor's project manager)

Date: _____

Copy to: _____

PLANNING:

Does the Contractor's Occupational Health and Safety Program deal with the work activities associated with this project? Yes No

Describe tasks to be undertaken: _____

HAZARDS ASSESSMENT:

Identify the hazards that could present themselves on this project (e.g. live electrical wires, over water, confined space, etc) and describe what steps will be taken to prevent an incident (e.g. cover up, de-energize, safe work practices, netting, etc). Prioritize from #1 as needing immediate action.

#	Hazard	Required Action	Completed by	Date
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

ENVIRONMENTAL ASSESSMENT:

Identify the environmental issues that could present themselves on this project (e.g. oil spills, asbestos, etc.) and describe the action that will be taken to eliminate or reduce the risk of occurrence (e.g. mop kits, air sampling, etc.)

#	Hazard	Required Action	Completed by	Date
1				
2				
3				
4				
5				

EMERGENCY RESPONSE:

In the event of an incident, pre-plan the response and write up the procedures. Minimally, the following list should be completed and posted on site:

Contact	Phone #	Contact	Phone #
Fire	911	Poison Control	428-8161
Ambulance	911	Dangerous Goods	1-800-565-1633
Doctor	911	Waste Disposal	
Police	911	Insurance	
HRSB Office	493-5110	Min/Dept of Labour	1-800-952-2687
Min./Dept.of Transport.		Min/Dept of Environment	1-800-565-1633

- Identify and arrange source of first aid, ambulance and rescue.
- Accidents will be reported to: _____
- Accidents will be investigated by: _____
- Back-up call to: _____
- HRSB # emergency/after hours: day 493-5110 after 4:00 pm 442-2476

SAFETY MEETINGS:

On this project, given the nature of the work and the anticipated size of the work force, the following frequency will apply:

Site meetings _____

Site Audits _____

Follow up with HRSB Manager: _____

SITE IMPLEMENTATION:

- Health and Safety Rep & Safety Committee:
Establish liaison between HRSB, contractor, site administration
First Aid, PPE, other safety items as required.

- Documentation:
Applicable MSDS
Safety program
Applicable work procedures
Permits
First Aid Certification

TRAINING:

The following training/testing will be mandatory on site:

1) _____

2) _____

3) _____

TENTATIVE SCHEDULE OF WORK:

- 1) Date Project Will Commence: _____
- 2) Number of Weeks to Complete Project: _____ weeks

NOTE:

Within one week of tender award the successful bidder shall provide a schedule clearly indicating timelines for completion of all aspects of the project.





Tantallon Elementary Schools WWTP Replacement

Issued for Tender



Tantallon Elementary Schools WWTP Replacement

Issued for Tender	WJD	May 17/17	SHE
Issued for Approval	W. D'E	Feb 1/17	SHE
Issued for Review	W. D'E	Jan 11/17	SHE
<i>Issue or Revision</i>	<i>Reviewed By:</i>	<i>Date</i>	<i>Issued By:</i>
			

<u>Section</u>	<u>Title</u>	<u>Pages</u>
<u>Division 03 - Concrete</u>		
03 10 00	CONCRETE FORMS AND ACCESSORIES	5
03 20 00	CONCRETE REINFORCING	5
03 30 00	CAST-IN-PLACE CONCRETE	15
03 35 05	CONCRETE FLOOR HARDENER AND SEALER	3
<u>Division 05 - Metals</u>		
05 50 00	METAL FABRICATIONS	7
<u>Division 06 - Wood, Plastics, and Composites</u>		
06 10 00	ROUGH CARPENTRY	5
06 17 53	PRE-FABRICATED WOOD TRUSSES	4
<u>Division 07 - Thermal and Moisture Protection</u>		
07 11 00	DAMPPROOFING	2
07 21 00	INSULATION	5
07 28 00	AIR/VAPOUR BARRIERS	3
07 31 13	ASPHALT SHINGLE ROOFING AND ACCESSORIES	5
07 46 40	RIGID VINYL SIDING	2
07 62 00	METAL FLASHING AND TRIM	3
07 80 00	FIRESTOPPING AND SMOKE SEALS	5
07 92 00	SEALANTS	4
<u>Division 08 - Openings</u>		
08 11 14	HOLLOW METAL DOORS, FRAMES AND HARDWARE	6
08 71 10	FINISH HARDWARE	8
<u>Division 09 - Finishes</u>		
09 21 16	GYPSUM BOARD	4
09 91 23	PAINTING	9
<u>Division 12 - Furnishings</u>		
12 35 53	FINISH CARPENTRY, ARCHITECTURAL WOODWORK AND CASEWORK	7
<u>Division 21 - Fire Suppression</u>		
21 05 01	MECHANICAL GENERAL REQUIREMENTS	5
<u>Division 23 - Heating, Ventilating and Air-Conditioning (HVAC)</u>		
23 05 29	BASES, HANGERS AND SUPPORTS	4
23 05 48	VIBRATION ISOLATION	3
23 05 53	MECHANICAL IDENTIFICATION	4
23 07 13	THERMAL INSULATION FOR DUCTING	6
23 31 13	METAL DUCTS - LOW PRESSURE TO 500 PA	6
23 33 00	DUCT ACCESSORIES	4
23 34 00	COMMERCIAL FANS	4
23 82 40	HEATERS - ELECTRIC	3
<u>Division 26 - Electrical</u>		

Division 26 - Electrical

26 05 00	ELECTRICAL GENERAL REQUIREMENTS	15
26 05 20	WIRE AND BOX CONNECTORS (0 - 1000V)	2
26 05 21	WIRES AND CABLES (0 - 1000V)	2
26 05 28	GROUNDING - SECONDARY	3
26 05 29	FASTENINGS AND SUPPORTS	3
26 05 31	JUNCTION, PULL BOXES AND CABINETS	2
26 05 32	OUTLET BOXES, CONDUIT BOXES AND FITTINGS	2
26 05 34	CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS	4
26 05 44	INSTALLATION OF CABLES IN TRENCHES AND DUCTS	2
26 24 17	PANELBOARD BREAKER TYPE	3
26 27 26	WIRING DEVICES	2
26 28 14	FUSES - LOW VOLTAGE	3
26 28 21	MOULDED CASE CIRCUIT BREAKERS	2
26 29 13	MOTOR CONNECTIONS	1
26 50 00	LIGHTING EQUIPMENT	4
26 52 01	UNIT EQUIPMENT FOR EMERGENCY LIGHTING	1
26 90 00	PLANT INSTRUMENTATION AND CONTROLS EQUIPMENT	6

Division 31 - Earthwork

31 10 00	CLEARING AND GRUBBING	2
31 23 10	EXCAVATING, TRENCHING AND BACKFILLING	11

Division 32 - Exterior Improvements

32 31 13	CHAIN LINK FENCES AND GATES	5
32 92 19	HYDRAULIC SEEDING	5
32 98 00	REINSTATEMENT	2

Division 33 - Utilities

33 31 00	SANITARY SEWER	5
33 34 00	PRESSURE SEWERS	6
33 40 00	CULVERTS AND HEADWALL	4
33 46 20	FOUNDATION DRAINAGE	3
33 65 76	DIRECT BURIED UNDERGROUND CONDUITS	2

Division 43 - Process Gas and Liquid Handling, Purification and Storage Equipment

43 31 14	RECIRCULATING SAND FILTER BED	3
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Division 44 - Pollution Control Equipment

44 42 11	PACKAGE WASTEWATER TREATMENT FACILITY (WWTF)	14
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PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies the requirements for supplying, transporting and installing concrete formwork and falsework.
- 1.2 RELATED SECTIONS .1 Concrete Reinforcement: Section 03 20 00
- .2 Cast-In-Place Concrete: Section 03 30 00
- .3 Excavating, Trenching and Backfilling: Section 31 23 10
- 1.3 REFERENCES .1 CAN/CSA-S269.3-M92(R2013), Concrete Formwork.
- .2 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .3 CSA O86-14, Consolidation, Engineering Design in Wood.
- .4 CSA O121-08(R2013), Douglas Fir Plywood.
- .5 CSA O151-09(R2014), Canadian Softwood Plywood.
- .6 CSA O153-13, Poplar Plywood.
- .7 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
- 1.4 WASTE MANAGEMENT AND DISPOSAL .1 Collect, separate and recycle all site generated waste materials.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Seal and store emptied containers safely for disposal.
-

1.4 WASTE
MANAGEMENT AND
DISPOSAL

(Cont'd)

- .4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Formwork lumber:
.1 Plywood and wood formwork materials to CSA O121, CSA O86, and CSA O153.
.2 Use formwork materials in accordance to CAN/CSA A23.1.
- .2 Falsework materials: to CSA S269.1.
- .3 Form ties: use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface.
- .4 Form release agent: 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; having no adverse affect on paint, adhesives, waterproofing, or other treatments which are specified for application to concrete and containing no non-drying ingredients such as mineral oil. Use biodegradable form release agent with low VOC content.
.1 Acceptable products: DuoGuardII by W.R. Meadows, Crete-Lease BIO-TRU-XTRA by Cresset, Enviro-Form by IPA Systems, Bio-Nox by Nox-Crete, or approved equivalent.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Verify lines, levels and column centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain the Consultant's approval for use of earth forms.

3.1 ERECTION
(Cont'd)

- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1.
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .8 Step/lower all foundations as indicated on drawings. Coordinate with plumbing and electrical contractors to step footings down as required to allow all underground plumbing and electrical services to be sleeved through foundation walls or run above footings/zone of influence. Do not locate any services under foundations or their associate zone of influence without written approval from the Consultant.
- .9 All stepped footings shown on the drawings are approximate and all of the required stepped footings may not be shown. Review all of the foundations and building services and submit to the Consultant the proposed footing locations and elevations to allow all of the services to be sleeved through the foundation wall and/or provide the required frost cover. Submit the proposed stepped footing locations and elevations prior to commencing any foundation work.
- .10 Construction Joints:
 - .1 In general incorporate either horizontal or vertical construction joints in accordance with CAN/CSA-A23.1 and to the Consultant's approval. Submit proposed joint locations for review prior to start of formwork erection.
 - .2 Provide construction joints in concrete where work is left off at day's end. Run reinforcement continuously through joints and shear key unless indicated otherwise.
 - .3 Provide proper key and reinforcement. In beams, provide inclined shear bars as required.

3.1 ERECTION
(Cont'd)

- .10 (Cont'd)
 - .4 Immediately before next pour, clean construction joint and brush with grout of neat cement.
- .11 Coat formwork with form release agent before reinforcement, anchors or other accessories are placed, unless soaking with water during hot weather is acceptable. Do not coat plywood forms pre-coated with a chemical release agent.
- .12 Prior to the concrete pour, review and correct as necessary formwork tolerances and alignment, particularly where suspended slabs are located.
- .13 Align form joints and make watertight. Keep form joints to minimum.
- .14 Use 25mm chamfer strips or as indicated on external corners.
- .15 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .16 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .17 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL AND
RESHORING

- .1 Leave formwork in place until the concrete element has achieved at least 70% of the specified 28-day compressive strength for that element. Additional cylinders to be cast for the purpose of early testing to verify 70% of compressive strength has been achieved.
- .2 For structural slabs, immediately replace formwork with adequate shoring to standard specified formwork. Submit proposed stripping and reshoring schedule for review by the Consultant prior to first concrete pour.

3.2 REMOVAL AND
RESHORING
(Cont'd)

- .3 Safely maintain structure, both before and after removal of the forms, until concrete has reached its specified 28 day strength.
- .4 Provide all necessary reshoring of members where early removals 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 3m apart.
- .6 Check all concrete formwork for alignment and levels prior to the placing of concrete in these forms. The Contractor shall again check the formwork for alignment and levels during and immediately after each concrete pour.
- .7 Provide and maintain during the total duration on site, properly constructed guard rails and toe boards at all slab edges and around all slab openings. These are to be built in accordance with the Construction Safety Act and to the approval of the Consultant. When the work of this trade is complete, all guard rails and toe boards are to be left in proper condition and will become Owners property. The dismantling of same shall become the responsibility of subsequent contractors.
- .8 Re-use of formwork and falsework subject to requirements of CAN/CSA-A23.1.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies the requirements for supplying, fabricating, shipping and placing the reinforcing as detailed on the drawings and as noted in these specifications.
- 1.2 RELATED SECTIONS .1 Concrete Forms and Accessories: Section 03 10 00
- .2 Cast-in-Place Concrete: Section 03 30 00
- .3 Excavating, Trenching and Backfilling: Section 31 23 10
- 1.3 REFERENCES .1 AASHTO M32-09(R2013), Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- .2 ACI SP-66-04, ACI Detailing Manual, 2004.
- .3 ASTM A1064/A1064M-16b, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .4 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .5 CSA A23.3-14, Design of Concrete Structures.
- .6 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.
- .7 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .8 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .9 Reinforcing Steel-Manual of Standard Practice, 4th Canadian Edition by the Reinforcing Steel Institute of Canada.
-

1.4 SOURCE QUALITY CONTROL

- .1 Upon request, provide the Consultant with:
 - .1 Steel reinforcement - certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum four (4) weeks prior to commencing reinforcing work. Mill test reports to include certification that reinforcing steel recycled steel content rating meets or exceeds 90%. Certification to also include a breakdown of the pre-consumer, post-industrial and post-consumer content percentages of recycled content.
 - .2 Supply test reports at no additional cost to the Contract.
 - .3 Upon request inform the Consultant of proposed source of material to be supplied.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings, including reinforcement placing in accordance with Section 01 33 00.
- .2 Indicate on shop drawing bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices, if approved by Consultant with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with 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. Provide Class B tension lap to CAN/CSA-A23.3 unless otherwise indicated.
- .4 Reinforcement shop drawings must indicate the location of all concrete pour joints. Consultant's approval for location of joints is to be obtained prior to cutting and bending of reinforcement.

1.6 SUBSTITUTES

- .1 Substitute different size bars only if permitted in writing by the Consultant.

1.7 HANDLING .1 Deliver, store and handle reinforcing in accordance with manufacturer's recommendation.

1.8 WASTE MANAGEMENT AND DISPOSAL .1 Collect, separate and recycle all site generated waste materials.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Reinforcing steel: billet steel, Grade 400W (weldable), deformed bars to CSA G30.18, unless indicated otherwise.

.2 Cold-drawn annealed steel wire ties: to AASHTO M32.

.3 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.4 Mechanical splices: subject to approval of Consultant.

.5 Plain round bars: to CSA G40.21.

2.2 FABRICATION .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2, ACI SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Consultant's approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 All steel reinforcing bars to have the necessary net sectional area and will be cut to the exact lengths, bent cold to the exact forms and dimensions, shown on the approved plans, or otherwise required, before being placed in position. Bending must be accurately done, in a bending machine and no welding or heating of any bars will be allowed, except with written approval from the Consultant.

3.2 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Consultant.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure (for steel reinforcement only).
- .3 Replace bars which develop cracks or splits.

3.3 PLACING
REINFORCEMENT

- .1 Examine formwork to ensure that it has been completed and adequately braced in place before starting reinforcement placing.
 - .2 Place reinforcing steel as indicated on drawings and in accordance with CSA A23.1 and as follows:
 - .1 Clean all reinforcing of millscale, oil grease, or other deleterious material before and after erection.
 - .2 Secure reinforcing steel rigidly in position with annealed wire or use approved clips at intersections supported on reinforcing chairs.
 - .3 Do not allow the position of the bars to alter during concreting and maintain the correct cover at all times.
 - .3 Prior to placing concrete, obtain the Consultant's approval of reinforcing material and placement. Provide Consultant with a minimum of 48 hours notice when reinforcing material will be installed and ready for inspection.
 - .4 Maintain cover to reinforcement during concrete pour. Cover to be as noted on Drawings.
-

3.3 PLACING
REINFORCEMENT
(Cont'd)

- .5 Place all reinforcing bars and hold rigidly in the exact positions in the forms as shown on the approved plans, or otherwise required, and there must be no displacement of the same by the placing and tamping of the concrete. Adjusting or moving the bars while the concrete is being placed will not be permitted unless specified on the plans. Protect concrete required for reinforcing steel in accordance brace to prevent displacement. Do not place concrete until the steel reinforcement, has been cleaned and placed in position and has been examined and approved by the Consultant.
- .6 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one (1) coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies the requirements for providing all labour, tools, materials and equipment to perform all cast-in-place concrete work.
- 1.2 RELATED SECTIONS .1 Concrete Forms and Accessories: Section 03 10 00
- .2 Concrete Reinforcing: Section 03 20 00
- .3 Insulation: Section 07 21 00
- .4 Excavating, Trenching and Backfilling: Section 31 23 10
- 1.3 REFERENCES .1 ACI 302.1R-15, Guide for Concrete Floor and Slab Construction.
- .2 ASTM C109/C109M-16a, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2 in. or 50 mm Cube Specimens).
- .3 ASTM C260/C260M-10a(R2016), Standard Specification for Air-Entraining Admixtures for Concrete.
- .4 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .5 ASTM C494/C494M-16, Standard Specification for Chemical Admixtures for Concrete.
- .6 ASTM C827/C827M-16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- .7 ASTM C939/C939M-16a, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
- .8 ASTM D412-16, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
-

1.3 REFERENCES
(Cont'd)

- .9 ASTM D624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
- .10 ASTM D1653-13, Standard Test Methods for Water Vapour Transmission of Organic Coating Films.
- .11 ASTM D1709-16A, Standard Test Method for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
- .12 ASTM D1751-04(R2013)e1, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .13 ASTM D2240-15, Standard Test Method for Rubber Property-Durometer Hardness.
- .14 ASTM E1155-14, Standard Test Method for Determining FF Floor Flatness and FL Levelness using the F-Number System.
- .15 ASTM E1745-11, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- .16 ASTM F1249-13, Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- .17 CAN/CGSB 37.2-M88, Emulsified Asphalt, Mineral Colloid- Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .18 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .19 CSA A23.3-14, Design of Concrete Structures.
- .20 CSA A3000-13, Cementitious Materials Compendium.

1.4 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00.

1.4 SUBMITTALS
(Cont'd)

- .2 Minimum of four (4) weeks prior to commencing concrete work, submit shop drawings to Consultant for review containing the following for each concrete mix:
 - .1 Cement type.
 - .2 Minimum compressive strength at 28 days.
 - .3 Class of exposure.
 - .4 Nominal size of coarse aggregate.
 - .5 Air content.
 - .6 Slump at time and point of discharge.
 - .7 Admixtures.
- .3 Provide two (2) copies of WHMIS MSDS.
- .4 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

1.5 CERTIFICATES

- .1 Minimum of four (4) weeks prior to starting concrete Work, submit to the Consultant the manufacturer's test data and certification by qualified independent inspection and testing laboratory that the following materials will meet specified requirements:
 - .1 Portland cement.
 - .2 Supplementary cementing materials:
 - .1 For fly ash, provide details of supply, supplier's quality control program, test data for at least three (3) samples from the previous month's supply and details of proposed quality control tests to be made between shipment to concrete supplier and use in the concrete.
 - .3 Grout.
 - .4 Admixtures.
 - .5 Aggregates.
 - .6 Water.
- .2 Provide certification that plant, equipment and materials to be used in concrete comply with requirements of CSA A23.1.
- .3 Provide certification that mix proportions selected will produce concrete of specified quality, yield and strength which will comply with CSA A23.1 and that mix design is adjusted to prevent alkali aggregate reactivity problems.

-
- 1.5 CERTIFICATES
(Cont'd)
- .4 Provide written confirmation from concrete supplier the percent replacement of mass of Portland cement for fly ash/supplementary cementing materials for all concrete mix designs.
- 1.6 QUALITY
ASSURANCE
- .1 Minimum of four (4) weeks prior to starting concrete work, submit proposed quality control procedures for review by the Consultant on following items:
- .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.
- 1.7 DELIVERY,
STORAGE AND HANDLING
- .1 Concrete hauling time: deliver to site of Work and discharge within 120 minutes maximum after batching.
- .1 Do not modify maximum time limit without receipt of prior written agreement from Consultant and concrete producer as described in CSA A23.1/A23.2.
 - .2 Submit deviations for review by Consultant.
- .2 Prepare to implement alternative concrete supply and placement contingency plans in the event of concrete material supply issues, batch plant malfunction and/or transport and placement equipment malfunction.
- 1.8 WASTE
MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for reuse and recycling.
 - .2 Use trigger operated spray nozzles for water hoses.
 - .3 Designate a cleaning area for tools to limit water use and runoff.
 - .4 Carefully coordinate the specified concrete work with weather conditions.
 - .5 Seal and store emptied containers safely for disposal.
-

- 1.8 WASTE MANAGEMENT AND DISPOSAL
(Cont'd)
- .6 Choose least harmful, appropriate cleaning method which will perform adequately.
 - .7 Prevent plasticizers, water-reducing agents, air-entraining/curing compounds from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Portland cement and supplementary cementing materials: to CSA A3000.
 - .2 Water: to CSA A23.1.
 - .3 Aggregates: to CSA A23.1. Coarse aggregates to be normal density.
 - .4 Air entraining admixture: to ASTM C260.
 - .5 Chemical admixtures: to ASTM C494. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .6 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 s.
 - .2 Flowable: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portion) 125 to 145%.
 - .3 Plastic: to ASTM C827. Flow table, 5 drops in 3 s, (ASTM C109, applicable portions) 100 to 125%.
 - .4 Dry pack to manufacturer's requirements.
 - .3 Acceptable products: SikaGrout 212 as manufactured by Sika Canada Inc., Masterflow 928 as manufactured by BASF Corporation, or approved equivalent.

2.1 MATERIALS
(Cont'd)

- .7 Vapour Retarder Membrane: 10mil (0.25mm) thick, polyolefin resin sheet in accordance with ASTM E1745 such as Perminator 10mil by W.R. Meadows Inc., or approved equivalent. Seal seams with a 100mm wide high density polyethylene tape with pressure sensitive adhesive to suit a 150mm wide sheet overlap in accordance with the manufacturer's written recommendations.
- .8 Curing compounds: to CSA A23.1 and to ASTM C309, Type 1-D with fugitive dye. Confirm compatibility with finish floor adhesives.
- .9 Premoulded concrete expansion joint filler:
 - .1 Closed-cell, polyethylene joint filler with peel-off tape such as Foam Tech as manufactured by NMW Inc., Deck-O-Foam by W.R. Meadows Inc., or approved equivalent, in accordance with ASTM D3575. For concrete surfaces in contact with hot asphalt, use Foam Tech H.
- .10 Joint sealer/filler:
 - .1 A two (2) component, polysulphide sealant, Duoflex SL (self-levelling) for slabs and Duoflex NS (non-sag) for walls as manufactured by Sika, or approved equivalent, complete with compatible foam back rod and primer.
- .11 Rigid insulation: as specified in Section 31 23 10 - Excavating, Trenching and Backfilling.
- .12 Waterstops:
 - .1 Ribbed waterstops: 10mm thick by 230mm high, extruded PVC.
 - .1 Acceptable product: Type 9380G by W.R. Meadows or approved equivalent.
 - .2 Hydrophilic, non-bentonite modified chloroprene rubber based concrete joint waterstop.
 - .1 Acceptable product: Hydrotite CJ-0725 by Greenstreak or approved equivalent.

2.2 CONCRETE MIXES

- .1 General: Where practically possible, for all concrete mixes listed below, except for concrete flat slab work, concrete supplier to maximize the amount Portland cement replaced with fly ash or another approved cementitious recycled material while maintaining the characteristics listed for each concrete mix listed as well as the workability of each mix. Concrete supplier to provide written confirmation of the percent replacement of Portland cement for fly ash/supplementary cementing materials for all mix designs.
- .2 Proportion normal density concrete in accordance with CSA A23.1, Alternative 1 to give the following properties for concrete in foundation:
 - .1 Cement: Type GU.
 - .2 Minimum compressive strength at 28 days: 25 MPa.
 - .3 Class of exposure: F-2.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 80 mm ±30 mm.
 - .6 Air content: 4 to 7%, except for slab on grade 3% maximum.
 - .7 Chemical admixtures: type as approved, and in accordance with ASTM C494.
- .3 Proportion normal density concrete in accordance with CSA A23.1, Alternative 1 to give the following properties for curbs and walkways.
 - .1 Cement: Type GU.
 - .2 Minimum compressive strength at 28 days: 32 MPa.
 - .3 Class of exposure: C-2.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 80 mm ±30 mm.
 - .6 Air content: 5 to 8%.
 - .7 Chemical admixtures: type as approved, and in accordance with ASTM C494.
- .4 Proportion normal density concrete in accordance with CSA A23.1, Alternative 1 to give the following properties for manhole benching, concrete grout in core fills and bond beams:
 - .1 Cement: Type GU.
 - .2 Minimum compressive strength at 28 days: 20MPa.
 - .3 Class of exposure: N.
 - .4 Nominal size of coarse aggregate: 10mm.

-
- 2.2 CONCRETE MIXES .4 (Cont'd)
(Cont'd) .5 Slump at time and point of discharge: maximum
250mm.
.6 Air content: 3% maximum.
- .5 Provide concrete mix designs based on trial mixes that have been designed and tested by a qualified professional engineer registered or licensed to practice in the Province of Nova Scotia and submitted for review to Consultant.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Confirm founding material on which footings and other concrete work are to be placed are free from water. Place concrete only on frost-free ground. Remove previously frozen bearing surfaces.
- .2 Place a mud slab in the bottom of footing excavations to prevent softening of the in-situ foundation soils.
- .3 Confirm foundations bear on structural fill or mud slabs on structural fill in accordance with Section 31 23 10. Place all structural fill as directed by the Geotechnical engineer and in the presence of the Geotechnical engineer or one of their qualified representatives.
- .4 Inspect all foundation bearing surfaces and obtain approval from the Owner's geotechnical engineer prior to placing concrete. If bearing surfaces are deemed unacceptable because conditions do not meet those anticipated during design, make adjustments as directed.
- .5 Do not place plumbing and electrical conduit under foundations or their associated zone of influence. Coordinate with mechanical and electrical contractor and step/lower all foundations so that all services either sleeve through foundation walls or run above footings/zone of influence. Do not place plumbing or conduit under foundations or their associated zone of influence without written consent from the Consultant.
-

3.2 WORKMANSHIP

- .1 Obtain Consultant's approval before placing concrete. Provide 48 hours notice prior to placing of concrete.
- .2 Pumping of concrete is permitted only after approval of equipment and mix.
- .3 Confirm reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain the Consultant's approval of proposed method for protection of concrete during placing and curing.
- .5 Do not place load upon new concrete until authorized by the Consultant.
- .6 Concrete protective cover to reinforcement as noted on the drawings.
- .7 Support bars on plastic coated steel chairs to maintain exact cover requirements.
- .8 In cold weather protect concrete work to CSA A23.1 and following:
 - .1 Cold weather is defined as a period when the mean air temperature drops below 5°C for more than three successive days.
 - .2 When air temperature is above 0°C and is forecast to remain so for 48 hours after placing, insulated tarps are acceptable protection provided concrete temperatures are monitored and comply with temperature limits specified in the following paragraph.
 - .3 For all other cold weather conditions protect concrete with a windproof enclosure of canvas or other material to allow free circulation of inside air around fresh concrete. At no point let walls of enclosure touch formwork and provide sufficient space for removal of formwork and for finishing. Supply approved heating equipment capable of keeping inside air at sufficiently curing temperatures:
 - .1 For an initial three days, at a temperature of not less than 15°C.
 - .2 Maintain concrete at temperatures of not less than 10°C for a total period of seven days plus the initial three days specified above.
 - .3 At no time shall concrete temperatures exceed 30°C at surfaces.

3.2 WORKMANSHIP
(Cont'd)

- .8 (Cont'd)
- .3 (Cont'd)
 - .4 Reduce enclosure air temperature at a rate not exceeding 10°C per day until outside air temperature has been reached.
 - .5 Take temperature readings both of air and of concrete surfaces at several points within area protected at start and at end of working day. Maintain complete records of temperature readings.
 - .4 Monitor concrete so it cures without suffering damage. When enclosure is provided, avoid rapid drying of the concrete.
- .9 Monitor concrete temperature and moisture evaporation rates and provide appropriate hot weather protection as defined in clause 7 of CSA A23.1. Maintain records of all measurements during hot weather periods for review by the Consultant.
- .10 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

3.3 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CSA A23.1.
- .2 Concrete to be dense, homogenous and free of cold joints, voids and honeycombing. Concrete to be fully bonded to reinforcing steel, anchors and embedded parts.
- .3 Consolidate concrete using a mechanical form vibrator method complete with mechanical hand held vibrators, if required, and subject to the approval of Consultant.
- .4 Place concrete in consolidated lifts and keep approximately horizontal and evenly distributed throughout the formed assembly. The rate of placement to be such that each successive lift is vibrated into the preceding lift to achieve proper bonding.
- .5 Place concrete monolithically without any cold and/or construction joints unless noted otherwise on the drawings.

3.3 CONSTRUCTION
(Cont'd)

- .6 Concrete placement and vibrating activities to be in accordance with the formwork design data, limitations and parameters provided by the Contractor.
- .7 Foundations, sleeves and inserts:
 - .1 Set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100mm x 100mm not indicated, must be approved by the Consultant.
 - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Consultant before placing of concrete.
 - .3 Check locations and sizes of foundations, sleeves and openings shown on drawings. Provide confirmation by qualified surveyor.
 - .4 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .8 Finishing:
 - .1 Finish concrete in accordance with CSA A23.1, and Part 3.5 Finishing of this section.
 - .2 Use procedures acceptable to Consultant or those noted in CAN/CSA-A23.1 to remove excess bleed water. Confirm surface is not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
 - .4 Cut back form ties and plug openings in a manner acceptable to Consultant.
 - .5 Repair holes and surface defects to the satisfaction of Consultant.
 - .6 Remove honeycombed or otherwise defective concrete and repair in a manner approved and to the satisfaction of Consultant.
 - .7 Confirm that all exposed concrete has neatly formed, 45 degree bevelled, 25mm chamfered edges where designated in accordance with Section 03 10 00 - Concrete Forms and Accessories.
- .9 Curing and protection:
 - .1 Do not use curing compounds where bond is required for subsequent topping or coating.
 - .2 Use approved curing compounds in accordance with the manufacturer's written instructions.
- .10 Anchor bolts:

3.3 CONSTRUCTION
(Cont'd)

- .10 (Cont'd)
 - .1 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete.
 - .2 Protect anchor bolt holes from water accumulations.
- .11 Core-drilling/cutting of holes in any concrete element is not permitted without written consent from the Consultant. Submit proposed core-drilling/cutting to the Consultant for review prior to execution of work. Request for core-drilling/cutting must have 72 hours notice to allow Consultant adequate time to review proposed locations.

3.4 PLACING
CONCRETE

- .1 Place concrete as specified in CSA A23.1.
- .2 Inform Consultant at least 48 hours before each concrete placing operation. Do not place concrete until authorized by the Consultant and following satisfactory site review and observations of geotechnical base preparations, formwork, reinforcing steel and other associated concrete batching and placement operations.
- .3 Do not place concrete when it is raining or likely to rain. If rain begins after concrete is placed, protect with waterproof covers until set.
- .4 Do not permit vertical free fall of concrete mix to exceed 1500mm.
- .5 For exposed concrete, take special precautions when placing to prevent segregation of concrete, and to avoid cold joints, honeycombing or voids. Do not allow vibrator to touch formwork.
- .6 Use form vibrators only when sections are too narrow for internal type. Employ a sufficient number of vibrators to ensure complete consolidation of concrete throughout entire volume of each layer. Have available at least one extra vibrator on hand for emergency.

3.4 PLACING
CONCRETE
(Cont'd)

- .7 Do not use vibrators for interior and exterior concrete slabs on fill or for the use of moving concrete for concrete slabs.
- .8 Use only tools and handling equipment that are clear of rust or other harmful and foreign material to avoid efflorescence and staining of slabs or hardened concrete.
- .9 Use concrete pumps to place concrete only with approval of methods, equipment and mix design.
- .10 Provide continuous supervision during placement of concrete including concrete grout to ensure reinforcing steel is maintained in correct position.

3.5 PLACING GROUT

- .1 Grout where indicated using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

3.6 SAW CUTTING

- .1 Commence sawing as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing and before all controlled shrinkage cracking occurs. Refer to clause 7.3.2 of CSA A23.1. Locate and complete all sawcuts in accordance with the Project Drawings and terminate all sawcuts at the face of columns, foundation walls and other control joints as shown on the Project Drawings.

3.7 FINISHING

- .1 Finish concrete in accordance with CSA A23.1 and in accordance with the drawings.
 - .2 Use smooth form finish for all concrete surfaces. Use form facing material that will produce a smooth, hard, uniform texture on the concrete. Do not use material with raised grain, torn surfaces, worn edges, patches, dents or other defects that will impair the texture of the concrete surface. Patch the holes and defects. Patch bug holes exceeding 5mm in depth until smooth. Completely remove fins.
-

3.7 FINISHING
(Cont'd)

- .3 Use a smooth, hard steel trowelled finish for the top of walls, columns, pedestals and sonotube foundations. Unless noted otherwise, the top surface slab/pads to have a light broom finish in even continuous strokes applied in the transverse or short direction. Do not power trowel slabs.
- .4 Rub exposed sharp edges of concrete with carborundum to produce 3mm radius edges unless otherwise indicated.
- .5 Apply curing compounds to concrete surfaces as required. Confirm in writing the compatibility of curing compound with the applied finish on each concrete surface.
- .6 Tolerance:
 - .1 All slabs/pads to have concrete surfaces finished to within 2mm in 1m as measured with a 1m straight edge placed on surface unless noted otherwise.
 - .2 All slabs subject to pedestrian traffic to have concrete surfaces finished to a specified overall floor flatness designation of FF50 and a specified overall floor levelness of FL33 to suit slopes and grades. The transition to existing, adjacent surfaces to be smooth and continuous without hollows, bumps, ridges, or potential tripping hazards.
- .7 Elevation survey: if requested by Owner, carry out an elevation survey on finished slabs in accordance with the measurement procedures outlined in CSA A23.1, clause 7.5.1 to confirm concrete slabs meet the specified surface finishes/tolerances.
- .8 Remove tie cones and patch with latex modified concrete finish. Mix in strict accordance with manufacturer's instructions.

3.8 WATERSTOPS

- .1 Install waterstops to provide continuous water seal. Do not distort or pierce waterstop in such a way as to hamper performance. Do not displace reinforcement when installing waterstops. Use equipment to manufacturer's requirements to field splice waterstops. Tie waterstops rigidly in place.

3.8 WATERSTOPS
(Cont'd)

- .2 Use only straight heat sealed butt joints in field. Use factory or field welded corners and intersections unless otherwise approved by the Consultant.
- .3 Provide waterstops as required to provide continuous seal and as indicated on the drawings and at all construction joints in water-retaining structures. Note: not all waterstops are indicated on the Drawings.
- .4 Install expansion joint waterstops in accordance with manufacturer's directions.

3.9 REPAIRS

- .1 In the event that the post-finishing survey shows that the slab surface does not meet the specified tolerances, take corrective action within five (5) working days, or as directed by the Consultant.
- .2 Submit proposed corrective action in writing, with complete details of methods, tools, and materials for the Consultant's approval. Upon acceptance of the proposed method, a test area is to be prepared, and upon acceptance, is to be the standard for the remainder of the repairs.
- .3 Grind down high points to a smooth surface conforming to the specifications and with a surface finish equal to the remainder of the slab. If cutting or chipping by hammer is required at high areas, then cut the area low with square saw cut edges and patched as noted below.
- .4 Fill low areas by patching with a bonded topping. Chip edges of patch areas and saw cut square a minimum of 25mm deep. Alternatively, the Consultant may approve feather edging if epoxy type topping is used and a properly bonded smooth finish can be removed before placing patch material. Patches are to be finished to a smooth surface equal to the finish on the remainder of the slab, and cured adequately. Do all patching procedures in strict accordance with the manufacturer's directions and to the approval of the Consultant.

3.10 SLAB-ON-GRADE
JOINTS

- .1 Provide construction joint between adjacent concrete pours.
- .2 Provide an isolation joint where the slab-on-grade abuts a vertical element.
- .3 Provide saw cut control joints as indicated on the drawings except at those locations where construction joints or isolation joints are provided.

3.11 VAPOUR
RETARDER MEMBRANE

- .1 Vapour retarder membrane:
 - .1 Install underslab vapour retarder membrane (Perminator, 10mil) under all concrete slabs-on-grade inside building, except for under the building base slab.
 - .2 Install membrane in strict accordance with membrane manufacturer's printed instructions.
 - .3 Lap underslab vapour retarder membrane minimum 150mm at joints and seals using high density polyethylene tape with pressure sensitive adhesive to create vapour and gas tight joints.
 - .4 Seal all pipe and conduit penetrations through the membrane using 'The Boot' and high density polyethylene tape to create vapour and gas tight seals.
 - .5 Seal to inside of concrete foundation walls and concrete pits to create a vapour and gas tight connection.
 - .6 Seal punctures in dampproof membrane before placing concrete. Use patching material at least 150mm larger than puncture and seal.

3.12 FIELD QUALITY
CONTROL

- .1 Site observations and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated or acceptable by Consultant in accordance with CSA-A23.1.
- .2 Provide a minimum of three (3) test cylinders as follows:
 - .1 Each day's pour.
 - .2 Each change of supplier.
 - .3 Each 50m³ or fraction thereof.
 - .4 Each type or grade of concrete.
 - .5 Additional test at the request of the Consultant.

3.12 FIELD QUALITY CONTROL
(Cont'd)

- .2 (Cont'd)
- .6 If Contractor wants to strip formwork early, request additional cylinders to be cast and pay for additional cylinders and testing of the additional cylinders.
- .3 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .4 Non-destructive Methods for Testing Concrete shall be in accordance with CSA A23.2.
- .5 Site observations or testing by Consultant will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.
- .6 Owner will pay for cost of tests.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for supplying and applying concrete floor hardener/sealer where indicated in Room Finish Schedule.
- 1.2 RELATED WORK .1 Cast-In-Place Concrete: Section 03 30 00
- 1.3 REFERENCES .1 CAN/CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- 1.4 PRODUCT AND MAINTENANCE DATA .1 Provide product and maintenance data for concrete floor finishes for incorporation into operation and maintenance manual.
- .2 Include application instructions for concrete hardener and curing compound.
- .3 Submit WHMIS MSDS-Material Safety Data Sheets. Indicate VOC content.
- 1.5 ENVIRONMENTAL REQUIREMENTS .1 Temporary lighting: minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 m² of floor being finished.
- .2 Ventilation: sufficient to prevent carbon monoxide or high levels of carbon dioxide and other injurious gases from affecting concrete.
- .3 Electrical power: sufficient to operate equipment normally used during construction.
- .4 Work area: water tight protection against rain and detrimental weather conditions.
- .5 Temperature:
-

1.5 ENVIRONMENTAL
REQUIREMENTS
(Cont'd)

- .5 (Cont'd)
 - .1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
 - .2 Maintain substrate temperature at 10°C minimum.
- .6 Moisture:
 - .1 Ensure concrete substrate is within moisture limits prescribed by manufacturer.
- .7 Safety:
 - .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Non-metallic floor hardener: premixed, quartz aggregate, dry shake surface hardener, coloured. Colour: light grey.
 - .1 Acceptable products: standard of acceptance is Coloured Floor Hardener Premix by CPD.
 - .2 Acceptable Alternative: Colorplete by Sika Canada.
- .2 Sealing compound:
 - .1 Surface sealer: to CAN/CGSB-25.20, Type 1 - solvent-based, colour - light grey.
 - .1 Acceptable product: standard of acceptance is Coloured Concrete Sealer by CPD.
 - .2 Mixing, ratios and application in accordance with manufacturers instructions.
- .3 Use compatible additives, admixtures and hardeners.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify slab surfaces are ready to receive work and elevations are as indicated on drawings and as instructed by manufacturer.

3.2 FLOOR FINISH

- .1 Finish concrete in accordance with CAN/CSA-A23.1, Classification A and as specified in Section 03 30 00. Do not use curing and sealing compound in areas where an applied finish or adhesive is to be applied.
- .2 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.
- .3 Saw cut crack-control joints to CAN/CSA A23.1 only where indicated on the Drawings.
- .4 Apply floor hardener in two shakes for a total application of minimum 4 kg/m² to areas indicated in strict accordance with manufacturer's written instructions. Cure to manufacturer's recommendations.
- .5 Apply sealing compound in accordance with manufacturer's instructions.
- .6 Cure concrete in accordance with CAN/CSA-A23.1 except where specified otherwise.

3.3 PROTECTION

- .1 Protect finished installation until floor treatment has completely cured and in accordance with the manufacturer's instructions.

PART 1 - GENERAL

1.1 WORK INCLUDED

- .1 This Section specifies requirements for furnishing all materials, labour, tools and equipment, and performing all operations necessary to complete all miscellaneous metal and fabricated items, as shown on the Drawings and specified in this Section.
- .2 The Work generally includes the following categories and all related items of miscellaneous metal shown on the Drawings except where noted otherwise:
 - .1 Anchors, chemical anchors, bolts and inserts
 - .2 Miscellaneous steel
 - .3 Pipe and valve supports
 - .4 Pipe bollards
 - .5 Electrical and mechanical equipment supports
 - .6 Gratings
 - .7 Guards for mechanical piping or ductwork
- .3 Where not indicated in this Section, refer to drawings for number of items to be provided for each category.

1.2 RELATED WORK

- .1 Cast-In-Place Concrete: Section 03 30 00
- .2 Painting: Section 09 91 23
- .3 Electrical: Division 26

1.3 REFERENCES

- .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A53/A53M-12, Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
 - .3 ASTM A307-14, Carbon Steel Bolts and Studs, 60,000 psi Tensile.
 - .4 ASTM F3125/F3125M-15a, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
-

1.3 REFERENCES
(Cont'd)

- .5 ASTM A480/A480M-16a, General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
- .6 ASTM A484/A484M-16, General Requirements for Stainless Steel Bars, Billets, and Forgings.
- .7 ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- .8 ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- .9 ASTM A500/A500M-13, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- .10 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .11 CAN/CSA-S16-14, Limit States Design of Steel Structures.
- .12 CSA-W59-13, Welded Steel Construction (Metal-arc Welding).
- .13 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of attachment, number of anchors, supports, reinforcement, details and accessories.
- .3 Provide stamp and signature of qualified professional engineer registered in the Province of Nova Scotia for connection designs.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- .1 Label, tag or otherwise mark items supplied for installation by other sections to indicate its function, location, and shop drawing designation.

1.6 JOB CONDITIONS

- .1 Protection:
 - .1 Maintain protection of Work of this Section from time of installation until final finishes are applied.
 - .2 Protect galvanized surfaces from damage.
 - .3 Protect exposed surfaces of prefinished metal work which does not receive site finishing with protective coatings or wrappings. Use materials recommended by finishers or manufacturers of metals to ensure that method is sufficiently protective, easily removed, and harmless to the finish.

1.7 DESIGN OF DETAILS AND CONNECTIONS

- .1 Design details and connections in accordance with requirements of CSA-S16.
- .2 Unless noted otherwise, connections shall be detailed to resist 50% of the web capacity of the members.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use new materials that are free from corrosion, rust, and millscale.
- .2 Steel angles and plates: to CSA-G40.21, 300W.
- .3 Rolled steel sections: to CSA-G40.21, 350W, and Class C for hollow structural sections.
- .4 Steel pipe: to ASTM A53, schedule 40, standard weight, unless noted otherwise, galvanized.
- .5 Stainless steel plate: to ASTM A480, Grade 316.
- .6 Stainless steel bars: to ASTM A484, Grade 316.
- .7 Aluminum plate: to ASTM B209M, Grade 6061-T6.
- .8 Aluminum sections: to ASTM B221, Grade 6061-T6.
- .9 Welding materials: to CSA-W59.
- .10 Anchor bolts: to ASTM A307 unless otherwise noted.

2.1 MATERIALS
(Cont'd)

- .11 Bolts, nuts and washers: to ASTM F3125 unless otherwise noted.
- .12 Galvanizing: hot-dip method with minimum zinc coating of 600 g/m² conforming to ASTM A123.
- .13 Shop coat primer: to CAN/CGSB-1.40.
- .14 Galvanized primer: one component, ready-mixed zinc rich.
 - .1 Acceptable product: Catha-Coat 13034 by Devoe Coating, or approved equivalent.
- .15 Chemical anchors: threaded AISI 316 stainless steel anchor, rod, nut, washer and adhesive capsule, shear stud or steel rebar as noted on Drawings.
 - .1 Acceptable product: Hilti HIT-HY 200 Chemical Adhesive with stainless steel HAS rods as manufactured by Hilti (Canada) Corp., unless noted otherwise on design drawings, or approved equivalent.
 - .2 Embedment as indicated on the Drawings or minimum embedment equal to the manufacturer's standard recommendations.

2.2 FABRICATION

- .1 Workmanship and finish must be equal to the best practice of modern shops for each item of work.
- .2 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .3 Provide exposed surfaces with a smooth finish and sharp, well defined lines and arises. Form sections to shape and size shown with sharp lines and angles.
- .4 Confirm castings have sharp corners and edges, and are clean, smooth and true to pattern.
- .5 Make exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.
- .6 Where possible, fit and shop assemble work, ready for installation.
- .7 Fabricate miscellaneous steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop Drawings.

2.3 SHOP PAINTING

- .1 Apply one (1) coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.
- .3 Prime after fabrication and before damage to surface occurs from weather or other exposure.
- .4 Spray prime contact surfaces of field assembled, bolted, friction type joints with primer only. Do not brush primer after spraying.
- .5 Do not prime metal within 50 mm of edge to be welded. Give unprotected steel one coat of approved protective coating after shop fabrication is completed.
- .6 Protect machine finished or similar surfaces that are not to be coated, but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by the Consultant.
- .7 Copy previous erection marks and weight marks on areas that have been shop primed.

2.4 MISCELLANEOUS
METALWORK ITEMS

- .1 Anchors, chemical adhesive anchors, bolts and inserts:
 - .1 Provide as required to fasten miscellaneous metal items to concrete or masonry.
 - .2 Where sizes, kinds and spacing of anchors are not indicated or specified, provide as necessary for the purpose as approved by Consultant.
 - .3 Hot-dip galvanize or use stainless steel for all anchors, bolts and inserts, where required.
 - .4 Provide gasket as a barrier between dissimilar metals as required.
 - .2 Miscellaneous steel:
 - .1 Provide miscellaneous steel as required for equipment supports, angles, and steel framing to shape, size and details required.
 - .2 Galvanize miscellaneous steel items after fabrication.
-

- 2.4 MISCELLANEOUS .2 (Cont'd)
METALWORK ITEMS .3 Use stainless steel where noted on drawings.
(Cont'd) Provide gasket as a barrier between dissimilar
metals where required.
- .3 Pipe and valve supports: fabricated from steel
plate, thickness indicated, galvanize after
fabrication. Anchor into concrete floor slab as
shown.
- .4 Pipe bollards:
.1 Fabricate bollards of 150 mm diameter steel
pipe, to ASTM A53, galvanized. Fabricate bollards to
lengths indicated, fill with concrete and set in
concrete foundation.
.2 Install bollards where indicated, paint exposed
portion yellow, as specified in Section 09 91 23.
- .5 Electrical and mechanical equipment supports:
fabricate from structural steel channel, and plate
to details indicated.
- .6 Gratings:
.1 5 mm bars, depth as shown, of the sizes
required for the locations indicated galvanized.
.1 Acceptable product: 38mm x 4.8mm type
30-102 by Fisher & Ludlow, unless noted
otherwise on drawings, or approved equivalent.
.2 Gratings to have ends banded and all bars
permanently locked at intersections.
.3 Support gratings on angle frames of sizes
indicated.
.4 Provide grating hold down clips as required.
.5 Reinforce all penetrations in grating to full
satisfaction of the Consultant at no additional
cost.
- .7 Steel handrails, guardrails, and guards for
mechanical piping or ductwork:
.1 Fabricate handrails, guardrails, and posts
using outside diameter pipe formed to the shapes and
size shown on the Drawings. Pipe to conform to ASTM
A500.
.2 Make changes in direction with smooth radius
curves. Mitre joints and weld flush.
.3 Fabricate posts from same material as rail.
Space and attach posts as shown.

2.4 MISCELLANEOUS
METALWORK ITEMS
(Cont'd)

- .7 (Cont'd)
.4 Hot-dip galvanize handrails, guardrails, and post assemblies after fabrication in buildings, at steel stairs and at exterior locations unless otherwise noted.

PART 3 - EXECUTION

3.1 FIELD
MEASUREMENTS

- .1 Verify all dimensions and take whatever field measurements required prior to fabrication to assure that all items function properly when installed.
.2 Details of proposed departures due to field conditions or other causes to be submitted to the Consultant for approval.

3.2 INSTALLATION

- .1 Install miscellaneous metal items in the locations shown on the Drawings.
.2 Install metalwork square, plumb and true using welded connections wherever possible to provide rigid structures. Provide anchor bolts, bolts and plates as necessary for connecting to structure of types acceptable to the Consultant.
.3 Hand over items for casting into concrete to appropriate trades together with setting templates.
.4 Exposed fastening devices to match finish, and to be compatible with material thorough which they pass.
.5 Touch-up field welds, bolts, and burnt or scratched surfaces with primer after installation.
.6 Touch-up galvanized surfaces with zinc-rich primer.
.7 Have chemical anchors installed by an experienced applicator, trained by the anchor manufacturer. Submit proof of training certification to the Owner upon request.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying, transporting and installing all items of rough carpentry.
- 1.2 RELATED WORK .1 Insulation: Section 07 21 00
.2 Sealants: Section 07 92 00
.3 Painting: Section 09 91 23
- 1.3 REFERENCES .1 CSA O80 Series-15, Wood Preservation.
.2 CSA O86-14, Engineering Design in Wood.
.3 CSA O112.9-10(R2014), Evaluation of Adhesives for Structural Wood Products (exterior Exposure).
.4 CSA O112.10-08(R2013), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
.5 CSA O121-08(R2013), Douglas Fir Plywood.
.6 CSA O141-05(R2014), Softwood Lumber.
.7 CSA O151-09(R2014), Canadian Softwood Plywood.
.8 CSA O325.0-16, Construction Sheathing.
.9 National Lumber Grades Owner (NLGA) Standard Grading Rules for Canadian Lumber 2014.
- 1.4 QUALITY ASSURANCE .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
.2 Plywood identification: by grade mark in accordance with applicable CSA standards.
-

PART 2 - PRODUCTS

2.1 FRAMING AND
STRUCTURAL
MATERIALS

- .1 Glued end-jointed (finger-jointed) lumber is not acceptable.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Framing and Board members: in accordance with NBC 2010.
- .4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 S2S or S4S is acceptable.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timbers sizes: "Standard" or better grade.
- .5 Lumber: unless specified otherwise, softwood kiln dried, spruce-pine-fir and cedar (where indicated) species, S4S, moisture content 15% or less in accordance with the following standards:
 - .1 CAN/CSA O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber 2014.
 - .3 Lumber for load bearing walls, shearwalls, posts and lintels: No. 1/No. 2 SPF.
- .6 Pressure treat all lumber in contact with ground or concrete.

2.2 PANEL MATERIALS

- .1 Douglas fir plywood (DFP): to CSA O121, standard construction, thickness indicated.
 - .2 Canadian softwood plywood (CSP): to CSA O151, standard construction, thickness indicated. Exterior grade.
 - .3 Panel standards: type, grade and thickness as indicated and in accordance with the following standards:
 - .1 Canadian Softwood Plywood (CSP): to CAN/CSA O151, standard construction.
-

2.2 PANEL MATERIALS
(Cont'd)

- .4 Construction sheathing: to CSA 0325.
 - .1 Ceiling sheathing to be 16 mm exterior grade Douglas Fir plywood sheathing.
 - .2 Roof sheathing to be 19 mm exterior grade tongue and groove plywood sheathing.

2.3 ACCESSORIES

- .1 Sealants: as specified in Section 07 92 00.
- .2 Nails, spikes and staples: galvanized for exterior work, plain finish for interior work.
- .3 Bolts: 12 mm diameter unless indicated otherwise, complete with nuts and washers.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.
- .5 General purpose adhesive to CSA-O112.
- .6 Sill gasket: purpose made compressible sill gasket by "TrueFoam", or approved equivalent.
- .7 Hold down anchors as indicated on the design drawings.

2.4 FINISHES

- .1 Galvanizing: use galvanized fasteners for exterior work, interior highly humid areas and pressure-preservative treated lumber as indicated.

2.5 WOOD PRESERVATIVE

- .1 Surface-applied wood preservative: clear copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.
- .2 Use pressure preservative treated wood to CAN/CSA O80, water borne for stained finish, where indicated and as follows:
 - .1 Treat plywood to CSA O80.9 using CCA or ACA preservative to obtain minimum net retention of 4.0 kg/m³ of wood.
 - .2 Treat lumber to CSA O80.2 using CCA or ACA preservative to obtain minimum net retention of 4.0 kg/m³ of wood.

- 2.5 WOOD PRESERVATIVE (Cont'd) .2 (Cont'd)
.3 Following water-borne preservative treatment, kiln dry material.

PART 3 - EXECUTION

- 3.1 PREPARATION .1 Treat cut surfaces of pressure preservative treated material with surface applied wood preservative, before installation, and as follows:
.1 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum three (3) minute soak on lumber and one (1) minute soak on plywood.
.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.
.3 Treat all material as indicated and as follows:
.1 Wood cants, backing, curbs, nailers on roof deck, and wall blocking.

- 3.2 INSTALLATION .1 Comply with requirements of NBC 2010, Division B, Part 9 supplemented by following paragraphs.
.2 Install members true to line, levels and elevations, square and plumb.
.3 Construct continuous members from pieces of longest practical length.
.4 Install spanning members with "crown-edge" up.
.5 Install furring and blocking as required to space-out and support casework, cabinets, electrical equipment mounting boards, and other work as required.
.6 Install furring to support siding applied vertically where there is no blocking.
.1 Align and plumb faces of furring and blocking to tolerance of 1:600.
.7 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

3.2 INSTALLATION
(Cont'd)

- .8 Install wood cants, nailers, curbs and other wood supports as required and secure using galvanized or stainless steel fasteners.
- .9 Sheathing to be installed as and where indicated on the Drawings.
- .10 Cutting of holes by trades or splices in members not indicated are not be permitted.

3.3 ERECTION

- .1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .2 Countersink bolts where necessary to provide clearance for other work.
- .3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.4 SCHEDULES

- .1 Sheathing:
 - .1 Plywood, DFP or CSP, exterior grade, pressure treated, square edge, thickness indicated.
 - .2 Interior and exterior applications as indicated on the Drawings.
- .2 Electrical equipment backboards: Canadian softwood plywood to CSA 0151, standard construction, CSP/S1S, 19 mm thick. Overall dimensions to suit equipment layout and arrangement. Install wood support framing as required. Painting of panel in Section 09 91 23.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for design, supply, transporting and erecting pre-fabricated wood roof trusses where shown on the Drawings and as specified herein.
- 1.2 RELATED WORK .1 Rough carpentry: Section 06 10 00
- 1.3 REFERENCES .1 CSA-086-14, Engineering Design in Wood.
.2 CAN/CSA-0141-05 (R2014), Softwood Lumber.
.3 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel Structures.
.4 NLGA, Standard Grading Rules for Canadian Lumber, 2014.
- 1.4 DESIGN CRITERIA .1 Design trusses, bracing and bridging in accordance with CSA-086 and NBC 2010 , Part 4 requirements, Post Disaster building designation. Internal wind uplift pressures shall be determined in accordance with NBC 2010, Part 4 requirements, Category 3 building designation.
.2 Dead load, live load, gross wind uplift and snow loads are indicated on the design drawings. Design trusses for point loads from suspended mechanical/electrical equipment as noted on plans.
.3 Limit combined live load and dead load deflections to 1/240th of span unless otherwise specified or indicated. Limit live load deflection to 1/360th of span unless otherwise specified or indicated.
.4 Design and supply all truss uplift anchors (truss tie downs), including girder truss tie downs, in accordance with CSA-086, to withstand the wind uplift loads shown on Drawings.
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- 1.4 DESIGN CRITERIA .5 At truss bearing points, where allowable compression perpendicular to the grain is exceeded, the truss manufacturer must provide bearing plates.
(Cont'd)
- 1.5 SOURCE QUALITY CONTROL .1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.
- 1.6 QUALIFICATION OF MANUFACTURERS .1 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.
- 1.7 SHOP DRAWINGS .1 Submit shop drawings and erection drawings in accordance with Section 01 33 00.
- .2 Each shop drawing submission showing connection details must bear signature and stamp of professional engineer registered or licensed in Nova Scotia.
- .3 Indicate species, sizes, and stress grades of all lumber used as structural members. Show pitch, span, camber, design heel height, configuration and spacing of members. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for each member.
- .4 Submit stress diagram or print-out of computer design indicating design load for each member. Indicate allowable load and stress increase.
- .5 Indicate arrangement of webs or other members to accommodate ducts and other specialties.
- .6 Show lifting points for storage, handling and erection.
- .7 Show location of lateral bracing for compression members.
- .8 Indicate uplift anchor size, type and location.
-

1.8 DELIVERY AND
STORAGE

- .1 Store members on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of members.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Lumber: SPF species, No. 1 grade, softwood, S4S, with maximum moisture content of 19% at time of fabrication and to following standards:
 - .1 CAN/CSA-0141.
 - .2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.
- .2 Fastenings: to CSA-086.
- .3 Tie-down anchors: prefabricated wood truss to top plate uplift anchors, galvanized, to resist uplift force calculated as per the National Building Code of Canada.

2.2 FABRICATION

- .1 Fabricate wood trusses in accordance with reviewed shop drawings.
- .2 Provide for design camber and roof slopes when positioning truss members.
- .3 Connect members using metal connector plates.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Erect wood trusses in accordance with reviewed erection drawings.
 - .2 Indicated lifting points to be used to hoist trusses into position.
 - .3 Make adequate provisions for handling and erection stresses.
 - .4 Exercise care to prevent out-of-plane bending of trusses.
-

3.1 ERECTION
(Cont'd)

- .5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
- .6 Install permanent bracing in accordance with reviewed shop drawings, prior to application of loads to trusses.
- .7 Do not cut or remove any truss material without approval of the Consultant.
- .8 Provide galvanized uplift anchor(s), at each truss bearing point, to resist uplift force, calculated as per National Building Code of Canada.
- .9 Have all truss tie downs (uplift anchors), including girder truss tie downs, designed, supplied and installed by the truss supplier.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for dampproofing under slabs as specified and where indicated on the Drawings.
-
- 1.2 RELATED WORK .1 Insulation: Section 07 21 00
 .2 Sealants: Section 07 92 00
-
- 1.3 STORAGE AND HANDLING .1 Provide and maintain dry, off-ground weatherproof storage, at temperatures above freezing, free from contact with cold or frozen surfaces.
 .2 Store materials on supports to prevent deformation.
 .3 Remove only in quantities required for same day use.
 .4 Store materials in accordance with manufacturers written instructions.
-
- 1.4 ENVIRONMENTAL REQUIREMENTS .1 Do not proceed with work when wind chill effect would tend to set bitumen before proper curing takes place.
 .2 Maintain air temperature and substrate temperature at dampproofing installation area above 5°C for 24 hours before, during and 24 hours after installation.
 .3 Do not apply dampproofing in wet weather.
 .4 Provide forced air circulation during installation and curing periods for enclosed applications.
-

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Under slab dampproofing vapour barrier: "Moiststop" sheet membrane, reinforced polyethylene, complete with lapped/sealed joints.

PART 3 - EXECUTION

- 3.1 APPLICATION .1 Under slabs:
 .1 Install sheet membrane of reinforced poly dampproofing/vapour barrier below concrete floor slab and extend 100mm up vertical face of concrete walls.
 .2 Lap joints of sheet dampproofing/vapour barrier 150mm minimum and apply a continuous heavy bead of acoustic sealant or Building Wrap Tape, to seal joints.
 .3 After concrete slab has been poured, install continuous perimeter caulked joint between foundation wall and slab.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for furnishing all materials, labour, tools and equipment necessary to complete batt insulation and rigid insulation as indicated and as specified herein.
- 1.2 RELATED WORK .1 Rough Carpentry: Section 06 10 00
 .2 Dampproofing: Section 07 11 13
 .3 Hollow Metal Doors and Frames: Section 08 11 14
 .4 Excavating, Trenching and Backfilling: Section 31 23 10
- 1.3 REFERENCES .1 CAN/ULC-S701-2011, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 .2 CAN/ULC-S702-2009, Thermal Insulation, Mineral Fibre, for Buildings.
 .3 CGSB 71-GP-24M-83, Adhesive, Flexible for Bonding Cellular Polystyrene Insulation.
- 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING .1 Package insulation materials and label them to designate manufacturer, type, density and insulation value, and reference standard specification number if applicable.
 .2 Store insulation materials in dry areas, protected from wetting and traffic.
 .3 Store insulation board flat, on a flat surface, to prevent edge damage and placing of materials on top of stored boards.
 .4 Store insulation board and adhesives at a minimum temperature of 4°C for 12 hours before installation, and store freezable adhesives only at temperatures above 0°C at all times.
-

- 1.5 JOB CONDITIONS
- .1 Install insulation materials subject to damage by water, freezing, sunlight or similar adverse environmental conditions with adequate protection against damage.
 - .2 Protect polystyrene insulation from sunlight at all times until permanent cover is installed.

- 1.6 PROTECTION
- .1 Ventilate area to receive spray applied polyurethane insulation by introducing fresh air and exhausting air continuously during and 24 hours after application to maintain non-toxic, unpolluted, safe working conditions.
 - .2 Provide temporary enclosures to prevent spray applied polyurethane insulation from contaminating air beyond application area.
 - .3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

PART 2 - PRODUCTS

- 2.1 GENERAL
- .1 Confirm all materials of an insulation system and the construction with which it is in contact are compatible.
 - .2 Inform others whose Work is affected of the thickness and installation methods of insulation to be installed.

- 2.2 MATERIALS
- .1 Batt insulation: to CAN/ULC-S702, Type 1.
 - .2 Rigid board wall insulation:
 - .1 Above grade: closed cell, cellular foamed polystyrene to CAN/ULC S701, Type 2, thickness indicated, (based on 50mm equal to RSI 1.761) shiplapped edges.
 - .1 Acceptable product: Styrofoam Cavitymate SC by Dow Chemical Canada Inc., Celfort 200 as manufactured by Owens Corning, TrueBoard type 2 by TrueFoam or approved equivalent.

2.2 MATERIALS
(Cont'd)

- .2 (Cont'd)
 - .2 Below grade insulation: extruded, closed cell, cellular foamed polystyrene to CAN/ULC S701, Type 3, thickness indicated, shiplapped edges. Cover exposed perimeter wall insulation to a minimum of 300mm below grade with 12.5mm thick cementitious board cladding.
 - .1 Acceptable product: Styrofoam SM by Dow Chemical Canada Inc., Celfort 300 as manufactured by Owens Corning, or approved equivalent.
 - .3 Vapour barrier type adhesive: to CGSB 71-GP-24, Type 2, Class as recommended by manufacturer and compatible with polystyrene insulation.
 - .4 Attic ventilation baffle: expanded polystyrene to CAN/ULC S701, 1200 LG. Acceptable product: TrueVent by TrueFoam, or approved equivalent.

2.3 COMPATIBILITY

- .1 Confirm all materials that come in contact with insulation board adhesive are compatible. Provide proof of compatibility if requested.

2.4 PERFORMANCE REQUIREMENTS

- .1 Fit insulation within construction elements and dimensions indicated on Drawings, without compression.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
 - .2 Verify all surfaces to which board insulation is applied are clean, reasonably smooth with no abrupt changes in plane, free of grease and with protruding fins of mortar or concrete removed, and that the surfaces are otherwise acceptable for board insulation application as specified.
 - .3 Install insulation to maintain continuity of thermal protection to building elements and spaces.
-

3.1 WORKMANSHIP
(Cont'd)

- .4 Fit insulation tightly around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and other protrusions.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .6 Do not enclose insulation until it has been inspected and approved by the Consultant.

3.2 EXAMINATION

- .1 Examine substrates and immediately inform Consultant in writing of defects.
- .2 Prior to commencement of work ensure:
 - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.
 - .2 Surfaces have not been coated with releasing agents, and other contaminants which would affect positive bonding of polyurethane insulation.
- .3 Report, in writing, to Consultant defects or conditions which would affect work. Do not proceed with work until conditions have been rectified.

3.3 PERIMETER
FOUNDATION
INSULATION

- .1 Install insulation boards vertically at 600 mm o.c. from top of foundation footings to underside of concrete floor slab, and for overhead door locations extend boards 600mm horizontally in from the foundation wall and 600mm past overhead door openings at each side (Lay boards on level, compacted fill).
- .2 Exterior application: extend boards as indicated on exterior face of the perimeter foundation wall with adhesive.
- .3 Cover exposed perimeter rigid foundation insulation with cementitious board to a minimum of 300mm below grade.

- 3.4 BATT INSULATION
INSTALLATION
- .1 Pack insulation in door frames as indicated.
 - .2 Install batt insulation in wood framed construction where indicated on Drawings, in a neat and tight fashion.
 - .3 Install batt insulation in two (2) layers, with first layer and thickness parallel to the joints or trusses, and the second layer perpendicular to the first layer.
- 3.5 ATTIC
VENTILATION
INSULATION
INSTALLATION
- .1 Install attic vent insulation at soffits to underside of roof sheathing using two vents per 610 mm o.c./truss space.
- 3.6 RIGID BOARD
WALL INSULATION
INSTALLATION
- .1 Apply full bed of Type 2 vapour barrier adhesive to polystyrene insulation board edges by trowel, to fill any gaps between joints of sheets and any penetrations.
 - .2 Install pressure-treated wood strapping vertically at 400 o.c. over insulation and exterior wall building wrap.
- 3.7 ADJUSTMENT AND
CLEANING
- .1 Remove adhesive and clean surfaces without marring or damaging surface.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for supplying and installing the sheet membrane air/vapour barrier system to ceilings, where shown on the Project Drawings and herein specified.
- 1.2 RELATED WORK .1 Rough Carpentry: Section 06 10 00
.2 Sealants: Section 07 92 00
.3 Hollow Metal Doors and Frames Section 08 11 14
.4 Aluminium Windows: Section 08 51 13
- 1.3 REFERENCES .1 CAN/CGSB-51.34-M86 Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
.2 CAN/CGSB-51.32-M77 Sheathing, Membrane Breather Type.

PART 2 - PRODUCTS

- 2.1 SHEET VAPOUR BARRIER .1 Polyethylene film: to CAN/CGSB-51.34-M86, Type 1, 6 mil thick interior ceiling vapour barrier.
.2 Exterior wall building wrap: single ply spunbonded polyolefin type.
.1 Acceptable product: Tyvek by Dupont, Air-Gard by Fabrene Inc., or approved equivalent.
- 2.2 ACCESSORIES .1 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50mm wide for lap joints and perimeter seals, 25mm wide elsewhere.
.2 Sealants: as specified in Section 07 92 00.
.3 Staples: minimum 6mm leg.
-

2.2 ACCESSORIES
(Cont'd)

- .4 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install and inspect services prior to installation of retarder.
- .2 Install sheet vapour retarder ceiling assemblies prior to installation of plywood to form continuous retarder.
- .3 Use sheets of largest practical size to minimize joints.
- .4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed to the satisfaction of the Consultant.

3.2 EXTERIOR
SURFACE OPENINGS

- .1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.3 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .2 Lap sheet over sealant and press into sealant bead.
 - .3 Install staples through lapped sheets at sealant bead into wood substrate.
 - .4 Confirm that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

- .1 Seal lap joints of sheet vapour barrier as follows:
- .1 Attach first sheet to substrate.
 - .2 Apply continuous bead of sealant over solid backing at joint.
 - .3 Lap adjoining sheet minimum 150mm and press into sealant bead.
-

- 3.4 LAP JOINT SEALS .1 (Cont'd)
(Cont'd)
- .4 Install staples through lapped sheets at sealant bead into wood substrate.
- .5 Allow for no gaps to exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.
- 3.5 ELECTRICAL BOXES .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
- .1 Install moulded box vapour barrier.
- .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.
- 3.6 OPENINGS .1 Equip window frames with factory site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder.
- .1 Material: compatible with building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies asphalt shingle roofing and accessories including flashing, fascia, soffit, eavestroughs/downspouts and splash pads.
- 1.2 RELATED WORK .1 Rough carpentry: Section 06 10 00
.2 Prefabricated wood trusses: Section 06 17 53
.3 Sealants: Section 07 92 00
- 1.3 REFERENCES .1 CSA A123.1-05 (R2015), Asphalt Shingles Made from Organic Felt and Surfaced with Mineral Granules/Asphalt Shingle Application on Roof Slopes 1:3 and Steeper.
.2 CAN/CSA A123.3-05 (R2010), Asphalt Saturated Organic Roofing Felt.
.3 CAN/CGSB-93.2-M91, Pre-finished Aluminum Siding, Soffits and Fascia, Prefinished for Residential Use.
- 1.4 SHOP DRAWINGS .1 Submit shop drawings and sample selection charts in accordance with Section 01 33 00.
- 1.5 STORAGE AND HANDLING .1 Provide and maintain dry, off-ground weatherproof storage.
.2 Remove only in quantities required for same day use.
- 1.6 WARRANTY MATERIALS .1 Provide two (2) bundles of shingles in original wrapper for maintenance purposes.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Asphalt shingles: to CSA A123.1.
 - .1 Type: double layer laminate, extra-heavy fiber glass mat, 152 mm exposure, minimum 40 year warranty and minimum wind uplift to 100 mph (150 km/hr).
 - .2 Colour: as selected by the Consultant.
 - .3 Texture: as selected by the Consultant.
 - .4 Acceptable product: IKO "Cambridge", CertainTeed "Hatteras", BP "Everest", or approved equivalent.
- .2 Building paper, and underlay for metal flashing: to CSA A123.3 organic felt No. 15.
- .3 Cement: a high quality black asphaltic plastic cement used for cementing shingle tabs and roof flashings.
- .4 Metal drip edge: minimum base aluminum thickness 26 gauge prefinished aluminum, white in colour.
- .5 Nails: galvanized steel, sufficient length to penetrate 19 mm into deck.
- .6 Prefinished aluminum fascia and continuous soffit vent system with factory applied coating to CAN/CGSB-93.2 supplemented and amended as follows:
 - .1 Type SF, base metal thickness 26 gauge.
 - .2 Class 1.
 - .3 Colour: as selected by the Consultant.
 - .4 Fasteners, hangers, clips, starter strips and other devices: of same material as sheet metal, of length and thickness suitable for application.
- .7 Ridge vent: shingle-over ridge vent system, polypropylene construction with interior baffle system to prevent rain/snow infiltration complete with end caps.
 - .1 Acceptable product: Hidden Vent as manufactured by ICI Acrylics Canada Inc., Cobra Ridge Vent, or approved equivalent.
- .8 Eave protection: self adhering, waterproof, glass fibre reinforced rubberized asphalt membrane.
 - .1 Acceptable product: Eavesshield as manufactured by Northern Globe, Ice and Water Shield by W.R. Grace, Eaveguard by Bakor, or approved equivalent.

2.2 SOFFIT AND
FASCIA FABRICATION

- .1 Fabricate aluminum soffit, fascias, flashings and other sheet aluminum work in accordance with Aluminum Association Aluminum Sheet Metal Work in Building Construction.
- .2 Form pieces in 2.44 m maximum lengths. Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm. Lap and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Form copings and fascias to profiles indicated of prefinished aluminum.

2.3 GUTTERS AND
DOWNSPOUTS

- .1 Gutters and downspouts to be fabricated from 19 gauge thick aluminum sheet, factory prefinished white, size and profile indicated.
- .2 Gutters and downspouts to be seamless and continuous. Prefinished surface toward outside face, and face of seams.
- .3 Provide goosenecks, strainer baskets, and necessary fasteners.
- .4 Gutter fasteners: purpose made, prefinished white, aluminum nails, 150 mm long x 6 mm.
- .5 Provide purpose made precast concrete splash pads and slope pads away from building for drainage.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Install drip edge along eaves and rake ends, overhanging 12 mm, with minimum 75 mm flange extending onto roof decking and 38 mm down fascia. Nail to deck at 200 mm oc. Keep bottom edge of drip flange (at 45° angle bend) 5 mm to 9.5 mm away from fascia.
 - .2 Eave protection:
-

3.1 APPLICATION
(Cont'd)

- .2 (Cont'd)
- .1 Apply eave protection along roof eaves (2 wythes), along rake edges (1 wythe), and at ridge vents (1 wythe total) or at other penetrations penetrating roof surface, all in accordance with manufacturer's recommendations.
 - .2 Extend eave protection from fascia to point on roof minimum 600 mm beyond inside face of exterior wall.
 - .3 Overlap end joints minimum 150 mm. Lap second course minimum 100 mm over top selvedge from course to course.
 - .4 Ensure ambient and surface temperatures are above 5°C during installation.
- .3 Apply building paper underlayment parallel to eaves over remaining roof area. Lap each layer at 100 mm at edges and 150 mm at ends.
- .4 Do asphalt shingle work in accordance with CAN/CSA-A123.5 except where specified otherwise, and as follows:
- .1 Provide ridge shingles as required. Start ridges at end away from prevailing wind direction. Bend shingle down to extend equal distance on each side of ridge.
 - .2 Cement shingles at three (3) places spaced equally across length of shingle, using 25 mm diameter spot of adhesive at all locations where "self-stick" installation is inadequate.
 - .3 Provide minimum four nails/shingle.
- .5 Install ridge vent along ridge of roof. Cover with cap shingles. Use additional cement where required to ensure no blow-off. Cap ends.

3.2 INSTALLATION OF
ACCESSORIES

- .1 Install soffits and fascias as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Lock end joints and caulk with sealant.
-

3.3 GUTTER AND
DOWNSPOUT
INSTALLATION

- .1 Install gutters and secure to building at 600 mm oc, with aluminum nails. Confirm positive drainage to downspouts. Caulk edge of gutters to face of fascia.
- .2 Install downspouts, and 45° bottoms to lead water to precast concrete splash pads. Secure downspouts to wall with straps at 1.8 m oc, minimum of three (3) straps on each downspout.

3.4 CLEAN-UP

- .1 Upon completion of the work, clean area of all unused material, packages and containers.
- .2 Remove deposits, stains, and protection and clean metals left unpainted and exposed to view with cleaners recommended by the manufacturer.

PART 1 - GENERAL

1.1 WORK INCLUDED .1 This section specifies requirements for providing vinyl siding.

1.2 RELATED WORK .1 Rough Carpentry: Section 06 10 00

1.3 REFERENCES .1 ANSI B18.6.3-2013, Machine Screws, Tapping Screws and Metallic Drive Screws.

.2 ASTM D3679-2013, Standard Specification for Rigid Poly (Vinyl Chloride) Siding.

1.4 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00.

.2 Indicate dimensions, siding profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia and related work.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Rigid vinyl: extruded polyvinylchloride to ASTM D3679 wood grain or embossed finish, double horizontal bevel profile, 225 mm wide x maximum permissible length, colour as selected by the Consultant from manufacturer's standard colour range.

.1 Acceptable products: Cambridge Double 4.5" Horizontal siding by Mitten Vinyl Inc. or approved equivalent.

.2 Accessories: external corners, cap strip, drip cap, undersill trim, J-type fascia, starter strip and louvre/door trim of extruded plastic, same material and colour as siding, with nailing strip pre-punched.

2.1 MATERIALS
(Cont'd)

- .3 Soffits: rigid vinyl, vented to allow minimum 41.3 cm² of free air flow/linear foot of soffit.
 - .1 Acceptable products: D5 Vented by Mitten Vinyl Inc., or approved equivalent.
- .4 Sealants: as specified in Section 07 92 00.
- .5 Fasteners: galvanized nails to ASTM A123 screws to ANSI B18.6.3 corrosion resistant, purpose made.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install louvre/door opening flashings, starter strips, inside corners, edgings, drip and cap.
- .2 Install siding sequentially from starter strip up, in accordance with manufacturer's written instructions.
- .3 Fasten siding panels at 400 mm to 450 mm o.c., except 200 mm to 250 mm o.c. on windy side of building, in centre of slots.
- .4 Fasten accessories at 250 mm to 300 mm o.c. in centre of slots.
- .5 Install exterior corners, fillers and closure strips with carefully formed and profiled work.
- .6 Maintain joints in exterior panels, true to line, tight fitting, hairline joints.
- .7 Seal junctions with dissimilar materials with sealant. Do work in accordance with Section 07 92 00.
- .8 Attach components in manner not restricting thermal movement. Conceal fasteners where possible.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Rough Carpentry: Section 06 10 00
 - .2 Sealants: Section 07 92 00
- 1.2 REFERENCES
- .1 ASTM D523-2014 Test Method for Specular Gloss.
 - .2 CAN/CGSB-51.32-M77 Sheathing, Membrane, Breather Type.
 - .3 CAN/CGSB-93.1-M85 Sheet, Aluminum Alloy, Prefinished, Residential.
 - .4 Aluminum Association Aluminum Sheet Metal Work in Building Construction.
 - .5 Canadian Roofing Contractors Association (CRCA) Manual.
- 1.3 SUBMITTALS
- .1 Submit duplicate 50 mm x 50 mm samples of each type of sheet metal material, colour and finish.
 - .2 Submit shop drawings in accordance with Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 PREFINISHED STEEL SHEET FLASHING
- .1 Prefinished steel, with factory applied silicone modified polyester.
 - .1 Class F1S.
 - .2 Colour to match existing building.
 - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
 - .4 Thickness - 0.76 mm (22 gauge).
- 2.2 ALUMINUM SHEET
- .1 Base sheet: proprietary utility sheet, plain, 0.60 mm (24 gauge) minimum thickness.
-

2.2 ALUMINUM SHEET
(Cont'd)

- .2 Finish: factory applied coating to CAN/CGSB-93.1 supplemented and amended as follows:
- .1 Type 1 - postforming sheet.
 - .2 Class F1S - finish coated one side.
 - .3 Colour of coating: to be commercially uniform and match the colour of the existing building.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.
- .3 Sealants: as per Section 07 92 00.
- .4 Cleats: of same material as flashing specified, and temper as sheet metal, minimum 50 mm wide. Thickness 0.76 mm (22 gauge).
- .5 Fasteners: of same material as sheet metal, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: of same material as sheet metal, with rubber packings.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with Aluminum Association Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
- .4 Hem exposed edges on underside 12 mm. Miter and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

- 2.4 FABRICATION
(Cont'd)
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
- 2.5 METAL CAP FLASHINGS
- .1 Form flashings, copings and fascias to profiles of prefinished steel.
- .2 Form flashings in accordance with CRCA FL series details. Provide slotted fixing holes and steel/plastic washer fasteners. Cover face and ends with plastic tape.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install sheet metal work in accordance with CRCA FL series details, Aluminum Sheet Metal Work in Building Construction.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Insert metal flashing into reglets under cap flashing to form weathertight junction.
- .8 Caulk flashing at reglet cap flashing with sealant.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for supplying and applying firestopping and smoke seal material as required for wall/floor/ceilings in areas/rooms which are fire-rated, as noted in the Room Finish Schedule.
- 1.2 RELATED WORK .1 Firestopping and smoke seals within electrical assemblies (i.e. inside conduits) are specified in Division 26.
- 1.3 REFERENCES .1 ASTM E2174-2014B, Standard Practice for On-site Inspection of Installed Fire Stops.
- .2 ULC S115-2011, Method of Fire Tests of Firestop Systems.
- .3 International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.
- .4 National Building Code, 2010.
- 1.4 SAMPLES .1 Submit samples in accordance with Section 01 33 00.
- .2 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.
- 1.5 SUBMITTALS .1 Submit shop drawings and product and safety data in accordance with Section 01 35 29.
- .2 Submit shop drawings to show proposed material, including composition and limitations, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
-

1.5 SUBMITTALS
(Cont'd)

- .3 Provide manufacturer's engineering judgments identification number and drawing details when no ULC or UL system are available for an application. Engineered judgments must include both project name and contractor's name who will install firestop system as described in drawing.
- .4 Submit material safety data sheets provided with product delivered to job site.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Firestopping and smoke seal systems: in accordance with ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining an effective barrier in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.
 - .2 Firestop system rating: F.
- .2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.
- .3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.
- .4 Fire-resistance rating of installed firestopping assembly in accordance with NBC.
- .5 Firestopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Firestopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

- 2.1 MATERIALS
(Cont'd)
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
 - .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
 - .10 Sealants for vertical joints: non-sagging.
 - .11 Acceptable manufacturers:
 - .1 Hilti Canada Corporation
 - .2 3M
 - .3 A/D Fire Protection Systems

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Confirm substrates and surfaces are clean, dry and frost free.
 - .2 Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.
 - .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
 - .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.
- 3.2 COORDINATION
- .1 Coordinate location and proper selection of cast-in-place firestop devices with trade responsible for the work. Install device before placement of concrete.
 - .2 Provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interference.
-

3.3 INSTALLATION

- .1 Install firestopping material and components in accordance with ULC certification and manufacturer's instructions.
- .2 Install firestopping and smoke seal material and components at all walls, floors and ceilings in fire rated rooms as noted on Room Finish Schedule on Drawings and also for all floor to floor penetrations.
- .3 Install firestopping and smoke seal on both sides of wall or slab where penetration or opening exists in fire rated rooms.
- .4 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .6 Tool or trowel exposed surfaces to a neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.

3.4 INSPECTION

- .1 Notify the Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.5 SCHEDULE

- .1 Firestop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Top of fire-resistance rated masonry and gypsum board partitions.
 - .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .6 Openings and sleeves installed for future use through fire separations.
-

3.5 SCHEDULE
(Cont'd)

- .1 (Cont'd)
 - .7 Around mechanical and electrical assemblies penetrating fire separations.
 - .8 Rigid ducts (greater than 129 cm²): fire stopping to consist of bead of firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.6 FIELD QUALITY
CONTROL

- .1 Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- .2 Keep areas of work accessible until inspection by applicable code authorities.
- .3 Perform inspection of through-penetration firestopping in accordance with ASTM E2174.
- .4 Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- .5 Install a warning card that is clearly visible adjacent to all large and medium openings that may be re-penetrated. This card should contain the following information:
 - .1 Warning that the opening has been firestop protected.
 - .2 Indicate the firestop system used (ULC).
 - .3 F rating or FT rating.
 - .4 Firestop product(s) used.
 - .5 Person to contact and phone number in case of modification or new penetration of firestop system.

3.7 CLEAN UP

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- .2 Remove temporary dams after initial set of firestopping and smoke seal materials.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying, and applying sealants as indicated.
- 1.2 RELATED WORK .1 Cast-in-place Concrete: Section 03 30 00
 .2 Dampproofing: Section 07 11 13
 .3 Hollow Metal Doors and Frames: Section 08 11 14
- 1.3 REFERENCES .1 ASTM C920-2014, Specification for Elastomeric Joint Sealants.
 .2 CAN/CGSB-19.13-M87 Sealing Compound, One Component, Elastomeric, Chemical Curing.
 .3 CAN/CGSB-19.24-M90 Multi-component, Chemical Curing Sealing Compound.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels intact. Protect from freezing, moisture and water.
- 1.5 ENVIRONMENTAL AND SAFETY REQUIREMENTS .1 Sealant and substrate materials to be minimum 5°C.
 .2 Should it become necessary to apply sealants below 5°C, consult sealant manufacturer and follow their recommendations.
 .3 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.
-

- 1.5 ENVIRONMENTAL AND SAFETY REQUIREMENTS (Cont'd) .4 Conform to manufacturer's recommended temperatures, relative humidity and substrate moisture content for application and curing of sealants including special conditions governing use.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Primers: type recommended by sealant manufacturer.
 - .2 Joint fillers:
 - .1 General: compatible with primers and sealants, outsized 30 to 50%.
 - .2 Polyethylene, urethane, neoprene or vinyl: extruded closed cell foam, Shore A hardness 20.
 - .3 Bond breaker: pressure sensitive plastic tape, which will not bond to sealants.
 - .4 Sealants:
 - .1 Interior and exterior caulking around perimeter of pressed steel frames and to base of frames to flooring: to CAN/CGSB-19.13, one-component, moisture curing, modified polyurethane, paintable, normal temperature range dry conditions, movement range to 10%.
 - .1 Acceptable product: DyMonic by Tremco Limited, or approved equivalent.
 - .2 Interior control and expansion joints: to CAN/CGSB-19.24 multi-component sealant, self levelling, for joint movement up to 25%.
 - .1 Acceptable product: Duoflex SL by Sternson Division of Sika Canada Inc., THC-900 for horizontal joints and THC-901 for vertical joints by Tremco Limited, or approved equivalent.
 - .3 Interior locations including: at corner joints where masonry walls butt into continuous walls, at masonry walls and concrete floor slabs, and at equipment pads to floor slabs, except where another sealant is specified: to CGSB 19.13.
 - .1 Acceptable product: DyMonic by Tremco Limited, or approved equivalent.
 - .5 Joint cleaner: xylol, methylethyleketon or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Remove by brushing, scrubbing, scraping or grinding loose mortar, dust, oil, grease, oxidation, mill scale, coatings and all other materials affecting bond of compounds from surfaces to which sealant compounds must adhere, except for painted surfaces.
- .3 Clean down caulked metal surfaces with clean cellulose sponges or rags soaked in solvent recommended by sealant manufacturer, and wipe dry with clean cloths. Confirm solvent is not injurious to painted surfaces.
- .4 Confirm releasing agents, coatings or other treatments have either not been applied to joint surfaces, or that they are entirely removed.
- .5 Confirm joint surfaces are dry and frost free.

3.2 APPLICATION

- .1 Apply sealant products where indicated on the drawings and as outlined in Clause 2.1 of this Section.
 - .2 Where necessary to prevent staining, mask adjacent surfaces before priming and caulking.
 - .3 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.
 - .4 Apply sealants, primers, joint fillers, and bond breaker if required, to manufacturer's instructions. Apply sealant using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.
 - .5 Form surfaces of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.
-

3.3 CURING

- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealant until proper curing has taken place.

3.4 CLEANING

- .1 Clean adjacent surfaces immediately and leave work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.
- .4 Do not use chemicals, scrapers, or other tools which would damage surfaces of caulked materials when excess compounds or droppings are removed. Repair Work damaged by cleaning.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying and installing exterior hollow metal doors, frames, and hardware as indicated.
- 1.2 RELATED WORK .1 Caulking of joints between frames and other building components: Section 07 92 00
- .2 Painting: Section 09 91 23
- 1.3 REFERENCES .1 Canadian Steel Door and Frame Manufacturers' Association, (CSDFMA).
- .1 Specifications for Commercial Steel Doors and Frames.
- .2 Recommended Selection and Usage Guide for Commercial Steel Doors.
- .3 Recommended Locations for Hardware for Steel Doors and Frames.
- .2 National Fire Protection Association (NFPA):
- .1 NFPA 80-2016, Fire Doors and Windows.
- .2 NFPA 252-2012, Methods of Fire Test of Door Assemblies.
- .3 ASTM A653/A653M-2015, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process.
- .4 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .5 CSA G40.21-2013, Structural Quality Steel.
- .6 ULC S104-2010, Fire Test of Door Assemblies.
- 1.4 SHOP DRAWINGS .1 Submit shop drawings and hardware schedule in accordance with Section 01 33 00 using D.H.I. (Door and Hardware Institute) formats.
-

- 1.4 SHOP DRAWINGS (Cont'd)
- .2 Indicate type of door and frame, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, finishes and fire ratings.
 - .3 Indicate proposed hardware including make, model, material, function, finish and all other pertinent information.
- 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING
- .1 Brace frame units to prevent distortion in shipment and protect finished surfaces by sturdy protective wrapping.
 - .2 Store doors and finishing hardware in a secure, dry location. Remove wrappings when finally stored in location, secure from damage. Store doors vertically with blocking between to allow air to circulate.
 - .3 Repair damage to finishes immediately after it occurs to prevent rusting. Use primer for painted surfaces and zinc primer for galvanized surfaces.
 - .4 Package each item of hardware separately or in like groups of hardware, label each package as to item definition and location.
 - .5 Maintain inventory list with hardware schedule.
- 1.6 REQUIREMENTS OF REGULATORY AGENCIES
- .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with ULC S104M and NFPA 252 for ratings specified or indicated.

PART 2 - PRODUCTS

- 2.1 DOOR MATERIAL
- .1 Sheet steel: 1.2 mm base thickness, commercial grade steel to ASTM A653, hot dipped galvanized, coating designation Z275 for exterior doors.
 - .2 Door Core:
 - .1 Exterior hollow steel: vertically stiffened with steel ribs and all voids filled with semi-rigid fibrous insulation minimum density 1.5 pcf.

-
- 2.1 DOOR MATERIAL .2 (Cont'd)
(Cont'd)
- .2 Interior honeycomb: structural core consisting of Kraft paper having 24.5mm cell size to thickness indicated.
- .3 Exterior doors to have caps at top of door.
- 2.2 FRAME MATERIAL .1 Sheet steel: commercial grade steel to ASTM A653, hot dipped galvanized, coating designation Z275 for exterior frames.
- .1 Frames: 1.6 mm base steel thickness.
- .2 Floor anchors, channel spreaders and wall anchors: minimum 1.6 mm base steel thickness.
- .3 Guard boxes: minimum 0.8 mm base steel thickness.
- .4 Hinge reinforcements: minimum 2.6 mm base steel thickness.
- .2 Top and bottom reinforcing channels: to CSA G40.21-M, type 300W.
- .3 Door bumpers: black neoprene single stud, three for each single door, and two for each double door.
- .4 Frames for exterior doors to be thermally broken and must accommodate expansion and contraction with surface temperature range of -34 deg.C to 76 deg.C. Deflection must not exceed 1/175th of span under wind loads for building locality in accordance with the National Building Code, 2010. Pack frames with fibreglass insulation and/or polyurethane insulation.
- 2.3 ADHESIVES .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
- 2.4 PRIMER .1 Touch up primer for doors and frames to CAN/CGSB-1.181.
-

2.5 DOOR AND FRAME
FABRICATION

- .1 The following fabricators are approved to perform work of this section: S.W. Fleming & Co. Ltd., Daybar, Apex Doors and Frames.
- .2 Steel doors: 45 mm thick unless otherwise indicated.
- .3 Interior frames: 145 mm butt-mounted; exterior frames to be thermally broken, 146 mm butt mounted; unless otherwise noted on the drawings.
- .4 Fabricate steel doors and frames as detailed, in accordance with Steel Door and Frame Manufacturers' Association, "Canadian Manufacturing Specifications for Steel Doors and Frames".
- .5 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided by finish hardware supplier.
- .6 Shop prime cold rolled steel sheet.
- .7 Touch up doors and frames at factory with primer where galvanized finish damaged during fabrication.
- .8 Cut mitres and joints of frames accurately and weld continuously on inside of frame profile.
- .9 Grind welded corners and joints of frames to flat plane, fill with metallic paste filler and sand to uniform smooth finish.
- .10 Prepare doors and frames for installation of hardware. Provide all steel reinforcements. Drill and tap to template information.
- .11 Reinforce all doors and frames for door closers whether closers are scheduled or not.
- .12 Install three (3) door bumpers on strike jamb for each single door and two (2) door bumpers at head for double doors.
- .13 Reinforce heads of frames wider than 1200 mm.
- .14 Provide floor anchors, adjustable tee anchors, and steel anchors in accordance with Canadian Steel Door and Frame Manufacturers Association. Weld floor anchors to frame.

2.5 DOOR AND FRAME
FABRICATION
(Cont'd)

- .15 Close tops and bottoms of doors with recessed spot welded channel and closures. Mechanically interlock longitudinal edges.
- .16 Install galvanized steel top caps for all exterior doors.
- .17 Construct thermally broken frames using steel core, separating exterior portion of frame from interior portion with polyvinyl chloride thermal break.
- .18 Insulate exterior frame components with polyurethane insulation.

2.6 THERMALLY
BROKEN DOORS AND
FRAMES

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.
- .2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
- .4 Apply insulation.

2.7 HARDWARE
MATERIAL

- .1 As specified on the Project Drawings.

PART 3 - EXECUTION

3.1 DOOR
INSTALLATION

- .1 Install doors in accordance with manufacturer's instructions.
- .2 Fit doors with 6 mm clearance at jambs and head of frame, and 10 mm clearance over threshold.

3.2 HARDWARE
INSTALLATION

- .1 Hardware supplier to furnish and deliver to the Contractor in sufficient time so as not to impede the progress of the work, all necessary templates and schedules required to fabricate doors and frames.
- .2 Furnish manufacturers' instructions for proper installation of each hardware component.
- .3 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular construction) prepared by Canadian Steel Door and Frame Manufacturers Association.
- .4 The mounting height may be varied conforming to the manufacturer's specific instructions and as approved by the Consultant.
- .5 Install hardware and trim square and plumb to doors.
- .6 Use all the installation aids available for a proper installation of the hardware items.
- .7 Protect exposed surfaces from scratches and abrasions with suitable covering until building is ready for final inspection.
- .8 All hardware must be thoroughly cleaned before it is turned over to the Owner.
- .9 Adjust all hardware as required to provide smooth operation. Lubricate hardware if required by supplier's instructions.
- .10 Deliver keys to Owner at building completion.

3.3 ADJUSTMENT

- .1 Adjust hinged doors to swing freely and easily, to remain stationary at any point of swing, to close evenly and tightly against stops without binding, and to latch positively when doors are closed with moderate force.

3.4 DOOR & HARDWARE
SCHEDULE

- .1 Door: sizes and materials as shown on Drawings.

3.4 DOOR & HARDWARE .2 Hardware: as shown on Drawings.
SCHEDULE
(Cont'd)

- 3.5 FINISH REPAIRS .1 Touch up finishes damaged during installation.
- .2 Fill exposed frame anchors, and surfaces with imperfections, marks/scratches/dents, etc with metallic paste filler and sand to a uniform smooth finish. Prime areas affected.
- .3 Finish paint doors and frames as specified in section 09 91 23.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying and installing finish hardware in the locations indicated in the hardware schedule and as specified herein.
- 1.2 RELATED WORK .1 Hollow Metal Doors and Frames: Section 08 11 14.
 .2 Rough Carpentry: Section 06 10 00.
- 1.3 REFERENCE STANDARDS .1 Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association.
 .2 ANSI/BHMA A156.1-2016, Butts and Hinges.
 .3 ANSI/BHMA A156.2-2011, Bored and Pre-assembled Locks and Latches.
 .4 ANSI/BHMA A156.4-2013, Door Controls (Closers).
 .5 ANSI/BHMA A156.5-2014, Auxiliary Locks and Associated Products.
 .6 ANSI/BHMA A156.7-2016, Template Hinge Dimensions.
 .7 ANSI/BHMA A156.18-2016, Materials and Finishes.
- 1.4 REQUIREMENTS OF REGULATORY AGENCIES .1 Install only ULC/ULI listed hardware for fire rated doors and frames. Provide latching devices and closing devices where necessary.
 .2 All hardware must comply with all applicable fire, building, life safety, and barrier free codes.
 .3 Hardware for doors in fire separations exit doors certified by ULC, accredited by Standards Council of Canada.
-

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00.
- .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .3 After approval samples will be returned for incorporation in the Work.
- .4 Upon award of Contract, check the schedule of hardware and all applicable drawings and specifications and furnish promptly to the applicable trades all templates and information required for proper preparation and application of hardware, in ample time to facilitate the progress of work.
- .5 Submit maintenance, operating, and installation instructions for installation purposes and to incorporate in project data book.

1.6 DELIVERY AND STORAGE

- .1 Clearly itemize each item of hardware and label in accordance with the schedule and delivered in the original manufacturer's containers.
- .2 Arrange delivery time and date, to the job site, of all hardware so that all work may progress without delay or interruptions.
- .3 Store and protect all hardware.

1.7 CERTIFICATION

- .1 Have the Hardware Supplier provide a qualified Architectural Hardware Specialist who will cooperate with the installer and clarify the location and/or installation methods of particular items.
 - .2 Have the Architectural Hardware Specialist make periodic inspections of the hardware installations and report improper or unsatisfactory conditions to the Consultant and expedite the replacement of faulty hardware. This Specialist shall attend job site meetings when so requested.
-

1.7 CERTIFICATION .3 After installation, have a regular member of the
 (Cont'd)

Architectural Hardware Consultants (AHC) inspect and certify in writing that all items and their installation are in accordance with specified requirements.

1.8 HARDWARE LIST .1 Submit contract hardware list in accordance with
 Door and Hardware Institute vertical format.

 .2 Indicate specified hardware, including make, model,
 material, function, size, finish and other pertinent
 information.

 .3 Prepare and supply and complete itemized hardware
 schedule for review. Schedule shall list all doors
 by number (in sequence) and location, with complete
 details of the hardware supplied, including
 installation heights and special instructions.
 Format of schedule to be Door and Hardware Institute
 (DHI) formula.

 .4 Allow for checking all changes to the work of this
 Section that may be issued and revise the reviewed
 hardware schedule accordingly. All revisions to the
 Hardware Schedule shall be submitted for approval.

1.9 EXAMINATION .1 Examine the plans and schedules to determine the
 dimensions, size and quantity of required hardware
 items and ensure that the hardware listed will fit
 and operate properly. Report all unsatisfactory
 conditions ordering.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS .1 Only door locksets and latchsets listed on CGSB
 Qualified Products List are acceptable for use on
 this project.

 .2 Use one manufacturer's products only for all similar
 product groups.

-
- 2.1 HARDWARE ITEMS (Cont'd)
- .3 Furnish warranty for all hardware items for a period of one(1) year from date of acceptance of the installation. Ten (10) year warranty for closers and two (2) year warranty on handicap operators.
 - .4 All hardware applied to metal doors and frames shall be made to templates together with instructions necessary for door and frame preparation.
 - .5 Hardware of same materials shall have consistent colour and finish throughout project.
 - .6 Use one manufacturer's products for all similar items.
 - .7 Fully warranty all hardware for a period of one (1) year from date of substantial completion. The warranty shall state expressly that all hardware will be replaced on the doors and frames at no cost to the Owner in event of breakage or other defect occurring, willful damage, or defective installation excluded.
- 2.2 MANUFACTURERS
- .1 Certain manufacturer's catalogue numbers are used in the schedule of Finishing Hardware, but it is not the intent that these items are specified exclusively. The manufacturer's numbers are used to indicate quality, style, design, function, finish, and features.
 - .2 Other manufacturers will be considered, providing the items meet or exceed the performance, function, and quality requirements of those specified, and are approved by the Consultant.
- 2.3 DOOR HARDWARE
- .1 Locks and latches:
 - .1 Bored and preassembled locks and latches: to ANSI/BHMA A156.2, series 4000 bored lock, grade 1, designed for function and keyed as stated in Hardware Schedule. Thru-bolted mechanism. Concealed mounting screws. ULC listed for 3 hour doors. Backset : 70 mm throughout. Standard of Acceptance: Sargent 8 Line, Orbit as listed in Schedule Finished to C26D, Satin Chromium plated. (Sargent 10 Line used with lever handles also.)
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- 2.3 DOOR HARDWARE .1 (Cont'd)
(Cont'd)
- .2 Mortise locks and latches: Series 1000 mortise lock, grade 1, designed for function and keyed as stated in Hardware Schedule. Standard of acceptance: Sargent 8200 Mortise knob lock, Orbit design, C26D finish.
- .2 Butts and Hinges: to ANSI/BHMA A156.1 designated by numeral identifiers, followed by size and finish, listed in Hardware Schedule. Use NRP feature on exterior hinges and for reverse swing locked doors. Use anti-friction bearing as noted.
- .1 Hinges: apply hinges to manufacturer's guidelines, supply ball bearing hinges, size as per manufacturer's guidelines. Supply NRP hinges for all locked out-swing doors and non-ferrous hinges in wet or corrosive areas.
- .1 Two (2) hinges on doors up to 1500 mm high.
- .2 Three (3) hinges on doors 1500 mm to 2250 mm high.
- .3 Four (4) hinges on doors 2250 mm to 3000 mm high.
- .3 Door Closers and Accessories:
- .1 Door controls (closers): to ANSI/BHMA A156.4, designated by numeral identifiers listed in Hardware Schedule, factory sized, finished to EN. One manufacturer for closer units throughout the Work. Full rack and pinion type cylinder with removable non-ferrous case and cast iron body. Double heat treated pinion shaft, single piece forged piston, chrome-silicon steel spring. Forged steel main arm. Units stamped with date of manufacture. Ten (10) year warranty on all closers.
- .2 Door controls - overhead holders/stops finished to C26D.
- .4 Door bottom seal: heavy-duty door seal of extruded aluminum frame and brush seal, clear anodized finish.
- .5 Thresholds: 108 mm and 127 mm wide x full width of frame opening, extruded aluminum, mill finish, serrated surface, with thermal break of rigid PVC.
- .6 Weatherstripping:
- .1 Head and Jamb seal: Extruded aluminum frame and solid closed cell neoprene insert, clear anodized finish.
-

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- 2.3 DOOR HARDWARE
(Cont'd)
- .7 Bolts: lock inactive leaf of pair of non-egress doors with lever extension flush bolts. Supply automatic flush bolts for fire rated egress doors. Apply to edge of door.
 - .8 Locks: heavy duty cylindrical, function as listed in the Hardware Schedule. Knobs in all areas, except for lever design in assisted handicap areas, finished in C26D.
 - .1 Acceptable products:
 - .1 Sargent 8/10 series, OB/LL trim
 - .2 Schlage D series Orbit/Sparta trim
 - .3 Best 8K/9K series, 4C/14D trim
 - .9 Push/pull trim: where pull is scheduled on one side of the door and push plate on the other side, supply fastening devices, and install so pull can be secured through the door from reverse side. Install push plate to cover fasteners finished to C26D.
 - .10 Closing devices: door closers to be modern type, with covers, rack and pinion with compression spring adjusting, closing speed, latching speed, backcheck, to be controlled by separate valves. Provide all plates, spacers and brackets for proper mount. Factory sized with field adjustability, application as per Hardware Legend, 10 year warranty. Cast iron bodies.
 - .1 Acceptable products: Sargent 350 series/1430 series; LCN 4000 series.
 - .11 Kickplates: kickplates to be satin, clear anodized aluminum, 1.3 mm (.050") thick, 305 mm high, and 50 mm less than door width.
 - .12 Stops: provide dome, wall or overhead type to stop the door as listed in the Hardware Schedule, finished to C26D.
 - .13 Weatherseal: supply aluminum extruded threshold width to the door opening width. Weatherstripping fixed head and jamb. Astragal full height of door. Door bottom full width of door.
- 2.4 FASTENINGS
- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
-

2.4 FASTENINGS
(Cont'd)

- .2 Exposed fastening devices to match finish of hardware.
- .3 Use fasteners compatible with materials through which they pass.
- .4 All hardware shall be supplied complete with all necessary screws, bolts or other fastening of suitable size and type to anchor the hardware in position neatly and properly in accordance with the best practices and to the Consultant's approval.
- .5 All fasteners must harmonize with the hardware as to material and finish.

2.5 KEYING

- .1 All exterior locks and cylinders to be keyed alike.
- .2 Provide three (3) keys for each different keyed lock/cylinder.

PART 3 - EXECUTION

3.1 INSTALLATION
INSTRUCTIONS

- .1 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
 - .2 Furnish manufacturers' instructions for proper installation of each hardware component.
 - .3 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
 - .4 Where door stop contacts door pulls, mount stop to strike bottom of pull.
 - .5 Install hardware to standard location dimensions in accordance with Canadian Guide for Doors and Frames.
 - .6 Only tradesmen competent in the installation of Finishing Hardware shall be used for this project.
-

3.1 INSTALLATION
INSTRUCTIONS
(Cont'd)

- .7 Accurately locate and adjust hardware to meet manufacturer's instructions. Use special tools and jigs as recommended.
- .8 Locate top hinges with top 125 mm below door top, bottom hinges with bottom 250 mm from floor, and intermediate hinges equidistant between top and bottom hinges.
- .9 Locate door stops to contact doors 75 mm from latch edge.
- .10 Install hardware and trim square and plumb to doors.
- .11 Replace missing hardware to ensure specified installation at time of building completion.
- .12 After installation, replace wrappings for hardware provided by manufacturer.
- .13 Safeguard keys to keep them out of unauthorized hands, tag them with opening number, and deliver them to person designated by Construction Manager at building completion.

3.2 HARDWARE
SCHEDULE

- .1 Provide all hardware listed on the Finishing Hardware Schedule.
- .2 The Finishing Hardware Schedule is furnished as a guide to the type of hardware to be used, but is not intended to be a complete schedule of quantities. Examine the Drawings and Specifications, and supply all hardware to complete the work.

3.3 DOOR HARDWARE
SCHEDULE

- .1 As shown on the Project Drawings.
 - .2 Hardware manufacturer's product numbers used in these specifications are as follows:
 - .1 Hinges - "Stanley"
 - .2 Lockset, etc. - "Sargent"
 - .3 Door Closer - "Sargent"
 - .4 Overhead Stop - "Sargent"
 - .5 Kickplate - "Hager"
 - .6 Threshold - "K.N. Crowder"
 - .7 Weatherstripping Set - "K.N. Crowder"
-

3.3 DOOR HARDWARE .2
SCHEDULE
(Cont'd)

- (Cont'd)
.8 Door Sweeps - "K.N. Crowder"
.9 Door Stop - "Hager"
.10 Surface Bolts - "Hager"
.11 Bi-fold - "Hager"

3.4 ADJUSTMENT AND .1
CLEANING

- .1 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by supplier's instructions.
.2 Clean hardware after installation in accordance with supplier's instructions.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying and installing gypsum board on ceiling and walls where shown on the Drawings.
- 1.2 RELATED WORK .1 Rough Carpentry: Section 06 10 00
 .2 Sealants: Section 07 92 00
 .3 Painting: Section 09 91 23
- 1.3 REFERENCES .1 ASTM A653/A653M-15, Specification for Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron (Galvannealed) by the Hot-Dip Process.
 .2 ASTM C475-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 .3 ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board.
 .4 ASTM C1002-14, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 .5 ASTM C1047-14A, Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 .6 ASTM C1396-2014, Standard Specification for Gypsum Board.
 .7 CAN/ULC-S102-2010, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.
-

1.4 DELIVERY,
STORAGE AND
HANDLING
(Cont'd)

- .2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.
- .3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.5 ENVIRONMENTAL
REQUIREMENTS

- .1 Maintain temperature minimum 10°C, maximum 21°C, for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Fire-rated gypsum board: 1-hour fire-rated, to ASTM C1396, 15.9 mm thick, 1200 mm wide x maximum practical length, dense gypsum core.
 - .1 Standard of Acceptance: CGC Sheetrock Firecode Core gypsum board panels.
- .2 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .3 Steel drill screws: to ASTM C1002.
- .4 Laminating compound: as recommended by manufacturer, asbestos-free.
- .5 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, 0.5 mm base thickness commercial grade sheet steel with Z275 zinc finish to ASTM A653, perforated flanges; one piece length per location.
- .6 Joint compound: to ASTM C475, asbestos-free.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.
- .2 Install work level to tolerance of 1:1200.
- .3 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers and grilles.

3.2 APPLICATION

- .1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply single layer gypsum board to metal furring using screw fasteners. Maximum spacing of screws 300 mm o.c.

3.3 INSTALLATION

- .1 Erect accessories straight, plumb and level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm o.c.
 - .2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
 - .3 Splice corners and intersections together and secure to each member with three (3) screws.
 - .4 Install access doors to electrical and mechanical fixtures specified in respective Sections.
 - .1 Rigidly secure frames to furring or framing systems.
 - .5 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
-

3.3 INSTALLATION
(Cont'd)

- .6 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .7 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
- .8 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .9 Completed installation to be smooth, level and plumb, free from waves and other defects and ready for surface finish.
- .10 Mix joint compound slightly thinner than for joint taping.
- .11 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.
- .12 Allow skim coat to dry completely.
- .13 Remove ridges by light sanding or wiping with damp cloth.
- .14 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of Substantial Completion.

PART 1 - GENERAL

- 1.1 WORK INCLUDED
- .1 This Section specifies requirements for providing all labour, tools, equipment and materials to complete all painting including preparation, painting and touch-up.
 - .2 Coordinate painting work for piping and equipment as specified under Division 40.
- 1.2 RELATED WORK
- .1 Rough Carpentry: Section 06 10 00
 - .2 Hollow Metal Doors, Frames and Hardware: Section 08 11 14
 - .3 Manufacturer's coatings of mechanical equipment: Divisions 23 and 44
 - .4 Piping and equipment identification: Section 23 05 53
- 1.3 REFERENCES
- .1 Canadian Painting Contractors' Architectural (CPCA).
 - .1 Painting Specifications Manual 1998.
 - .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.146-99, Cold Curing, Glass Epoxy Coating.
 - .2 CAN/CGSB-1.38-2000, Interior Enamel Undercoat.
 - .3 CAN/CGSB-1.57-03, Interior Alkyd Semigloss Enamel.
 - .4 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
 - .5 CAN/CGSB-1.81-M90 CORR, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .6 CAN/CGSB-1.188-04, Emulsion Type Filler Masonry Block.
 - .7 CAN/CGSB-1.195-99, Interior Latex Semigloss Paint.
 - .8 CAN/CGSB-1.213-04, Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminium.
 - .9 CAN/CGSB-85.100-93, Painting.
 - .10 CAN/CGSB-85.10-99, Protective Coatings for Metals.
 - .3 CAN/CSA 1.119-2000, Interior Latex Primer-Sealer.
-

1.4 QUALITY
ASSURANCE

- .1 Provide affidavits stating only "first-line" products have been used on this Contract.
- .2 Paint manufacturer must be represented by a qualified technical representative, trained as a paint inspector, with a minimum five (5) years experience.
- .3 The manufacturer's technical representative will make a minimum of one (1) inspection prior to and during application to ensure proper application.
- .4 After inspection the manufacturer's representative will provide a written report to the Consultant within five (5) working days.

1.5 START-UP
MEETING

- .1 After award of Contract and prior to the painting and coating work, hold a start-up meeting with the following people present:
 - .1 The Owner.
 - .2 The Consultant.
 - .3 The applicator and his designated inspectors and crew supervisors who will be working on site on this project.
 - .4 The paint manufacturer's trained paint inspector.
- .2 The purpose of the meeting will be to discuss the specifications, job conditions, and painting and coating Work to be done with reference to the most recent product data sheets and application instructions.

1.6 SURFACE AND
ENVIRONMENTAL
CONDITIONS

- .1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Do not apply exterior paint finishes in unsuitable weather conditions.
 - .3 Do not apply paint finishes when relative humidity exceeds 85%, when condensation has formed or is likely to form, or immediately following rain, frost, or formation of dew.
-

1.6 SURFACE AND ENVIRONMENTAL CONDITIONS

(Cont'd)

- .4 Provide adequate ventilation or isolation measures to protect against toxic fumes.
- .5 Apply paint only to adequately prepared surfaces.
- .6 Apply paint only when previous coat of paint is dry or adequately cured.
- .7 Additional Interior Application Requirements:
 - .1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

1.7 DELIVERY, HANDLING AND STORAGE

- .1 Deliver, store and handle materials in accordance with Section 01 61 00.
- .2 Labels to clearly indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Provide and maintain dry, temperature controlled, secure storage.
- .5 Observe manufacturer's recommendations for storage and handling.
- .6 Store materials and supplies away from heat generating devices.
- .7 Store materials and equipment in a well ventilated area with temperature range 7°C to 30°C.
- .8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.

1.7 DELIVERY,
HANDLING AND
STORAGE
(Cont'd)

- .10 Remove paint materials from storage only in quantities required for same day use.
- .11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .12 Fire Safety Requirements:
 - .1 Provide fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.8 SUBMITTALS

- .1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used in accordance with Section 01 33 00.
- .2 Submit the names of paint manufacturers and local supplier. Confirm painting requirements and submit colour schedule for approval as per Section 01 33 00 prior to ordering of products
- .3 Upon completion, submit records of products used. List products in relation to finish system and include the following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 Manufacturer's Material Safety Data Sheets (MSDS).

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Paint products as manufactured by Glidden/Devoe Coating, and Pittsburgh Paint Ltd (PPG) or approved equivalent.

2.1 MATERIALS
(Cont'd)

- .2 Use only "first line" products produced by the manufacturer. Use only products of manufacturer whose best quality lines meet or exceed CGSB specifications for finishing materials as specified in the Paint Formulae, except where otherwise specified.
- .3 Paint materials for each coating formula to be products of a single manufacturer.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- .1 All painting application and methods to be done in strict accordance with the recommendation of the applicable CGSB Standards, manufacturer's instructions and subject to the approval of the Consultant.
 - .2 Do not paint when temperature is below 10°C.
 - .3 Before painting equipment mask manufacturer's name plates and any other name plates carrying informational data pertaining to equipment. Do not paint nameplates.
 - .4 Paint to be well mixed and kept stirred while being applied. Do not thin paint unless approved by the Consultant, and only with such materials and to such extent as not to damage paint.
 - .5 Spread paint to coverage not greater than that recommended by paint manufacturer.
 - .6 Force paint into pores, angles and crevices of well cleaned surfaces and in such manner as will assure a continuous even coat making contact with all parts of the surface and producing a film free of air bubbles, skips and thin spots.
 - .7 Paint thickness for each coat to be minimum as recommended by the applicable CGSB specifications or as recommended by the manufacturer of the material subject to approval of the Consultant.
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- 3.1 WORKMANSHIP .8 Defective painting and finishing Work resulting from
(Cont'd) application to unsatisfactory surfaces shall be
considered the responsibility of those performing
the Work of this Section.
- 3.2 PREPARATION OF .1 In general:
SURFACES
- .1 Vacuum clean interior areas immediately before finishing Work commences.
 - .2 Remove from surfaces grease, oil, dirt, dust, ridges, and other soil and materials that would adversely affect the adhesion or appearance of finish coatings.
 - .3 Remove rust on surfaces primed under Work of other Sections and the areas reprimed under the Work of those Sections.
 - .4 Finish, patch and smooth surfaces to remove cracks, holes, ridges, and similar blemishes.
 - .5 Touch up damaged prime coats on shop primed metals with same priming material.
 - .6 Neutralize high alkaline surfaces to receive latex paints. Remove residue before painting.
 - .7 Scrub mildewed surfaces with a bleach solution and rinse with clean water.
 - .8 In the case of existing coatings, hand tool clean to remove all loose flaking paint and rust and feather sand edges.
 - .9 Degloss existing paint coatings by scuff sanding.
 - .10 Blast-track to remove existing floor coatings, adhesives, etc., where noted in finish schedules or noted on drawings.
- .2 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .3 Touch up shop paint primer on steel with same type primer as originally used.
- .4 Prepare wood surfaces to CAN/CGSB-85-100.
- .1 Sand surfaces smooth; clean soiled surfaces and remove dust and dirt.
 - .2 Use vinyl sealer over knots and resinous areas.
 - .3 Apply wood paste filler to nail holes and cracks.
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- 3.2 PREPARATION OF SURFACES
(Cont'd)
- .5 Prepare galvanized steel and zinc coated surfaces to CAN/CGSB-85-10.
 - .6 Equipment pads, concrete floor surfaces preparation: clean and etch with muriatic acids.
 - .7 PVC piping surfaces preparation: scuff sand, clean soiled surfaces, and remove dust and dirt.
 - .8 Interior steel, ductwork, piping:
 - .1 Vacuum clean to remove all dust, dirt and other contaminants from all surfaces.
 - .2 Remove from surfaces grease, oil, dirt, dust, ridges and other soil and materials that would adversely affect the adhesion or appearance of finish coating.
 - .3 Hand tool clean SSPC-SP2 to remove any, dirt, rust, loose paint, etc.
 - .4 Use a rust inhibitor covering in areas where rust is encountered prior to applying finish coat.
 - .5 Prepare and prime black iron piping (i.e. Sprinkler lines, mains, etc.) prior to finish coat of paint.
- 3.3 APPLICATION
- .1 Sand and dust between each coat to remove defects visible from distance up to 1500 mm.
 - .2 Finish bottoms, edges, tops and cutouts of doors after fitting as specified for door surfaces.
 - .3 Finish all surfaces exposed to view, requiring finish for preservation of material, or to facilitate maintenance.
 - .4 Apply number of coats of specified paints to designated surfaces as indicated in Painting Formulae and manufacturer's recommendations.
 - .5 Protect and cover machinery and equipment and adjacent surfaces during painting operations.
 - .6 Take special care during paint application to ensure disconnects and unions remain properly operable once painting operations completed.
-

3.4 MECHANICAL,
ELECTRICAL AND
PROCESS EQUIPMENT

- .1 Paint inside of ductwork where visible with primer and one (1) coat of matte black paint.
- .2 Leave factory-finished electrical and process equipment in original finish except for touch-up as required, unless otherwise indicated under Division 40.
- .3 Paint exposed conduits, pipes, fittings, fasteners and hangers. Colour to match adjacent surfaces, except as noted otherwise. Paint pipe hangers to match piping.
- .4 Paint valves and miscellaneous devices to match adjacent piping. Where adjacent piping is not painted, paint valves to match adjacent machinery, as directed by the Consultant.
- .5 Paint both sides and edges of plywood backboards for electrical equipment before installation.
- .6 Do not paint over nameplates.

3.5 PAINTING
FORMULAE

- .1 Formula 1: for exterior galvanized and zinc coated ferrous metals, including metal doors apply: 1 coat galvanized steel primer CAN/CGSB-1.213 (Devoe 4120, PPG 97-687) 2 coats semi-gloss enamel CAN/CGSB-1.59 (Devoe 4308, PPG 54 line)
- .2 Formula 2: for interior machinery and equipment (not coated by equipment manufacturer) apply:
1 coat alkyd primer CAN/CGSB-1.81 (PPG 94-269, Devoe 4160)
2 coats semi-gloss latex CAN/CGSB-1.195 (Devoe 4206, PPG 19 line)
- .3 Formula 3: for interior primed ferrous metals, apply:
1 coat spot priming same type as originally used.
2 coats semi-gloss enamel CAN/CGSB-1.57 (Glidden 9440-0, PPG 6-90)
- .4 Formula 4: for interior plywood (equipment backboards, ceiling etc.) apply:

1 coat enamel undercoat CGSB-1.38 (Glidden 9431-0, PPG 6-6) 2 coats semi-gloss enamel CAN/CGSB-1.57 (Glidden 94410-0, PPG 6-90)

- .5 Formula 5: for ductile iron piping coated with manufacturer's asphalt sealer:
1 coat BIN pigmented white shellac sealer
2 coats semi-gloss enamel CAN/CGSB-1.59 (Glidden 4308, PPG 54 line)
- .6 Formula 6: for interior copper and black iron piping and fittings, including insulated piping:
1 coat tinted enamel undercoat CGSB-1.38 (Glidden 250, PPG 6-6)
2 coats semi-gloss enamel CAN/CGSB-1.57 (Glidden 9440-0, PPG 6-90)
- .7 Formula 7: for interior PVC piping apply:
1 coat polyamide - epoxy, 5 - 7 mils DFT (PITT-GUARD DTR Series 97-145, two components, Devoe 233H)
1 coat high gloss industrial enamel, 3 mils DFT (PITT-TECH Series 90-300, Devoe 4208).
- .8 Formula 8: for interior gypsum board apply:
1 coat primer - sealer to CAN/CGSB 1.119 (Glidden 36600, Pittsburgh 6-2)
2 coats semi-gloss latex to CAN/CGSB 1.195m (Glidden 9480-0, Pittsburgh 1a line)

PART 1 - GENERAL

- 1.1 WORK INCLUDED
- .1 This section includes site applied or fabricated items of finished carpentry including wood trim, shelving and vanities.
 - .2 This section also includes mill fabricated items of architectural woodwork including cabinetry.
- 1.2 RELATED WORK
- .1 Sealants: Section 07 92 00
 - .2 Hollow Metal Doors, Frames and Hardware: Section 08 11 14
 - .3 Resilient tile and base: Section 09 65 00
 - .4 Painting: Section 09 91 23
- 1.3 REFERENCE STANDARDS
- .1 Do millwork to Millwork Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC).
 - .2 CAN/CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
 - .3 CAN/CSA O121-08(R2013), Douglas Fir Plywood.
 - .4 CAN/CSA O141-05(R2014), Softwood Lumber.
 - .5 CAN/CSA O151-09(R2014), Canadian Softwood Plywood.
- 1.4 SAMPLES
- .1 Submit duplicate 300mm x 300mm nominal samples of each type of panelling and each type of solid wood or plywood to receive stain or natural finish.
 - .2 Submit duplicate 305mm long samples of each type of trim and moulding.
-

1.5 PRODUCT
DELIVERY, STORAGE
AND HANDLING

- .1 Do not deliver wood materials to site until storage areas are completed, and conditions are such that no damage or deterioration will occur to them while in storage and during installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: to CSA 0141 and National Lumber Grades Authority requirements, with maximum moisture content of 7% for interior work, yard lumber selected for (natural) paint finish, spruce, pine, fir species, to AWMAC premium grade.
- .2 Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 7%, birch species, to AWMAC premium grade.
- .3 Hardwood plywood: to CSA 0115 of thickness indicated, rotary cut face, birch species veneer of finish grade where exposed to view and sound grade where not exposed.
- .4 Canadian softwood plywood: to CSA 0151, S2S where both sides exposed to view and S1S where one side exposed, select grade.
- .5 Douglas fir plywood: to CSA 0121, G2S where both sides exposed to view and G1S where one side exposed, select grade.
- .6 Accessories:
.1 Nails and staples: galvanized for exterior work, interior highly humid areas and for treated lumber; plain finish elsewhere.
.2 Wood screws: type and size to suit application.
.3 Splines: metal.
.4 Adhesive: recommended by manufacturer.

2.2 FABRICATION

- .1 General:
.1 Assemble architectural woodwork in mill in units as large as possible. Design units to fit together as one unit if site assembly is required.
-

2.2 FABRICATION
(Cont'd)

- .1 (Cont'd)
 - .2 Incorporate services, fixtures and trim in work of this Section as indicated on Drawings or specified in mechanical or electrical, or both. Make necessary cutouts to template information.
 - .3 Edge plywood where specified or indicated with solid wood to match face veneer, with profiled pressure glued edge joint and finished level with plywood surfaces.
- .2 Trim:
 - .1 Rout or groove backs of flat trim members.
 - .2 Kerf backs of wide flat members.
- .3 Fastening:
 - .1 Fasten work with nails generally, but use screws or special fasteners at critical joints where strain, and excessive usage and shrinkage is anticipated, and where required by specified quality grade standards.
 - .2 Glue built-up work as well as nailing and screwing.
 - .3 Blind nail unless impossible.
 - .4 Set finishing nails below finished surfaces.
- .4 Finishing:
 - .1 Finish each surface of work of specified quality grade standard where exposed or semi-exposed. Consider that all visible surfaces are exposed, including underside of work above 1200mm from floor. Consider that underside of work within 1200mm of the floor, tops of work more than 1800mm above the floor, interiors of fitments behind opaque doors and the backs of fitment doors are semi-exposed.
 - .2 Fine sand surfaces level and smooth after fabrication.
- .5 Acceptable manufacturer for pre-fab units: LongLac - Multi-Core Robert Brury Co. Ltd.

2.3 CABINETWORK

- .1 Cabinets: minimum 16 mm pressed particleboard with laminated melamine finish on all exposed surfaces, colour to be selected by Consultant.
 - .2 Cabinet Doors: 19 mm MDF raised panel design with "Sadolin" or "Thermo-foil" finish, colour as selected by Consultant.
-

2.3 CABINETWORK
(Cont'd)

- .3 Cabinet hardware:
 - .1 Door hinges: Blum No.71.6630, white finished.
 - .1 Blum hinge: 170 degree, full overlay application, concealed and self-closing.
 - .2 Door catches: magnetic type, white finished.
 - .3 Door catches: elbow type, for doors with one-leaf lock, provide on top and bottom of non-lock leaf.
 - .4 Drawer slides: Accuride, fully extendable, of quality to operate adequately for size and capacity of drawer, white in finish.
 - .5 Pilaster strips: recessed, slotted, pre-finished white steel, with shelf clips to match.
 - .6 Drawer and pulls: 100mm centres, 6mm diameter satin aluminum or satin chrome, "D" shape. Blum HB4041.
 - .7 Locks: Knappe & Vogt 987 HP. Supply with two (2) keys.
 - .8 Coat Hooks: Richelieu Wardrobe Hook BP-6513-140.
 - .9 Cabinet hardware is generally noted as white in colour, but final colour selection will be by Consultant.
- .4 Refer to the Architectural drawings for details.

2.4 FABRICATION OF
CABINETS

- .1 Fabricate cabinets off site as indicated on the drawings.
 - .2 Set nails and screws, apply plain wood filler to indentations, sand smooth and leave ready to receive finish.
 - .3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
 - .4 Shelving to cabinetwork to be adjustable unless otherwise noted.
 - .5 Factory finish casework and cabinetwork on all surfaces. On site finishing limited to touch-up only.
 - .6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
-

2.5 WORK BENCHES

- .1 Softwood lumber: to CSA-0141 and National Lumber Grade requirements, with maximum moisture content of 8% for interior work, yard lumber select for natural finish SPF species.
- .2 Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 8% for interior work, birch species.
- .3 Factory finish work benches. On site finishing limited to touch-up only.
- .4 Shop assemble work benches for delivery to site.

2.6 SHELVING

- .1 Fabricate shelving units using minimum 19 mm pressed particleboard with laminated white malamine finish on all exposed surfaces. Stiffen shelving over 1200 wide from deflection.
- .2 Install shelving in locations as indicated on Architectural Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Before commencing installation ensure that grounds, strapping and other constructions and surfaces to which work is installed are satisfactory for fitting and adequate for securing work.
- .2 Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site to ensure that adaptation is not required which would result in construction delay.

3.2 INSTALLATION

- .1 General:
 - .1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
 - .2 Install work plumb, level and straight, and fasten it securely to backing to support itself and anticipated superimposed loads.
-

3.2 INSTALLATION
(Cont'd)

- .1 (Cont'd)
 - .3 Install fire-rated doors and frames in accordance with National Fire Codes, Volume 4, produced by National Fire Protection Association (NFPA) 80.
 - .2 Fastening:
 - .1 Position items of finished carpentry work and architectural woodwork accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.
 - .4 Replace items of finish carpentry and architectural woodwork with damage to wood surfaces including hammer and other bruises.
 - .3 Trim:
 - .1 Install in single lengths except where material limitation makes impossible. Stagger joints where they occur and locate over solid backing for fastening.
 - .4 Cutting and fitting:
 - .1 Cut mouldings with sharp true profiles.
 - .2 Cope trim and mouldings at interior corners and at returns.
 - .3 Miter trim and mouldings at exterior corners. Glue and lock shop miters that are over 150 mm from heel to point.
 - .4 Scribe and joint work accurately together, and to other work, to fit tightly and with flat smooth surfaces. Fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects. Install trim or filler panels to close gaps.
 - .5 Installation of hollow metal frames: refer to Section 08 11 14.
 - .6 Installation of doors: refer to Section 08 11 14.
 - .7 Install finishing hardware in accordance with the manufacturer's written instructions.
-

3.2 INSTALLATION
(Cont'd)

- .8 Cabinetry schedule and installation: install cabinetry hardware, pilaster strips and clips, hinges, drawer slides and pulls, supplied as specified.

3.3 ADJUSTMENT AND
CLEANING

- .1 Adjust hinged doors to swing freely and easily, to remain stationary at any point of swing, to close evenly and tightly against stops without binding, and to latch positively when doors are closed with moderate force. Adjust sliding doors to operate smoothly without binding, and to close evenly and tightly against jambs.
- .2 Adjust hardware so that latches and locks operate smoothly and without binding, and closers act positively with the least possible resistance in use. Lubricate hardware if required by supplier's instructions.
- .3 Clean hardware after installation in accordance with supplier's instructions.
- .4 Sand clean woodwork to leave free from finished defects in any exposed part.
- .5 Install resilient base around perimeters of all cabinets/benches as per Section 09 65 00 and as indicated on Architectural Drawings, Room Finish Schedule.
- .6 Caulk sides, tops, bases and countertops of all cabinets/benches as per Section 07 92 00.

PART 1 - GENERAL

- 1.1 EQUIPMENT LIST .1 Complete list of equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.
- .2 Submit for approval at time of tender within 48 hours within ten (10) days after award of contract.
- 1.2 ALTERNATES .1 The equipment listed on the project equipment schedules is the "basis of design equipment", the Contactor is permitted to find alternates to this equipment that meet the technical and quality requirements of the project specifications. If there are necessary changes to the building systems to accommodate these alternates, the changes shall be coordinated and provided by the Contractor at no additional cost to the Owner.
- 1.3 TRIAL USAGE .1 Consultant may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
- .1 Trial usage to apply to systems only after prior approval of the Consultant
- .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 13mm plywood board. Affix typewritten label beneath sample indicating service.
- 1.4 PROTECTION OF OPENINGS .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.
-

1.4 PROTECTION OF
OPENINGS
(Cont'd)

- .2 Seal all ductwork openings with 6 mil plastic to protect it from dirt, dust, and foreign materials during the course of the day's installation. Confirm that at the end of the day, all open joints are closed off. Tape all plastic with duct tape. Cover and protect all un-installed ductwork before it is installed.
- .3 Protect all existing ductwork to be re-used, closing off openings with 6 mil plastic.

1.5 SPARE PARTS

- .1 Furnish the following spare parts:
 - .1 One (1) set of belts for each piece of machinery.
 - .2 Three (3) sets of filters for each filter bank.

1.6 SPECIAL TOOLS

- .1 Provide one (1) set of special tools required to service equipment as recommended by manufacturers.
- .2 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.7 DEMONSTRATION
AND OPERATING AND
MAINTENANCE
INSTRUCTIONS

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Where specified elsewhere in Divisions 21, 22 and 23, manufacturers to provide demonstrations and instructions.
- .3 In addition to where training is specified elsewhere in other divisions, factory trained personnel shall provide on-site instruction in operation and maintenance as follows:
 - .1 Ventilation Systems - minimum four (4) hours.
- .4 Use operation and maintenance manual, asbuilt drawings, audio visual aids, etc. as part of instruction materials.

1.8 CLOSEOUT
SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into operations and maintenance manual.
 - .2 Operation and maintenance manual to be approved by the Consultant and final copies deposited with, the Consultant before final inspection.
 - .3 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for each system and each component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .4 Maintenance data to include:
 - .1 Servicing, maintenance, operation and troubleshooting instructions for each item of equipment and parts list.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .5 Performance data to include:
 - .1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 95 Testing, Adjusting and Balancing.
 - .6 Approvals:
 - .1 Submit copies of draft Operation and Maintenance Manual to the Consultant for approval. Submission of individual data will not be accepted unless so directed by the Consultant.
 - .2 Make changes as required and resubmit two (2) copies as directed by the Consultant.
 - .7 Additional data:
-

-
- 1.8 CLOSEOUT SUBMITTALS (Cont'd)
- .7 (Cont'd)
- .1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.
- 1.9 SHOP DRAWINGS AND PRODUCT DATA
- .1 Submit shop drawings and product data for:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances. eg. access door swing spaces.
- .3 Installation requirements and procedures.
- .2 Accompany shop drawings and product data with:
- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify as to current model production.
- .5 Certification of compliance to applicable codes.
- .6 Identify section and paragraph numbers.
- 1.10 CLEANING
- .1 Clean interior and exterior of systems. Vacuum interior of ductwork and air handling units.
- 1.11 PROJECT RECORD DRAWINGS
- .1 Site records:
- .1 Consultant will provide one (1) set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the Work. Mark there on all changes as Work progresses and as changes occur. This includes changes to existing mechanical systems, control systems and low voltage control wiring.
- .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
- .3 Use different colour waterproof ink for each service.
- .4 Make available for reference purposes and inspection at all times.
- .2 Project Record drawings:
-

- 1.11 PROJECT RECORD .2 (Cont'd)
DRAWINGS
(Cont'd)
- .1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of asbuilt drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 13mm high as follows:
"Project Record drawings: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED"
(Signature of Contractor) (date).
 - .3 Submit to the Consultant for approval and make corrections as directed.
 - .4 TAB to be performed using Project Record drawings.
 - .5 Submit completed reproducible Project Record drawings with Operating and Maintenance Manuals.
- .3 Submit copies of Project Record drawings for inclusion in final TAB report.
- 1.12 WASTE .1 Separate and recycle waste materials.
MANAGEMENT AND
DISPOSAL
- 1.13 ELECTRICAL .1 Electrical Work to conform to Division 26 including
the following:
- .1 Starters, motor protection and manual control devices are specified and indicated in Division 26 except where otherwise indicated or specified. Wiring to packaged mechanical equipment is indicated on electrical drawings. Coordinate as required.
 - .2 Supplier and installer responsibility is indicated on electrical drawings and related mechanical responsibility as indicated on mechanical equipment schedules on mechanical drawings or in specifications.
 - .3 Control wiring 50 V and greater, specified and installed by Division 26. Control wiring 50 V or less, is responsibility of Division 23, except as indicated elsewhere in the specifications.
- 1.14 EQUIPMENT .1 Equipment supports supplied by equipment
SUPPORTS manufacturer specified elsewhere in Divisions 21, 22 and 23.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
 - .1 ANSI/ASME B31.1-2016, Power Piping, (SI Edition).
 - .2 ANSI/ASME B31.3-2014, Process Piping.
 - .3 ANSI/ASME B31.5-2016, Refrigeration Piping and Heat Transfer Components.
 - .4 ANSI/ASME B31.9-2014, Building Services Piping.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A125-04(R2014), Specification for Steel Springs, Helical, Heat Treated.
 - .2 ASTM A307-2014, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563-15, Specification for Carbon and Alloy Steel Nuts.
- .3 Factory Mutual (FM)
- .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP58-2009, Pipe Hangers and Supports Materials, Design and Manufacture, and Selection, Application and Installation.
- .5 Underwriter's Laboratories of Canada (ULC).

1.2 DESIGN REQUIREMENTS

- .1 Construct hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
- .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1, B31.3, B31.5, B31.9 or MSS SP58.
- .3 Confirm supports, guides, anchors do not transmit excessive quantities of heat to building structure.

1.3 PERFORMANCE REQUIREMENTS

- .1 Design supports and hangers to withstand seismic events for location as per the National Building Code.
-

1.4 SHOP DRAWINGS
AND PRODUCT DATA .1 Submit shop drawings and product data in accordance
with Section 01 33 00.

- .2 Submit shop drawings and product data for following
items:
.1 Bases, hangers and supports.
.2 Connections to equipment and structure.
.3 Structural assemblies.

1.5 CLOSEOUT
SUBMITTALS .1 Provide maintenance data for incorporation into
operation and maintenance manual.

PART 2 - PRODUCTS

2.1 GENERAL .1 Fabricate hangers, supports and sway braces in
accordance with ANSI B31.1 and MSS SP58.
.2 Use components for intended design purpose only. Do
not use for rigging or erection purposes.
.3 Acceptable materials: Cooper B- Line, Unistrut,
Thaler, or approved equivalent.

2.2 HANGERS .1 Finishes:
.1 Hangers and supports: galvanized painted with
zinc-rich paint after manufacture.
.2 Use electroplating galvanizing process or hot
dipped galvanizing process.
.2 Upper attachment structural: Suspension from upper
flange of I-Beam.
.1 Malleable iron top of beam jaw clamp with
hooked rod, spring washer, plain washer and nut UL
listed, FM approved where required.
.3 Upper attachment to concrete:
.1 Ceiling: Carbon steel welded eye rod, clevis
plate, clevis pin and cotters with weld-less forged
steel eye nut. Confirm eye is 6 mm minimum greater
than rod diameter.
.2 Concrete inserts: wedge shaped body with
knockout protector plate UL listed FM approved where
required to MSS SP58.

2.2 HANGERS
(Cont'd)

- .4 Shop and field fabricated assemblies:
 - .1 Trapeze hanger assemblies: MSS SP58.
 - .2 Steel brackets: MSS SP58.
 - .3 Sway braces for seismic restraint systems: to MSS SP58.
- .5 Hanger rods: threaded rod material to MSS SP58.
 - .1 Confirm hanger rods are subject to tensile loading only.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
 - .3 Do not use 22 mm or 28 mm rod.
- .6 Duct supports: Duct hangers and supports shall follow the recommendations of SMACNA.
 - .1 Provide all hangers required to properly support ductwork. Hangers shall be galvanized or primed steel channel or angle sections. To adjust duct height provide cadmium plated threaded steel rods with nuts and washers. All hanger rod installation to be double nutted top and bottom.
 - .2 For ducts 500mm and smaller, 25mm strap hangers are acceptable.
 - .3 In concrete use self drilling inserts at proper centers securely anchored in concrete.
 - .4 Do not break continuity of duct insulation vapour barrier with hangers or rods.

2.3 EQUIPMENT
ANCHOR BOLTS AND
TEMPLATES

- .1 Provide templates to achieve accurate location of anchor bolts.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions and recommendations.
- .2 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER
INSTALLATION

- .1 Install hanger so that rod is vertical under operating conditions.

- 3.2 HANGER
INSTALLATION
(Cont'd)
- .2 Adjust hangers to equalize load.
 - .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members. Comprised of angle iron or c-channel.
- 3.3 FINAL
ADJUSTMENT
ADJUSTMENT
- .1 Adjust hangers and supports:
 - .1 Ensure that rod is vertical under operating conditions.
 - .2 Equalize loads.
 - .2 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
 - .3 Beam clamps:
 - .1 Hammer jaw firmly against underside of beam.

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Cast-in-Place Concrete: Section 03 30 00
- .2 Testing, Adjusting and Balancing (TAB) of Mechanical Systems: Section 23 05 95

1.2 REFERENCES

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA 13-2016, Installation of Sprinkler Systems.
- .2 National Building Code of Canada (NBC) 2010.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Provide separate shop drawings for each isolated system shop drawings complete with performance and product data.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 Size and shape of bases type and performance of vibration isolation to be as indicated.
- .2 Acceptable product: Korfund, Mason, Vibron, Vibro-Acoustics.

2.2 ELASTROMERIC
PADS

- .1 Type EP1: neoprene waffle or ribbed; 9mm minimum thick; 50 durometer; maximum loading 350 kPa.
 - .2 Type EP2: rubber waffle or ribbed; 9 mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.
-

2.2 ELASTROMERIC
PADS
(Cont'd)

- .3 Type EP3: neoprene-steel-neoprene; 9 mm minimum thick neoprene bonded to 1.71 mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.
- .4 Type EP4: rubber-steel-rubber; 9 mm minimum thick rubber bonded to 1.71 mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

2.3 ELASTROMERIC
MOUNTS

- .1 Type M1: colour coded; neoprene in shear; maximum durometer of 60; threaded insert and two (2) bolt-down holes; ribbed top and bottom surfaces.

2.4 SPRINGS

- .1 Design stable springs so that ratio of lateral to axial stiffness is equal to or greater than 1.2 times the ratio of static deflection to working height. Select for 50% travel beyond rated load. Units to be complete with levelling devices.
- .2 Ratio of height when loaded to diameter of spring to be between 0.8 to 1.0.
- .3 Cadmium plate for outdoor, 100% relative humidity.
- .4 Colour code springs.

2.5 SPRING MOUNT

- .1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.
- .2 Type M2 stable open spring: support on bonded 6mm minimum thick ribbed neoprene or rubber friction and acoustic pad.
- .3 Type M3 stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.
- .4 Type M4 restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; builtin resilient limit stops, removable spacer plates.

2.5 SPRING MOUNT
(Cont'd)

- .5 Type M5 enclosed spring mounts with snubbers for isolation up to 950 kg maximum.
- .6 Acceptable manufacturer: Korfund, Mason, Vibron, Vibro-Acoustics.

2.6 HANGERS

- .1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.
- .2 Type H1 neoprene in-shear, moulded with rod isolation bushing which passes through hanger box.
- .3 Type H2 stable spring, elastomeric washer, cup with moulded isolation bushing which passes through hanger box.
- .4 Type H3 stable spring, elastomeric element, cup with moulded isolation bushing which passes through hanger box.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install vibration isolation equipment in accordance with manufacturer's instructions and adjust mountings to level equipment.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Painting: Section 09 91 23
- 1.2 REFERENCES
- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB1.60-97, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB24.3-92, Identification of Piping Systems.
 - .2 National Fire Protection Association
 - .1 NFPA 13-2016, Installation of Sprinkler Systems.
 - .2 NFPA 14-2016, Standpipe and Hose Systems.
- 1.3 PRODUCT DATA
- .1 Submit product data in accordance with Section 01 33 00.
 - .2 Product data to include paint colour chips, other products specified in this section.
- 1.4 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00.
 - .2 Samples to include nameplates, labels, tags, lists of proposed legends.

PART 2 - PRODUCTS

- 2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES
- .1 Metal nameplate mechanically fastened to each piece of equipment by manufacturer.
 - .2 Lettering and numbers to be raised or recessed.
 - .3 Information to include, as appropriate:
 - .1 Equipment: Manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.
-

2.1 MANUFACTURER'S
EQUIPMENT
NAMEPLATES
(Cont'd)

.4 Include required listings (ie. CSA, ULC, etc.).

2.2 SYSTEM
NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: white letters, black background
(except where required otherwise by applicable
codes).

.2 Construction:

.1 3 mm thick laminated plastic or white anodized
aluminum, matte finish, with square corners, letters
accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

#	mm	Lines	Letters (mm)
1	10 x 50	1	3
2	13 x 7	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: Use size #
5.

.2 Use maximum of 25 letters/numbers per line.

2.3 DUCTWORK
IDENTIFICATION

.1 50 mm high stencilled letters and directional arrows
150mm long x 50 mm high.

.2 Colours: Black, or coordinated with base colour to
ensure strong contrast.

.3 Identify system: e.g. Supply HRV- 1, Exhaust EF-1,
etc.

- 2.4 CONTROLS COMPONENTS IDENTIFICATION
- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
 - .2 Inscriptions to include function and (where appropriate) failsafe position, component ID name.

- 2.5 LANGUAGE
- .1 Identification to be in English.

PART 3 - EXECUTION

- 3.1 TIMING
- .1 Provide identification only after all touch-up painting has been completed.

- 3.2 INSTALLATION
- .1 Perform Work in accordance with CAN/CGSB 24.3 except as specified otherwise.
 - .2 Provide ULC and/or CSA registration plates as required by respective agency.

- 3.3 NAMEPLATES
- .1 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
 - .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
 - .3 Protection
 - .1 Do not paint, insulate or cover in any way.

- 3.4 LOCATION OF IDENTIFICATION ON DUCTWORK SYSTEMS
- .1 On long straight runs in open areas in Mechanical rooms: At not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
 - .2 Adjacent to each change in direction.
-

3.4 LOCATION OF
IDENTIFICATION ON
DUCTWORK SYSTEMS

(Cont'd)

- .3 At least once in each small room through which ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in chases, ceiling spaces, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification to be easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 MECHANICAL
EQUIPMENT

- .1 Mechanical equipment located above ceilings or access doors (such as balancing dampers) install circular 19mm diameter self-adhesive identification discs on the underside of the ceiling, as close as possible to the location of the equipment.
- .2 Major mechanical equipment (such as fans, etc.) require laminated plastic plates.

PART 1 - GENERAL

1.1 RELATED
SECTIONS

- .1 Bases, Hangers and Supports: Section 23 05 29
- .2 Mechanical Identification: Section 23 05 53

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM B209M-14, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
 - .2 ASTM C335-10e1, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .3 ASTM C449-07(R2013), Standard Specification for Mineral Fiber Hydraulic Setting Thermal Insulating and Finishing Cement.
 - .4 ASTM C553-2013, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .5 ASTM C612-2014, Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .6 ASTM C921-10, Standard Practice for Determining Properties of Jacketing Materials for Thermal Insulation.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 51GP52Ma-1989, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .3 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC S102-07, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC S701-11, Thermal Insulation Polystyrene, Boards and Pipe Covering.

1.3 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
-

- 1.3 DEFINITIONS .1 (Cont'd)
(Cont'd)
- .2 "EXPOSED" will mean "not concealed" as defined herein.
 - .3 Insulation systems insulation material, fasteners, jackets, and other accessories.
- .2 TIAC Codes:
- .1 CRD: Commercial Round Ductwork,
 - .2 CRF: Commercial Rectangular Finish.
 - .3 CEF: Commercial Rigid Insulation External Application.
- 1.4 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.
- 1.5 SAMPLES .1 Submit samples in accordance with Section 01 33 00.
- .2 Submit for approval a complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.
- 1.6 MANUFACTURERS' INSTRUCTIONS .1 Submit manufacturer's installation instructions in accordance with Section 01 33 00.
- .2 Installation instructions to include procedures used and installation standards achieved.
- 1.7 QUALIFICATIONS .1 Installer: specialist in performing work of this section, and have at least five (5) years successful experience in this size and type of project, qualified to standards of TIAC.
-

- 1.8 DELIVERY,
STORAGE AND
HANDLING
- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
 - .2 Protect from weather and construction traffic.
 - .3 Protect against damage from any source.
 - .4 Store at temperatures and conditions recommended by manufacturer.

PART 2 - PRODUCTS

- 2.1 FIRE AND SMOKE
RATING
- .1 In accordance with CAN/ULCS102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

- 2.2 INSULATION
- .1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.
 - .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 C mean temperature when tested in accordance with ASTM C335.
 - .3 TIAC Code C1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51GP52Ma (as scheduled in PART 3 of this Section).
 - .4 TIAC Code C2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51GP52Ma (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to ASTM C553.
 - .2 Jacket: to CGSB 51GP52Ma.
 - .3 Maximum "k" factor: to ASTM C553.

- 2.3 JACKETS
- .1 Canvas:
 - .1 220 gm/m2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .2 Lagging adhesive: Compatible with insulation.
-

2.4 ACCESSORIES

- .1 Vapour retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
- .2 Indoor Vapour Retarder Finish:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
- .3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.
- .4 ULC Listed Canvas Jacket:
 - .1 220 gm/m2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.Outdoor Vapour Retarder Mastic:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m2.
- .5 Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.
- .6 Contact adhesive: quick-setting.
- .7 Canvas adhesive: washable.
- .8 Tie wire: 1.5 mm stainless steel.
- .9 Banding: 12 mm wide, 0.5 mm thick stainless steel.
- .10 Facing: 25 mm galvanized steel hexagonal wire mesh stitched on one face of insulation.
- .11 Fasteners: 4 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.

PART 3 - EXECUTION

3.1 PREINSTALLATION REQUIREMENTS

- .1 Pressure testing of ductwork systems complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

3.2 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and as indicated.
- .3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Hangers, supports to be outside vapour retarder jacket.
- .5 Supports, Hangers in accordance with Section 23 05 29-Bases, Hangers and Supports.
 - .1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
- .6 Fasteners: At 300 mm o.c. in horizontal and vertical directions, minimum two rows each side.
- .7 Application: on either cold or variable temperature, round, rectangular (width less than 750mm) or oval ducting.
 - .1 Exhaust Fans:
 - .1 Insulation within 10ft. of exterior wall.
 - .2 Supply/makeup air:
 - .1 Insulate entirely.

3.3 DUCTWORK
INSULATION
SCHEDULE

- .1 Insulation types and thicknesses, conform to the following Table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts (exposed)	C1	Yes	50
Rectangular warm air ducts (exposed)	C1	No	25
Rectangular cold and dual temperature supply air ducts (concealed)	C2	Yes	25

3.3 DUCTWORK
INSULATION
SCHEDULE

(Cont'd)

Rectangular warm air ducts (concealed)	C2	No	25
Intake and exhaust plenums	C1	Yes	50
Exhaust duct between dampers and louvers	C1	No	50

- .2 Jackets: Exposed round ducts 600 mm and larger,
smaller sizes where subject to abuse:
 - .1 Use TIAC code C1 insulation, scored to suit
diameter of duct.

- .2 Finishes to conform to the following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	None	None
Indoor, exposed within mechanical room	CRF/ Canvas	CRD/ Canvas
Indoor, exposed elsewhere	CRF/ Aluminum CRF/Self	CRD/ Aluminum CRD/Self

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A480/A480M-16a, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - .2 ASTM A635/A635M-15, Specification for Steel, Sheet and Strip, Heavy Thickness Coils, Hot Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - .3 ASTM A653/A653M-15E1, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .2 National Fire Protection Agency (NFPA)
 - .1 NFPA 90A-2016, Installation of Air Conditioning and Ventilating Systems.
 - .2 NFPA 90B-2016, Installation of Warm Air Heating and Air Conditioning Systems.
 - .3 NFPA 91-2015, Standard for Exhaust System for Air Conveying of Vapours, Gases, Mists, and Non-combustible Particle Solids.
 - .4 NFPA 96-2014, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
 - .1 SMACNA 1966-2006, HVAC Duct Construction Standards, Metal and Flexible.
 - .2 SMACNA 012-2012, HVAC Duct Leakage Test Manual.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
 - .2 Indicate following:
 - .1 Sealants.
 - .2 Tape.
 - .3 Proprietary Joints.
-

1.3 CERTIFICATE OF RATINGS

- .1 Catalogue or published ratings must be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with municipal regulations.

PART 2 - PRODUCTS

2.1 SEAL CLASSIFICATION

- .1 Classification to SMACNA Seal Class A.
- .2 Seal classification:
 - .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.
 - .2 Class C: acceptable for galvanized ductwork.

2.2 SEALANT

- .1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 300°C to plus 930°C.

2.3 TAPE

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 FITTINGS

- .1 Fabrication: to SMACNA.
 - .2 Radiused elbows:
 - .1 Rectangular: Centreline radius: 1.5 times width of duct.
 - .2 Round: smooth radius or five piece. Centreline radius: 1.5 times diameter.
 - .3 Mitred elbows, rectangular:
 - .1 To 400 mm: with single thickness turning vanes.
 - .2 Over 400 mm: with double thickness turning vanes.
-

2.4 FITTINGS
(Cont'd)

- .4 Branches:
 - .1 Rectangular main and branch: with radius on branch 1.5 times width of duct or 45° entry on branch.
 - .2 Round main and branch: enter main duct at 45° with conical connection.
 - .3 Provide volume control damper in branch duct near connection to main duct.
 - .4 Main duct branches: with volume control damper.
- .5 Transitions:
 - .1 Diverging: 200 maximum included angle.
 - .2 Converging: 300 maximum included angle.
- .6 Offsets:
 - .1 Full short radiused elbows as indicated.
- .7 Obstruction deflectors: maintain full cross-sectional area. Maximum included angles: as for transitions.

2.5 FIRE STOPPING

- .1 Retain angles around duct on both sides of fire separation only if required by authority having jurisdiction.
- .2 Firestopping material and installation must not distort duct.

2.6 GALVANIZED
STEEL

- .1 Lock forming quality: to ASTM A653, G90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to SMACNA. Less than 24 gauge is not permitted.
- .3 Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

2.7 STAINLESS STEEL

- .1 To ASTM A480/A480M, Type 304, 18 gauge minimum.
 - .2 Finish: No 4. finish on exposed side of duct in finished area's, No. 3 finish or lower where concealed.
-

- 2.7 STAINLESS STEEL (Cont'd)
- .3 Thickness, fabrication and reinforcement: to SMACNA.
 - .4 Joints: to SMACNA and be continuous inert gas welded. Lateral seam orientated at the top of the duct.

2.8 HANGERS AND SUPPORTS

- .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500 mm.
- .2 Hanger configuration: to SMACNA.
- .3 Hangers: galvanized steel angle with black steel rods to ASHRAE or SMACNA following table:

<u>Duct Size</u> (mm)	<u>Angle Size</u> (mm)	<u>Rod Size</u> (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

- .4 Upper hanger attachments:
 - .1 For concrete: manufactured concrete inserts.
 - .1 Acceptable manufacturers Myatt, Grinnell, Hunt.
 - .2 For steel joist: manufactured joist clamp steel plate washer.
 - .1 Acceptable manufacturers Myatt, Grinnell, Hunt.
 - .3 For steel beams: manufactured beam clamps:
 - .1 Acceptable manufacturers Myatt, Grinnell, Hunt.

PART 3 - EXECUTION

- 3.1 DUCT SYSTEMS
- .1 Ducts to be galvanized steel except where indicated on the plans to be stainless steel.

3.2 GENERAL

- .1 Do Work in accordance with NFPA 90A, NFPA 90B, and SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm beyond insulated duct.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation. Do not place fire stopping material in expansion space between damper sleeve and fire partition.
- .5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
- .6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.
- .7 Protect ductwork from dirt and weather during transportation, prior to and during installation. Use enclosed trailers and store material indoors in a covered and protected area.

3.3 HANGERS

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing to be in accordance with SMACNA or as follows:

<u>Duct Size (mm)</u>	<u>Spacing (mm)</u>
to 1500	3000
1501 and over	2500

3.4 WATERTIGHT DUCT

- .1 Provide watertight duct for:
 - .1 Fresh air intake and exhaust plenums.
 - .2 As indicated.
-

- 3.4 WATERTIGHT DUCT .2 Form bottom of horizontal duct without longitudinal
 (Cont'd)
- 3.5 SEALING AND .1 Apply sealant to outside of joint to manufacturer's
TAPING
- .2 Bed tape in sealant and recoat with minimum of one
 (1) coat of sealant to manufacturers
 recommendations. Sealant and tape to be applied to
 full perimeter of duct.
- 3.6 LEAKAGE TESTS .1 Perform duct leakage on fume exhaust ductwork in
 accordance with SMACNA HVAC Duct Leakage Test
 Manual.
- .2 Do leakage tests in sections.
- .3 Make trial leakage tests as instructed to
 demonstrate workmanship.
- .4 Install no additional ductwork until trial test has
 been passed.
- .5 Test section minimum of 30 m long with not less than
 three branch takeoffs and two (2) 90 degree elbows.
- .6 Complete test before insulation or concealment.
- 3.7 BRANCH .1 Use low loss fittings with conical tee's at round
CONNECTIONS
AND TEES

PART 1 - GENERAL

- 1.1 REFERENCES .1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
.1 SMACNA 1966-2006, HVAC Duct Construction Standards Metal and Flexible.
- 1.2 PRODUCT DATA .1 Submit product data in accordance with Section 01 33 00
.2 Indicate the following:
.1 Flexible connections.
.2 Duct access doors.
.3 Turning vanes.
.4 Instrument test ports.
- 1.3 CERTIFICATION OF RATING .1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

PART 2 - PRODUCTS

- 2.1 GENERAL .1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.
- 2.2 FLEXIBLE CONNECTIONS .1 Frame: galvanized sheet metal frame 0.66 mm thick with fabric clenched by means of double locked seams.
.2 Material:
.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 400 C to plus 900 C, density of 1.3 kg/m².
-

-
- 2.3 ACCESS DOORS IN DUCTS
- .1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.
 - .2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
 - .3 Gaskets: neoprene.
 - .4 Hardware:
 - .1 Up to 300 mm x 300 mm: two (2) sash locks complete with safety chain.
 - .2 301 mm to 450 mm: four (4) sash locks complete with safety chain.
 - .3 451 mm to 1000 mm: piano hinge and minimum two (2) sash locks.
 - .4 Doors over 1000 mm: piano hinge and two (2) handles operable from both sides.
 - .1 Hold open devices.
 - .2 300 mm x 300 mm glass viewing panels.
- 2.4 TURNING VANES
- .1 Factory or shop fabricated double thickness with trailing edge, to recommendations of SMACNA and as indicated.
- 2.5 INSTRUMENT TEST PORTS
- .1 1.6 mm thick steel zinc plated after manufacture.
 - .2 Cam lock handles with neoprene expansion plug and handle chain.
 - .3 28 mm minimum inside diameter. Length to suit insulation thickness.
 - .4 Neoprene mounting gasket.
- 2.6 BRANCH CONNECTIONS
- .1 Conial galvanized sheet metal with lockable butterfly damper.
 - .2 Sheet metal thickness to corresponding round duct standards.
-

- 2.6 BRANCH CONNECTIONS
(Cont'd)
- .3 Use only low loss fittings. For round branches with a diameter of 100mm or less smaller than the main, use regular to round low loss fittings.
 - .4 No branch fittings at the same size as the branch duct will be permitted. Use conical or square-to-round only.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Flexible Connections:
 - .1 Install in following locations:
 - .1 Inlets and outlets to supply air units and fans.
 - .2 Inlets and outlets of exhaust and return air fans.
 - .3 As indicated.
 - .2 Length of connection: 100 mm.
 - .3 Minimum distance between metal parts when system in operation: 75 mm.
 - .4 Install in accordance with recommendations of SMACNA.
 - .5 When fan is running:
 - .1 Ducting on sides of flexible connection to be in alignment.
 - .2 Confirm slack material in flexible connection.
 - .2 Access doors and viewing panels:
 - .1 Size:
 - .1 600 mm x 600 mm for person size entry.
 - .2 450 mm x 450 mm for servicing entry.
 - .3 300 mm x 300 mm for viewing.
 - .4 As indicated.
 - .2 Locations:
 - .1 Fire and smoke dampers.
 - .2 Control dampers.
 - .3 Devices requiring maintenance.
 - .4 Required by code.
 - .5 Intake and exhaust plenums.
 - .6 Turning vanes.
 - .7 As required for duct cleaning (minimum 10m apart and at all changes in direction)
 - .8 Elsewhere as indicated.
 - .3 Instrument test ports:

3.1 INSTALLATION
(Cont'd)

- .3 (Cont'd)
 - .1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
 - .2 Locate to permit easy manipulation of instruments.
 - .3 Install insulation port extensions as required.
 - .4 Locations.
 - .1 For traverse readings:
 - .1 Ducted inlets to roof and wall exhausters.
 - .2 Inlets and outlets of other fan systems.
 - .3 Main and submain ducts.
 - .4 And as indicated.
 - .2 For temperature readings:
 - .1 At outside air intakes.
 - .2 And as indicated.
- .4 Turning vanes:
 - .1 Install in accordance with recommendations of SMACNA and as indicated.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Motors, Drives and Guards: Section 23 05 13
- .2 Vibration Isolation and Seismic Control: Section 23 05 48
- .3 Duct Accessories: Section 23 33 00

1.2 REFERENCES

- .1 AMCA 99-16, Standards Handbook.
- .2 ANSI/AMCA 210-16, Laboratory Methods of Testing Fans for Rating.
- .3 AMCA 300-14, Reverberant Room Method for Sound Testing of Fans.
- .4 AMCA 301-14, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- .5 CGSB 1.181-99, Ready Mixed Organic Zinc-Rich Coating.
- .6 NEMA ICS 7.1-06 Safety Standard for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
- .7 American Bearing Manufacturers Association (ABMA).

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
 - .2 Provide:
 - .1 Fan performance curves showing point of operation, BHP and efficiency.
 - .2 Sound rating data at point of operation.
 - .3 Dimensional data.
 - .4 Installation procedures.
 - .3 Indicate:
 - .1 Motors, sheaves, bearings, shaft details.
-

-
- 1.3 SHOP DRAWINGS AND PRODUCT DATA (Cont'd) .3 (Cont'd)
.2 Minimum performance achievable with variable speed controllers and variable inlet vanes as appropriate, dimensions, installation procedure.
- 1.4 CLOSEOUT SUBMITTALS .1 Provide operation and maintenance data for incorporation into operation and maintenance manual.
- 1.5 EXTRA MATERIALS .1 Spare parts include:
.1 Matched sets of belts.
.2 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.
- 1.6 MANUFACTURED ITEMS .1 Obtain catalogued or published ratings from tests carried out by manufacturer or from independent testing agency signifying adherence to codes and standards in force.
- 1.7 WARRANTY .1 Provide extended warranty for parts and labour for five (5) years following project substantial completion.

PART 2 - PRODUCTS

- 2.1 FANS GENERAL .1 Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards, fan inlet and/or outlet safety screens as indicated and as specified in Section 23 05 13, inlet or outlet dampers and vanes as indicated.
- .2 Factory primed before assembly in colour standard to manufacturer.
- .3 Scroll casing drains: as indicated.
-

-
- 2.1 FANS GENERAL
(Cont'd)
- .4 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.
 - .5 Vibration isolation: to Section 23 05 48.
 - .6 Flexible connections: to Section 23 33 00.
- 2.2 CENTRIFUGAL FANS
- .1 Fan wheels:
 - .1 Welded steel or aluminum construction.
 - .2 Maximum operation speed of centrifugal fans not more than 40% of first critical speed.
 - .3 Air foil or backward inclined blades, as indicated.
 - .4 Bearings: air handling quality, heavy duty, split pillowblock, flange mounted grease lubricated ball or roller self aligning type with oil retaining, dust excluding seals and a certified minimum rated life to ABMA L10 of 100,000 hours.
 - .2 Housings:
 - .1 Volute with inlet cones: fabricated steel for wheels 300 mm or greater, cast iron, or steel, for smaller wheels, braced, and with welded supports.
 - .2 For horizontally and vertically split housings provide flanges on each section for bolting together, with gaskets of non-oxidizing nonflammable material.
 - .3 Provide bolted latched airtight access doors with handles.
 - .4 Spark resistant construction Type B minimum where indicated.
- 2.3 CABINET FANS
GENERAL PURPOSE
- .1 Fan characteristics and construction: as centrifugal fans.
 - .2 Cabinet hung single or multiple wheels with DWDI centrifugal fans in factory fabricated casing complete with vibration isolators and seismic control measures, motor, direct drive or V-belt drive and guard outside casing.
-

2.3 CABINET FANS .3 Fabricate casing of zinc coated or phosphate treated
GENERAL PURPOSE steel reinforced and braced for rigidity. Provide
(Cont'd) removable panels for access to interior. Paint
uncoated, steel parts over with corrosion resistant
paint to CGSB 1.181. Finish inside and out, over
prime coat, with rust resistant enamel to Section 09
91 13. Internally line cabinet with 1225 mm thick
rigid acoustic insulation, pinned and cemented,
complete with metal nosings on all exposed edges.

2.4 INLINE .1 Characteristics and construction: as for centrifugal
CENTRIFUGAL FANS fan wheels, with axial flow construction and direct
belt drive as indicated.
.2 Provide AMCA arrangements 1 or 9 as indicated with
stiffened flanges, smooth rounded inlets, and
stationary guide vanes.
.3 Acceptable manufacturers: Cook, Penn, Greenheck.

PART 3 - EXECUTION

3.1 FAN .1 Install fans as indicated, complete with resilient
INSTALLATION mountings specified in Section 23 05 48 and Seismic
Control, flexible electrical leads and flexible
connections in accordance with Section 23 33 00 Duct
Accessories.
.2 Provide sheaves and belts required for final
balance.
.3 Bearings and extension tubes to be easily
accessible.
.4 Access doors and access panels to be easily
accessible.
.5 Installation shall be in strict accordance with
manufacturers recommendations.
.6 Grease fan bearing prior to operation.

PART 1 - GENERAL

- 1.1 REFERENCES .1 CAN/CSA C22.2 No. 46-13, Electric Air Heaters.
- 1.2 PRODUCT DATA .1 Submit product data in accordance with Section 01 33 00.
- .2 Submit product data sheets for unit heaters. Include:
- .1 Product characteristics.
 - .2 Performance criteria.
 - .3 Mounting methods.
 - .4 Physical size.
 - .5 kW rating, voltage, phase.
 - .6 Cabinet material thicknesses.
 - .7 Limitations.
 - .8 Colour and finish.
- .3 Submit product data sheets for unit heaters. Include product characteristics, performance criteria, physical size, limitations and finish.
- 1.3 CLOSEOUT SUBMITTALS .1 Provide operation and maintenance data for unit heaters for incorporation into operation and maintenance manual.

PART 2 - PRODUCTS

- 2.1 UNIT HEATER .1 Electric unit heater to be horizontal, forced fan type of kW rating, voltage and phase as specified on the drawings.
- .2 Heating elements: Element totally enclosed in a metal tubular sheath with spiral steel fins.
- .3 Fan motor: totally enclosed, permanently lubricated ball bearing type. Fan shall be factory wired and shall be complete with built in fan motor thermal overload protection.
-

- 2.1 UNIT HEATER
(Cont'd)
- .4 Cabinet: die formed, steel, 18 gauge, complete with adjustable louvers.
 - .5 Provide unit heater complete with heavy duty, mounting bracket suitable for wall or ceiling mounting as indicated on the drawings.
 - .6 Finish: Polyester, epoxy powder coat paint finish, almond colour.
 - .7 Provide unit heater complete with the following controls and accessories:
 - .1 Automatic reset overtemperature protection.
 - .2 Terminal blocks for all field wiring.
 - .3 Control circuit.
 - .4 Contactors.
 - .5 Power disconnect switch.
 - .8 Unit heater to be operated by integral thermostat.
 - .9 Standard of Acceptance:
 - .1 Chromalox type EUH series.
 - .10 Additional acceptable manufacturers:
 - .1 Ouellet
 - .2 Q-Mark
 - .3 Stelpro
 - .4 CCI Thermal

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install all electric heaters and controls as indicated and in accordance with manufacturer's instructions.
 - .2 Power and control connections will be by Division 26.
- 3.2 FIELD QUALITY CONTROL
- .1 Perform tests in accordance with Section 26 05 00.
 - .2 Test cut-out protection when air movement is obstructed.

3.2 FIELD QUALITY
CONTROL

(Cont'd)

- .3 Test fan delay switch to assure dissipation of heat after element shut down.
- .4 Test unit cut-off when fan motor overload protection has operated.
- .5 Confirm heaters and controls operate correctly.

1.1 GENERAL

- .1 This Section covers items common to sections of Division 26. This Section supplements requirements of Division 01.
- .2 Refer to Electrical Drawings and scope of work outlined herein, for demolition and removals to be carried out.

1.2 RELATED WORK

- .1 Direct Buried Underground Conduits: Section 33 65 76

1.3 REFERENCES

- .1 CSA C22.1-15, Canadian Electrical Code, Part 1.
- .2 CAN/CSA C22.2 No. 0.1-M1985(R2013), General Requirements for Double-Insulated Equipment.
- .3 CSA C22.3 No. 1-2015, Overhead Systems.
- .4 CSA C22.3 No. 7-2015, Underground Systems.
- .5 CAN3 C235-83(R2015), Preferred Voltage Levels for AC Systems, 0 to 50 000 V.
- .6 EEMAC Y1-2-1979, Standard for Performance Specification for Finishing Systems for Outdoor Electrical Equipment.

1.4 SCOPE OF WORK

- .1 The work of this Contract consists of furnishing all materials, tools, equipment and labour, and performing the electrical services as indicated and as specified herein and on the Electrical Drawings.
 - .2 Remove, salvage and dispose of all existing equipment as noted on the drawings.
 - .3 Supply and install one (1) new service entrance rated 120/208V, 100A, 3P, 4W, panelboard complete with circuit breakers in new process building.
 - .4 Supply and install new receptacles in new process building.
 - .5 Supply and install new meter socket in accordance with power utilities requirements.
-

1.4 SCOPE OF WORK
(Cont'd)

- .6 Coordinate with Owner and power utility to provide a new 120/208V overhead service to the process building.
 - .7 Install and interwire electrical/instrumentation for mechanical and process systems specified in other divisions including the supply and installation of power, control & instrumentation cabling and required conduit and mounting hardware, in accordance with these specifications and shop drawings/manufacturer requirements.
 - .8 Supply and install new termination junction boxes, including all necessary fittings and mounting hardware, as indicated on the drawings.
 - .9 Supply and install new conduit, including all necessary fittings, couplings, cable glands, conduit seals, and mounting hardware, as indicated on the drawings.
 - .10 Supply and install outdoor, indoor, and emergency lighting systems as indicated on the drawings.
 - .11 Supply and install power distribution, general services, control, instrumentation and communications wiring and cables.
 - .12 Document, test and calibrate to satisfaction of the Consultant, electrical equipment as specified herein and on the drawings.
 - .13 Supply and install grounding as necessary to satisfy the CEC and the local provincial inspection department.
 - .14 Safely store electrical equipment awaiting installation.
 - .15 Protect installed electrical equipment during construction.
 - .16 Repair/replace equipment damaged during construction, or otherwise deemed defective or non-compliant with this specification, at no expense to the Contract. These expenses include all material, labour and other fees.
-

1.4 SCOPE OF WORK
(Cont'd)

- .17 Obtain "scope of work" clarification prior to issuing their Tender. Any cost extras due to any misunderstanding/ misinterpretation of the scope of work will not be entertained during the construction phase of the work.
- .18 Coordinate/schedule with other trades to ensure that the construction proceeds in a timely and efficient manner. Minimize disturbance to existing systems and provide access for plant operator for routine maintenance and inspection.
- .19 As indicated on the drawings, some areas within the treatment plant facility are Zone 1 and Zone 2 hazardous locations as defined by Section 18 of the Canadian Electrical Code. All electrical installations in these areas shall be completed in accordance with the Canadian Electrical Code for the specified classification. These areas may contain hydrogen sulphide (North American Gas Group C, IEC Gas Group IIB) and methane (North American Gas Group D, IEC Gas Group IIA) gases. These areas are also a Category 2 location in accordance with Section 22 of the Canadian Electrical Code and the electrical installation shall be completed as per the requirements of a Category 2 location. Refer to the electrical design drawings for locations of hazardous locations.
- .20 Core drill all concrete floors and walls as required for installation of new electrical services. Prior to core drilling at any location, scan concrete floors and walls to locate any embedded electrical services. Document their location and provide this to the Consultant.

1.5 CODES AND
STANDARDS

- .1 Do complete installation in accordance with CSA C22.1 and local regulations except where specified otherwise.
- .2 Comply with all CSA electrical bulletins in force at the time of tender submission. While not identified or specified by reference number in this division, the bulletins shall be considered to form part of the related CSA part II standard.
- .3 Abbreviations for electrical terms: to CSA Z85.

1.6 CARE, OPERATION
AND START-UP

- .1 Instruct operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components, including but not limited to overload relays, motor circuit protectors, circuit breakers, electronic motor soft starters.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.7 VOLTAGE RATINGS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.8 PERMITS, FEES
AND INSPECTION

- .1 Submit to the Electrical Inspection Department, Municipal Authority and Supply Authority the necessary number of drawings and specifications for examination and approval prior to commencement of work. Submit this information within twenty (20) working days of the award of Tender and provide the Consultant with written notice at the time this has been submitted.
 - .2 Provide the Consultant with a copy of the Electrical Inspection Department and Supply Authority Plans Review Report immediately upon receipt. No shop drawings will be reviewed prior to receipt of the Plans Review Report from the Contractor.
-

1.8 PERMITS, FEES
AND INSPECTION
(Cont'd)

- .3 Obtain all necessary permits including an Electrical Wiring Permit for electrical work and Communications Cabling Permit for communications cabling work from the authority having jurisdiction prior to commencement of work. Provide a copy of each permit to the Consultant upon receipt. Properly display the permits on the work site.
- .4 Upon specific request, the Consultant will provide to the Contractor, up to a maximum of three (3) copies of the drawings and specifications required for submittal to the Electrical Inspection Department and Supply Authority. These drawings and specifications will be provided to the Contractor at no cost, unless specified otherwise.
- .5 Arrange for all required inspections to be conducted by the authority having jurisdiction. Provide a copy of all inspection reports to the Consultant immediately upon receipt. Notify the Consultant immediately of changes required by the authority having jurisdiction prior to making changes. All changes must be approved by the Consultant.
- .6 Furnish Certificates of Acceptance from authorities having jurisdiction upon completion of Work. Include a copy in the Operations and Maintenance Manual.
- .7 Pay all associated fees.

1.9 MATERIALS AND
EQUIPMENT

- .1 Equipment and material to be CSA certified or certified by an agency approved by the Electrical Inspection Department. Where there is no alternative to supplying equipment which is not certified, obtain special approval from Electrical Inspection Department and the Consultant.
- .2 Factory assemble control panels and component assemblies.

1.10 ELECTRIC
MOTOR, EQUIPMENT
AND CONTROLS

- .1 Coordinate supplier and installer responsibility for mechanical and process equipment specified in other specification divisions to ensure complete and functioning systems.

-
- 1.10 ELECTRIC MOTOR, EQUIPMENT AND CONTROLS
(Cont'd)
- .2 Confirm location of mechanical and process equipment and associated control devices specified in other divisions. All device locations may not be necessarily shown on the electrical drawings.
- 1.11 FINISHES
- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two (2) coats of finish enamel.
- .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1.
- .2 Paint outdoor electrical equipment green finish to EEMAC Y1-1.
- .2 Clean and touch up surfaces of existing and new shop-painted equipment scratched or marred during shipment or installation, to match original paint to the satisfaction of the Consultant. If not acceptable, replace equipment at no additional cost to the contract.
- .3 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- 1.12 FASTENERS AND EQUIPMENT MOUNTING
- .1 Fastening devices for all equipment and components, including bolts, nuts, washers, and screws shall be stainless steel throughout except as follows:
- .1 Use zinc plated steel fastening devices in the electrical rooms, and other dry areas.
- .2 Use hot dipped galvanized steel fastening devices in non-hazardous, damp areas.
- .2 In the Process Building wall mount electrical equipment on 21mm thick fire retardant plywood backboards that are fastened directly to the wall. Paint plywood with two (2) coats of fire retardant paint to match wall colour.
- 1.13 EQUIPMENT IDENTIFICATION
- .1 Identify electrical equipment with nameplates and labels as specified herein.
- .2 Identification:
-

1.13 EQUIPMENT IDENTIFICATION
(Cont'd)

.2 (Cont'd)

.1 Provide all switchboards, panels, disconnect switches, MCC's, receptacles, transformers, control panels, fire alarm devices, magnetic starters, TOL's, etc. with lamicaid nameplates as further described herein. Take care to affix all plates true and level, and plumb in all instances.

.2 Affix nameplates to all NEMA 1 surfaces with stainless steel type fasteners.

.3 Affix nameplates to other types of surfaces with contact type cement.

.4 Affix nameplates to building exterior surfaces with nylon inserts and self tapping screws unless specifically indicated otherwise.

.5 Apply contact type cement (battered) to complete rear side of plate, as opposed to several locations or areas on same.

.6 Lamicaid nameplates installed on distribution panelboards, motor control centres, transformers, and splitters must indicate the following:

.1 Designated name of equipment.

.2 Amperage of overcurrent protection device.

.3 Voltages, number of phases and wires.

.4 Designation of power source.

PANEL C - 100 AMPS

120/208V - 3PH - 4W

FED FROM PANEL B

.7 Lamicaid nameplates installed on combination starters, magnetic starters, manual starter and all various systems controls, control panels, disconnect switches, etc., shall contain the following information:

.1 Designated name of equipment or equipment being fed, whichever is applicable.

.2 Designated name of power source.

.3 Branch circuit breaker number(s) where possible.

.4 Voltage(s) and phase.

FAN NO. 5

PANEL H - CKT. 17

120V - 1 PH

SUPPLY FAN NO. 3

M.C.C. NO. 1

600V - 3 PH

.8 Lamicaid nameplates installed on fusible type disconnect switches are to also indicate the maximum designated/designed fuse size.

1.13 EQUIPMENT
IDENTIFICATION
(Cont'd)

.2 (Cont'd)

.9 Install lamicoïd nameplates on all junction and pull boxes sized 150 mm x 150 mm and larger indicating name of system, designated panel name and electrical characteristics where applicable.

.10 Install lamicoïd nameplates above all types of receptacles and abutted directly to tops of their respective device plates. Identification is to indicate respective panel source complete with associated circuit breaker number(s). Lamicoïd plate to be 1.5 mm thick x 13 mm high complete with 6 mm black letters on white core, directly above all flush receptacles. Plate to be identical width as finish device plate and the top left and right corners to be rounded off.

.11 Lamicoïd nameplates above 120V receptacles protected by GFCI circuit breakers, or GFCI type receptacles are to be identified as per the following:

.1 1.5mm thick x 19mm wide complete with 6 mm black letters on white core above all receptacles. Identical width as finish device plate (EXAMPLE: GFCI Protected Panel H-26).

.12 Lamicoïd nameplate(s) for voice/data/CATV/CCTV/multimedia outlets shall be applied directly to face of finish plate.

.1 1.5mm thick x 19mm wide complete with 6mm black letters on white core above all receptacles. Identical width as finish device plate.

.13 Allow for an "average" of 40 letters for each lamicoïd nameplate.

.14 Lamicoïd 3 mm thick plastic engraving sheet, white face, black core, for all electrical systems except fire alarm systems which shall have red face with white core.

.15 Lettering on lamicoïd nameplates shall not "start", nor "end" nearer than 9 mm from either, or both ends of said plates. Size of lettering, including overall lengths of various plates must be as indicated in the following chart.

NOMINAL NAMEPLATE SIZES

Size 1	10mm x	50mm	1 line	5mm high letters
Size 2	13mm x	75mm	1 line	6mm high letters
Size 3	16mm x	75mm	2 lines	5mm high letters
Size 4	19mm x	90mm	1 line	10mm high letters
Size 5	50mm x	90mm	2 lines	13mm high letters
Size 6	25mm x	100mm	1 line	13mm high letters

1.13 EQUIPMENT
IDENTIFICATION
(Cont'd)

Size 7	25mm x 100mm	2 lines	6mm high letters
Size 8	50mm x 150mm	2 lines	13mm high letters
Size 9	50mm x 100mm	3 lines	10mm high letters

- .3 Wording on nameplates and labels to be approved by Consultant prior to manufacture.
- .4 Identification to be English.
- .5 Provide lamicoid nameplates and install on, or adjacent to, all various systems' control panels and/or cabinets complete with information as indicated. Nameplates are to reflect individual system's assigned name, and where applicable, also indicate both designated panel name and associated branch circuit breaker number(s).
- .6 Co-ordinate names of equipment and systems with other trades to ensure that equipment identification is consistent.
- .7 In addition to required nameplates and colour coding, junction boxes to have the panel and circuit numbers of all wiring contained within listed on the coverplate. Write list using black indelible marker.
- .8 Colour code electrical junction boxes and pull boxes to match existing systems.
- .9 Provide clearly visible marking on electrical equipment to warn persons of potential electrical shock and arc flash hazards as specified in Section 2 of the Canadian Electrical Code.
- .10 Provide terminal boxes, panels and miscellaneous equipment fed from two or more sources with a warning nameplate prominently displayed: "CAUTION - MORE THAN ONE SOURCE VOLTAGE".
- .11 Provide terminal boxes, panels and miscellaneous wire ways containing intrinsically safe circuits with a warning nameplate prominently displayed: "INTRINSICALLY SAFE CIRCUIT".

1.14 WIRING
IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring. Panduit PLD-1 and PLD-2 or approved equivalent.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.
- .5 Indicate panel and circuit number on all phase conductors (i.e., Panel A, ckt 3) at the device and at any intermediate junction/pull boxes.
- .6 Identify all neutral conductors to indicate the phase conductor with which they are associated and at any intermediate junction/pull boxes.

1.15 CONDUIT AND
CABLE
IDENTIFICATION

- .1 Colour code conduits, boxes and cables to match existing systems.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 For power cables to electrical equipment, indicate designated name of equipment and designated name of power source (i.e., Fuel Pump #1 - fed from MCC #1).
- .4 Where more than one (1) cable terminates at a device, add cable number (i.e., -1, -2) to end of cable identification.
- .5 Use Electrovert PVC K-marking sleeves (black on yellow), complete with PVC carrier strip and self-locking nylon cable ties (black) or approved equivalent.

1.16 WIRING
TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.
-

1.17 MANUFACTURERS
AND CSA LABELS

- .1 Visible and legible after equipment is installed.

1.18 WARNING SIGNS

- .1 As specified and to meet requirements of Electrical Inspection Department.
- .2 Decal or Porcelain enamel signs, minimum size 180 mm x 250 mm.

1.19 LOCATION OF
EQUIPMENT

- .1 Locate outlets in accordance with the Drawings and these Specifications.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of equipment at no extra cost or credit, providing distance does not exceed 1 m and information is given before installation.
- .4 Locate light switches on latch side of doors.

1.20 MOUNTING
HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
- .1 Local switches: 1350 mm (54").
 - .2 Wall receptacles:
 - .1 General: 450 mm (18").
 - .2 Elevated mounting in process areas: 1200 mm (48").
 - .3 Outdoors: 1200 mm (48") above finished grade.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Control Panels: HMI centerline 1500mm (60") above finished floor.
-

- 1.21 LOAD BALANCE .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Submit, at completion of work, a report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.
- 1.22 CONDUIT AND CABLE INSTALLATION .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Arrange and pay for holes through exterior walls; provide flashings and make weatherproof.
- .4 Install conduits to be embedded or plastered over, neatly and close to the building structure so furring can be kept to a minimum.
- 1.23 FIRESTOPPING .1 Provide firestopping and smoke sealing of all cable, cabletrough or conduit penetrations through fire resistant separations in accordance with Section 07 84 00.
- 1.24 FIELD QUALITY CONTROL .1 Conduct and pay for following tests:
- .1 Power distribution system including phase rotation, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
-

1.24 FIELD QUALITY CONTROL
(Cont'd)

- .3 Insulation resistance testing:
- .1 Megger circuits, feeders and distribution equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and distribution equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .4 Provide a type written tabular report indicating test results.
- .4 Provide a type written tabular report indicating the normal field measured load current for all motors, indicating the motor circuit protector trip setting or fuse type/rating, the overload heater element sizes and/or settings. Indicate the motor nameplate current.
- .5 Advise Consultant of dates when testing will take place. Provide five (5) days notice of such tests.
- .6 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .7 Submit test results for Consultant's review and approval.

1.25 SHORT-CIRCUIT & PROTECTION COORDINATION STUDY

- .1 Confirm circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

1.26 QUALITY ASSURANCE

- .1 Instructions:
- .1 Interferences: electrical drawings are generally of a diagrammatic nature. Plan and coordinate the work to eliminate interferences with other trades. Provide all necessary raceway offsets, fittings, and boxes, adjust all fixture and equipment boxes, adjust all fixture and equipment locations and provide all supporting materials required for a planned, coordinated and neat installation. Where interferences occur, the Consultant's authorized representative will decide which item must be relocated regardless of which was installed first.

-
- 1.26 QUALITY ASSURANCE
(Cont'd)
- .1 (Cont'd)
- .2 Electrical workmanship: provide workmanship of the highest quality. Sub-standard work will not be accepted. Use only persons skilled in the trades involved.
- .3 Electrical materials: provide all materials used in this work, unless particularly specified otherwise, that are new, free from flaws, or imperfections.
- .4 Sleeves and inserts: furnish and locate all sleeves and inserts required for this work in accordance with drawings.
- .2 Applicable standards:
- .1 All electrical work must conform with the requirements and recommendations of the latest edition of the Canadian Electrical Code and all local codes and ordinances. In conflicts between codes, the more stringent requirements shall govern.
- .2 In no instance will the standard established by this specification be reduced by any of the codes or standards referred to in this specification.
- .3 Standards: the specifications and standards of the following organizations are by reference made as part of these specifications and all electrical work, unless otherwise indicated, shall comply with their requirements and recommendations wherever applicable.
- .4 Canadian Standard Association (CSA).
- .5 Illuminating Engineering Society (I.E.S.).
- .6 Institute of Electrical and Electronics Engineers (I.E.E.E.).
- .7 Instrument Society of America (I.S.A.).
- .8 American Society for Testing Materials (A.S.T.M.).
- .9 Certified Ballast Manufacturers (C.B.M.).
- .10 Insulated Power Cable Engineer's Association (I.P.C.E.A.).
- .11 Electrical Equipment Manufacturer's Association of Canada (E.E.M.A.C.).
- .12 National Fire Protection Association (N.F.P.A.).
- .13 Underwriter's Laboratories of Canada (U.L.C.).
- .14 Joint Industrial Council (J.I.C.).
- .15 All local and provincial codes and ordinances.
- 1.27 PROCESS EQUIPMENT PACKAGES
- .1 Coordinate electrical work with the process system vendors.
-

1.27 PROCESS
EQUIPMENT PACKAGES
(Cont'd)

- .2 Verify connection details and requirements for interwiring between vendor supplied process equipment packages specified in other divisions.
- .3 Refer to manufacturer's shop drawings for connection details and recommended installation details.
- .4 Provide all cable, conduit, supports and miscellaneous hardware as per the requirements of this specification.

1.28 RECORD
DRAWINGS

- .1 Record Drawings:
 - .1 After award of Contract, Consultant will provide a set of full-sized drawings for purpose of maintaining record drawings. Accurately and neatly record deviations from Contract Documents caused by site conditions and changes ordered by Consultant.
 - .2 Identify drawings as "Project Record Copy". Maintain in new condition and make available for inspection on site by Consultant.
 - .3 On completion of Work and prior to final inspection, submit record documents to Consultant.

1.29 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Remove from site and dispose of all debris and waste materials at appropriate disposal/recycling facilities.
- .2 Separate and recycle waste materials in accordance with applicable Construction/Demolition Waste Management And Disposal Regulations.

PART 1 - GENERAL

- 1.1 REFERENCES .1 CSA C22.2, No. 65-13, Standard for Wire Connectors.

PART 2 - PRODUCTS

- 2.1 WIRE AND BOX CONNECTORS .1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Tin-plated copper, colour keyed, crimp type compression connectors, (long barrel, two hole) with a straight, 45° or 90° lug tongue configuration as required.
- .1 Acceptable products: Thomas & Betts "Color-keyed" compression connectors or approved equivalent.
- .4 Clamps or connectors for armoured cable, liquid tight, flexible conduit, as required.
- .5 All wire connectors must be rated for operating voltage indicated.

PART 3 - EXECUTION

- 3.1 WIRE AND BOX CONNECTORS INSTALLATION .1 Make all connections and terminations electrically and mechanically secure. Sizes of connectors to be as per manufacturer's recommendations for various sizes and combinations of wire sizes.
- .2 Make all joints required in branch wiring #8 and smaller utilizing twist-on pressure type connectors as manufactured by "Ideal" (colour coded wirenut) or "Marrettes" #31, #33 or #35, or approved equivalents.
-

3.1 WIRE AND BOX
CONNECTORS
INSTALLATION
(Cont'd)

- .3 Make branch wiring joints larger than #8 AWG utilizing colour keyed crimp type compression connectors (two hole, long barrel, tin-plated copper) complete with manufacturer approved compression tools. Apply a first layer of compound type tape followed by additional layers of "Scotch" #33+ vinyl tape. Bolt compression connectors together and torqued in accordance with manufacturer's recommendation. Heat shrink can also be used.
- .4 Plier tighten marrette type connectors.
- .5 Make wire connectors for connections to equipment not provided with lugs utilizing colour keyed, crimp type compression connectors (long barrel, two hole, tin-plated copper, straight lug tongue) complete with manufacturer approved compression tools. Alternate lug tongue configurations (45° and 90°) will be accepted where required by application.

PART 1 - GENERAL

- 1.1 SUBMITTALS .1 Submit shop drawings, and product data in accordance with Section 01 33 00.
- 1.2 RELATED SECTIONS .1 Conduits, Conduit Fastenings and Conduit Fittings: Section 26 05 34
- .2 Wire and Box Connectors (0 - 1000V): Section 26 05 20
- .3 Primary Process Instrumentation Devices and Cabling: Section 26 90 00
- 1.3 REFERENCES .1 CSA C22.1-15, Canadian Electrical Code.

PART 2 - PRODUCTS

- 2.1 BUILDING WIRES .1 Conductors: soft drawn, stranded, copper(of 98% conductivity). Minimum size #12 AWG.
- .2 Copper conductors: size as indicated, with 600V insulation of chemically cross-linked thermosetting polyethylene material rated RW90-XLPE.
- .3 Copper conductors: size as indicated, with 1000V insulation of chemically cross-linked thermosetting polyethylene material rated RWU90-XLPE.
- .4 Colour code wiring in accordance with the Canadian electrical Code.
- 2.2 PROCESS CONTROL AND INSTRUMENTATION CABLING .1 Refer to Section 26 90 00 and electrical drawings.
-

PART 3 - EXECUTION

- 3.1 INSTALLATION OF BUILDING WIRES
- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34.
 - .2 Use RWU90 for all underground runs.
- 3.2 INSTALLATION OF CABLES: GENERAL
- .1 Support cables independently of supports used for equipment of other trades; do not support from or secure cables to ductwork and piping.
 - .2 Install cables in a neat and professional manner, so as to conserve headroom.
 - .3 Install cables parallel and perpendicular to building lines.
 - .4 In wet/damp areas and outdoors, cables to enter into the bottom of the equipment.
 - .5 Twist together stranded conductors at each termination.
 - .6 Do not lay cables on top of suspended ceiling grids and tiles.
 - .7 Ty-rap branch circuit phase conductors and neutral (where applicable) at the closest point of entry within all panelboards, pullboxes, junction boxes, motor control centres and switchboards.

PART 1 - GENERAL

- 1.1 PRODUCT DATA .1 Submit product data in accordance with Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 EQUIPMENT .1 Direct buried grounding conductors: bare stranded copper of minimum 98% conductivity, un-tinned, soft annealed, size as indicated.
- .2 Insulated grounding and bonding conductors: soft-drawn, stranded copper of minimum 98% conductivity, un-tinned, type RW90 (green coloured insulation). Conductors to be FT4 rated when installed in free-air.
- .3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermit welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.
- .4 Rod electrodes, copper clad steel, 21mm diameter, 3m long.
- .5 Clamps for grounding of conductor, size as required to grounding electrodes.
- .6 Copper crimp type compression connectors (cable to cable, cable to ground rod) long barrel, one or two hole as space permits.
- 2.2 MANUFACTURERS .1 Acceptable manufacturers: FCI - Burndy Corporation, Erico Inc., Thomas & Betts, Ilsco.
-

PART 3 - EXECUTION

3.1 INSTALLATION
GENERAL

- .1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including conductors, connectors, accessories as indicated to conform to requirements of local authority having jurisdiction over installation.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .5 Soldered joints not permitted.
- .6 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .7 Make buried connections, and connections to electrodes, using copper welding by thermit process or inspectable copper, crimp type and compression connectors.
- .8 Provide an insulated copper bonding conductor in all conduit runs. Size bonding conductor per the Canadian Electrical Code (minimum size #12 AWG).

3.2 ELECTRODES

- .1 Bond separate, multiple electrodes together.
- .2 Use copper conductors, size as indicated, for connections to electrodes.
- .3 Install grounding triad near the electrical service entrance and connect to electrical grounding system with copper conductor, size as indicated on the drawings.

3.3 SYSTEM AND
CIRCUIT GROUNDING

- .1 Install system and circuit grounding connections to neutral of secondary systems.
-

3.4 EQUIPMENT
GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to, the following list: Service equipment, transformers, generators, pipe systems, frames of motors, starters, control panels and distribution panels.

3.5 FIELD QUALITY
CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of the Consultant and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault protection during tests.

PART 1 - GENERAL

1.1 NOT APPLICABLE .1 Not applicable.

PART 2 - PRODUCT

2.1 SUPPORT CHANNELS .1 U shape, size 41 mm x 41 mm, 2.7 mm thick, surface mounted, suspended or set in poured concrete walls and ceilings unless otherwise indicated.

.2 Standard rolled structural steel shapes and plates or prefabricated structural systems.

.3 Unless otherwise indicated, use hot dipped galvanized steel (after fabrication).

.4 Use 316 stainless steel outside, in wet and corrosive areas, and in electrically hazardous areas.

2.2 CABLE TIES .1 Nylon flame retardent, low smoke cable tie, size as required.

.2 Nylon flame retardant, low smoke cable tie mounting bracket. Mechanical fastening type only; adhesive mounts not acceptable.

.3 The use of cable ties for supporting purposes is not permitted. Cable ties can only be used to hold various system cables in place.

PART 3 - EXECUTION

3.1 INSTALLATION .1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors or nylon shields.

.2 Secure equipment to poured concrete with expandable inserts.

3.1 INSTALLATION
(Cont'd)

- .3 Secure equipment to hollow masonry walls with stainless steel toggle bolts.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole straps for conduits and cables larger than 50 mm.
 - .3 Conduit straps to match conduits in material and finish. Cable straps to be galvanized steel or stainless steel.
- .6 Suspended support systems for horizontal runs.
 - .1 Support individual cable and conduit runs with minimum 12 mm dia. continuously threaded rods and spring clips.
 - .2 Support two (2) or more cables and conduits on channels supported by minimum 12 mm dia threaded rod hangers where direct fastening to building construction is impractical.
 - .3 Continuously threaded rods shall be zinc plated steel or stainless steel to match supporting hardware.
- .7 For surface mounting of two or more conduits and cable, use support channels spaced in accordance with the Canadian Electrical Code (maximum 1.5m spacing).
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Provide adequate support for conduits and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure conduits or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

3.1 INSTALLATION
(Cont'd)

- .12 Provide fastenings and supports as required for each type of equipment, cables and conduits, and in accordance with manufacturer's installation recommendations.
- .13 Provide hot dipped galvanized or stainless steel beam clamps to secure conduits to exposed steel work.
- .14 Various suspended types of junction, pull and/or outlet boxes as well as conduits, are to be supported with minimum size 12 mm threaded rod, nuts and flat washers. Secure threaded rods to boxes with one flat washer and nut installed on both sides of box.
 - .1 One (1) rod required for all type boxes sized 150 mm x 150 mm and smaller.
 - .2 Two (2) rods required for boxes sized 200 mm x 200 mm and larger, up to and including those sized 300 mm x 300 mm.
 - .3 Minimum of four (4) rods required for all boxes sized larger than 300 mm x 300 mm.
 - .4 Cut-off all excess rod within 12 mm of channel bottom.
- .15 In addition to C.E.C. minimum conduit spacing requirements, all suspended conduit runs containing horizontal or vertical elbows are to have one additional support rod installed not greater than 300 mm and mid point of "all" 90° bends. Maximum spacings between conduit support channels will be as dictated by smallest size conduit(s) being supported and/or secured to same.
- .16 Where galvanized steel supports are exposed to moisture, touch-up all field cut surfaces with galvanizing paint.
- .17 Provide isolation pads between dis-similar metals where required.
- .18 Coordinate the location of electrical support systems with other trades before installation.

PART 1 - GENERAL

- 1.1 SUBMITTALS .1 Submit shop drawings, and product data in accordance with Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 JUNCTION AND PULL BOXES .1 General: Provide outlet, tap, junction, pull and floor boxes with screw-fastened covers. Provide junction and pull boxes longer than 500mm (20") in any dimension complete with continuously hinged cover.
- .2 Tap, Junction and Pull Boxes: Provide boxes constructed of welded and galvanized sheet steel, of sizes required by Canadian Electrical Code. Use 14 USS gauge metal on boxes with no dimension of 600 mm (24") or more, except use 10-gauge boxes with any dimension of 900 mm (36") or more.
- .3 Dusttight boxes: In dry process or mechanical rooms, provide NEMA type 12 boxes (painted steel) with clamped, threaded or screw fastened covers.
- .4 Watertight Boxes: In damp, wet and outdoor locations, provide NEMA Type 4X water-tight boxes with clamped, threaded or bolted covers. Boxes shall be painted steel, stainless steel (316SS) or copper free cast aluminum boxes. PVC boxes may be used in areas where rigid PVC conduit is installed.
- .5 Hazardous Rated Boxes:
.1 Boxes must be suitable for the hazardous classification as noted on the drawings.
.2 Boxes must be cast ferrous metal boxes with threaded connection for use with threaded galvanized steel conduit.
.3 Boxes must be copper free cast aluminum boxes with threaded connections for use with threaded aluminum conduit.
-

PART 3 - EXECUTION

3.1 CABINETS,
JUNCTION AND PULL
BOXES

- .1 Only main junction and pull boxes are indicated on the drawings. Provide boxes to suit field conditions and where required by the Canadian Electrical Code.
- .2 Install junction and pull boxes in inconspicuous but accessible locations.
- .3 Mount cabinets with top not higher than 2m above finished floor.
- .4 Provide all required mounting hardware.
- .5 Junction or outlet boxes feeding a maximum of two (2) fixture drops must not be sized smaller than 100mm square.
- .6 Concealed boxes located in the ceiling spaces above suspended type ceilings are not to be installed greater than 762mm above the finished ceiling elevation.
- .7 Junction boxes larger than 150mm x 150mm used in branch circuit wiring are to be complete with bonding terminal stripes.
- .8 Bond all pull boxes with bonding conductor.

3.2 IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00.

PART 1 - GENERAL

1.1 NOT APPLICABLE .1 Not applicable

PART 2 - PRODUCTS

- 2.1 OUTLET AND CONDUIT BOXES
- .1 General:
 - .1 Size boxes in accordance with CSA C22.1.
 - .2 100 mm square or larger outlet boxes as required for special devices.
 - .3 Gang boxes where wiring devices are grouped.
 - .4 Blank cover plates for boxes without wiring devices.
 - .5 Combination boxes with barriers where outlets for more than one system are grouped.
 - .2 Sheet steel outlet boxes:
 - .1 Electro-galvanized steel single and multi-gang flush device boxes for flush installation, minimum size 75 x 50 x 38 mm or as indicated. 100 mm square outlet boxes when more than one conduit enters one side.
 - .2 100 mm square or octagonal outlet boxes for lighting fixture outlets.
 - .3 Masonry boxes: electro-galvanized steel masonry single and multi-gang boxes for devices flush mounted in exposed block walls.
 - .4 Concrete boxes: electro-galvanized steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.
 - .5 Surface mounted outlet boxes:
 - .1 Cast FS or FD copper free aluminum or ferrous alloy boxes (to match conduit material) with factory threaded hubs and mounting feet for surface wiring of switches, receptacles, thermostats, etc.
 - .2 NEMA 4X PVC outlet boxes in areas where PVC conduit is to be used.
 - .6 Explosion proof outlet boxes:
-

2.1 OUTLET AND
CONDUIT BOXES
(Cont'd)

- .6 (Cont'd)
- .1 Surface mounted, single gang, cast aluminum outlet box with factory threaded hubs, rated for installation in the hazardous area classification as noted on the drawings.
 - .2 Confirm the outlet box and device are compatible and that the required hazardous rating is maintained.

2.2 FITTINGS -
GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of foreign materials.
- .3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes. Use watertight bushings and cable connectors for all cable/conduit terminations in process control cabinets and NEMA 3R/4/4X pull/junction boxes.

PART 3 - EXECUTION

3.1 OUTLET BOX, AND
CONDUIT BOX
INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction materials.
- .3 Provide correct size of openings in boxes for conduit and armoured cable connections. Reducing washers not allowed.
- .4 Recess outlet boxes in finished areas and on exterior walls.

PART 1 - GENERAL

1.1 LOCATION OF CONDUIT .1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

1.2 RELATED WORK .1 Section 26 05 29 - Fastenings and Supports.
.2 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

1.3 REFERENCES .1 CAN/CSA-C22.2 No. 18.1-13, Outlet Boxes, Conduit Boxes and Fittings and Associated Hardware.
.2 CSA-C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.
.3 CSA C22.2 No. 45.2-2008 (R2013), Electrical Rigid Metal Conduit - Aluminium.
.4 CSA C22.2 No. 56-2013, Flexible Metal Conduit and and Liquid Tight Flexible Metal Conduit.

PART 2 - PRODUCTS

2.1 CONDUITS .1 Rigid aluminum threaded conduit, fittings and connectors: to CSA C22.2 No. 45.2.
.2 Rigid PVC conduit, fittings and connectors: to CSA C22.2 No. 211.2.
.3 Flexible aluminum conduit and liquid-tight flexible metal conduit: to CSA C22.2 No. 56.
.4 Minimum power and control/instrumentation conduit size for all areas: 21mm.
.5 Rigid PVC conduit to be FT4 rated.

- 2.2 CONDUIT FASTENINGS
- .1 One hole conduit straps to secure surface conduits 50 mm and smaller. Two hole conduit straps for conduits larger than 50 mm.
 - .2 Heavy duty pipe clamps (with adjustable saddle) to secure conduits to support channels.
 - .3 Refer to specification Section 26 05 29 for suspended and surface support systems for conduits.
 - .4 Finish and material for conduit fastenings to match conduit.
 - .5 Provide isolators between dis-similar metals as required.

- 2.3 CONDUIT FITTINGS
- .1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.
 - .2 Factory "ells" where 90° bends are required for 25 mm and larger conduits.
 - .3 Cast type EYS and EYD type sealing fittings with factory threaded hubs and rated for installation in the hazardous areas as noted on the drawings.
 - .1 Acceptable Manufacturers: Appleton, Crouse-Hinds or Killark.

- 2.4 EXPANSION FITTINGS FOR RIGID CONDUIT
- .1 Weatherproof expansion fittings with internal bonding assembly suitable for linear expansion as required.
 - .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection in all directions.
 - .3 Weatherproof expansion fittings for linear expansion at entry to building as required.
 - .4 Provide expansion fittings at exit point (above-ground) of all underground services, and where indicated on the drawings.

- 2.5 FISH CORD
- .1 Polypropylene.
-

PART 3 - EXECUTION

3.1 CONDUIT
INSTALLATION

- .1 General:
- .1 Use rigid aluminum threaded conduit unless otherwise indicated.
 - .2 Use rigid PVC conduit for all direct buried underground services: minimum size 27mm diameter.
 - .3 Rigid PVC conduit is also permitted in the Process Building where not subjected to mechanical damage.
 - .4 Transition from rigid PVC conduit to rigid aluminum conduit below grade.
 - .5 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
 - .6 In finished areas, conceal conduits. In all other areas, conduits may be surface mounted or concealed as determined during construction.
 - .7 In non-hazardous areas, use liquid tight flexible metal conduit for connection to vibrating equipment and instruments. In Zone 1/Zone 2 hazardous areas, use explosion-proof flexible couplings for connections to vibrating equipment and all instruments.
 - .8 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
 - .9 Mechanically bend metallic conduit over 21 mm dia.
 - .10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
 - .11 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.
 - .12 Dry conduits out before installing wire.
 - .13 Provide minimum 300 mm spacing between instrumentation/control conduits and 600V power conduits. Where possible, instrumentation control conduits to cross at right angles to 600V power conduits.
 - .14 Install conduit sealing fittings in hazardous areas in accordance with Canadian Electrical Code requirements. Fill with compound. Seal all conduit leaving a hazardous area using an approved sealing fitting when conduit is continuous.
 - .15 Drawings do not show all required unions. Unions shall be installed to facilitate removal of equipment. Where seals are installed, install the unions between the equipment and the seal.
-

- 3.1 CONDUIT
INSTALLATION
(Cont'd)
- .1 (Cont'd)
 - .16 Install conduits to prevent low pockets where moisture can accumulate. Install a combination breather and drain fitting at the lowest point of each above-grade conduit system, which is unbroken by sealing fittings on other obstructions.
 - .2 Surface conduits:
 - .1 Run parallel or perpendicular to building lines.
 - .2 Group conduits wherever possible on suspended or surface channels.
 - .3 Do not pass conduits through structural members except as indicated.
 - .4 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum 25 mm at crossovers.
 - .5 Fasten to flutes of metal roof deck when practical.
 - .6 Do not run conduits where they obstruct lifting devices such as monorails, cranes and hoists.
 - .3 Concealed conduits:
 - .1 Do not install horizontal runs in masonry walls.
 - .2 Do not install conduits in concrete toppings.
 - .3 Run parallel or perpendicular to building lines.
 - .4 Conduits underground: slope conduits to provide drainage.
 - .5 Supply and install pull string in each spare conduit. Cap and seal conduit at each end.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Excavating, Trenching and Backfilling: Section 31 23 10.
 - .2 Direct Buried Underground Cable Ducts: Section 33 65 76.

PART 2 - PRODUCTS

- 2.1 CABLE PROTECTION
- .1 Protection materials and methods as indicated on drawings.

PART 3 - EXECUTION

- 3.1 CABLE INSTALLATION IN DUCTS
- .1 Install cables as indicated in ducts.
 - .2 Do not pull spliced cables inside ducts.
 - .3 Install multiple cables in duct simultaneously.
 - .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
 - .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

- 3.2 FIELD QUALITY CONTROL
- .1 Perform tests in accordance with Section 26 05 00.
 - .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
 - .3 Check phase rotation and identify each phase conductor of each feeder.
-

3.2 FIELD QUALITY CONTROL
(Cont'd)

- .4 Check each feeder for continuity, short circuits and grounds. Confirm resistance to ground of circuits is not less than 50 megohms.
- .5 Pre-acceptance tests:
 - .1 After installing cable but before terminating, perform insulation resistance test with megger on each phase conductor.
 - .2 Check insulation resistance after each termination to ensure that cable system is ready for acceptance testing.
- .6 Remove and replace entire length of cable if cable fails to meet any of test criteria.

PART 1 - GENERAL

- 1.1 SHOP DRAWINGS
AND PRODUCT DATA
- .1 Submit shop drawings in accordance with Section 01 33 00.
 - .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

- 1.2 OPERATIONS AND
MAINTENANCE DATA
- .1 Provide operations and maintenance data for panelboards for incorporation in to operation and maintenance manual.
 - .2 Include panel schedules.

PART 2 - PRODUCTS

- 2.1 PANELBOARDS
- .1 Panelboard:
 - .1 Install circuit breakers in panelboards before shipment.
 - .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
 - .2 Service-entrance rated.
 - .3 Bus and breakers rated for the interrupting capacity (momentary rms symmetrical) as indicated on the drawings.
 - .4 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
 - .5 Panelboard: mains, number of circuits, and number and size of branch circuit breakers as indicated on the drawings.
 - .6 Two keys for each panelboard and key panelboards alike.
-

2.1 PANELBOARDS
(Cont'd)

- .7 Tin-plated, copper busbars with neutral of same ampere rating as mains.
- .8 Mains: suitable for bolt-on breakers.
- .9 Trim with concealed front bolts and hinges.
- .10 Trim and door finish: baked grey enamel.
- .11 Provide panelboard complete with NEMA 12 enclosure.

2.2 BREAKERS

- .1 Breakers: as specified in Section 26 28 21.
- .2 Bolt-on breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Lock-on devices for 10 % of 15 to 30 A breakers installed as indicated. Turn over unused lock-on devices to Owner.

2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00.
- .2 Nameplate for each panelboard size 9 engraved.
- .3 Nameplate for each circuit in distribution panelboards size 2 engraved.

2.4 ACCEPTABLE MANUFACTURERS

- .1 Cutler-Hammer, Square D, Siemens.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Locate panelboard as indicated and surface mount securely, plumb, true and square, to adjoining surfaces.
 - .2 Connect panelboard to source transformer or circuit breaker as indicated.
 - .3 Connect loads to circuits.
-

- 3.1 INSTALLATION
(Cont'd)
- .4 Connect neutral conductors to common neutral bus with respective neutral identified.
 - .5 Install type-written panel schedule in new panelboards.

PART 1 - GENERAL

- 1.1 SUBMITTALS .1 Submit shop drawings, and product data in accordance with Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 SWITCHES .1 Heavy duty, specification Grade, 20 A, 120 V, single pole, switches with the following features:
.1 Terminal holes approved for No. 10 AWG wire.
.2 Silver alloy contacts.
.3 Urea or melamine molding for parts subject to carbon tracking.
.4 Suitable for back and side wiring.
.5 Ivory nylon, heavy duty toggle.
.6 Integral ground terminal.
.7 Acceptable manufacturers:
.1 Copper Wiring Devices, Leviton, Hubbell, Pass & Seymour
- .2 Toggle operated fully rated for lamps, and up to 80% of rated capacity of motor loads.
- .3 Switches of one manufacturer (hazardous and non-hazardous) throughout project.

- 2.2 RECEPTACLES .1 Design R1:
.1 Heavy duty, specification grade, duplex ground fault circuit interrupter (GFCI) receptacles, CSA type 5-15R, 125V, 15A, u-ground, with indicator light, test trip function, ivory colour and maximum trip threshold of 5 mA.
.2 Acceptable Manufacturers: Hubbell, Pass & Seymour, Cooper Wiring Devices, Leviton.
- .2 Use the receptacles of one manufacturer throughout project.

- 2.3 COVER PLATES .1 Cover plates for wiring devices.

- 2.3 COVER PLATES
(Cont'd)
- .2 Cover plates from one manufacturer throughout project.
 - .3 Electrogalvanized or cast cover plates with gaskets for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
 - .4 Weatherproof coverplates for exterior devices or where indicated.

PART 3 - EXECUTION

- 3.1 SWITCH, RECEPTACLE, AND COVER PLATE INSTALLATION
- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Mount toggle switches at height specified in these Specifications or as indicated.
 - .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height specified in these Specifications or as indicated.
 - .3 "Daisy-Chain" or looping through of conductors from one device to another is not acceptable. Provide separate pig-tail conductor leads for final termination to each receptacle.
 - .4 Cover plates:
 - .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 CAN/CSA C22.2 No. 248.8-11, Low Voltage Fuses - Part 8 Class J fuses.
 - .2 CAN/CSA C22.2 No. 248.4-00(R2015), Low Voltage Fuses - Part 4: Class CC fuses.
- 1.2 SHOP DRAWINGS AND PRODUCT DATA
- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
- 1.3 MAINTENANCE MATERIALS
- .1 Provide three (3) spare fuses of each type and size.
- 1.4 DELIVERY AND STORAGE
- .1 Ship fuses in original containers.
 - .2 Do not ship fuses installed.
 - .3 Store fuses in original containers in moisture free location.

PART 2 - PRODUCTS

- 2.1 FUSES GENERAL
- .1 Fuses: provide the product of one manufacturer throughout the Work.
 - .2 Low voltage fuses, types as specified, shall be CSA certified in accordance with CSA Standard C22.2 No. 248.
- 2.2 FUSE TYPES
- .1 Fuses: high rupturing capacity (HRC) type, minimum 200kA interrupting rating (momentary RMS symmetrical).
 - .2 Class J:
-

2.2 FUSE TYPES

(Cont'd)

- .2 (Cont'd)
- .1 Fuses rated 1 to 600 amperes, 600 Vac, shall be CSA certified Class J in accordance with Standard C22.2 No. 248.8.
 - .2 Where a time delay characteristic is required, fuses shall carry 500% of their ampere rating for not less than 10 seconds and shall be clearly labeled "time delay".
- .3 Class CC:
- .1 Fuses rated 1 to 30 amperes, 600 Vac, shall be CSA certified Class CC in accordance with Standard C22.2 No. 248.4.
 - .2 Where a time delay characteristic is required, fuses shall carry 200% of their ampere rating for not less than 12 seconds.
- .4 Standard of acceptance:
- .1 Class J: Mersen type A4J (non-time delay) and AJT (time delay).
 - .2 Class CC: Mersen type ATMR (non-time delay) and ATDR (time delay) and ATQR (time delay).
- .5 Acceptable manufacturers:
- .1 Mersen.
 - .2 Bussmann.
 - .3 Littelfuse.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Confirm correct fuses are fitted to physically matched mounting devices.
- .3 Confirm correct fuses fitted to assigned electrical circuit.
- .4 Confirm fuse size is correctly identified on equipment.
- .5 For feeder circuit fuses, use fast acting Class J fuses unless otherwise noted.

3.1 INSTALLATION
(Cont'd)

- .6 For full voltage non-reversing motor starters, full voltage reversing motor starters, full voltage multi-speed motor starters and transformers, use time delay Class J fuses.

- .7 For 600Vac control circuits, use Class CC type fuses. Use time delay Class CC fuses upstream of control transformers and solenoids.

PART 1 - GENERAL

- 1.1 SHOP DRAWINGS AND PRODUCT DATA .1 Submit shop drawings and product data in accordance with Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 BREAKERS GENERAL
- .1 Bolt-on moulded case circuit breaker, quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
 - .2 Common trip breakers: with single handle for multiple applications.
 - .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 5 to 10 x current rating.
 - .4 Circuit breakers with interchangeable trips as indicated.
 - .5 Circuit breakers to have interrupting rating (momentary RMS symmetrical) equal to or greater than associated panelboard or as indicated.
- 2.2 THERMAL MAGNETIC BREAKERS
- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping.
 - .2 Provide ground fault interrupter type for circuits so marked.
- 2.3 MANUFACTURERS .1 Acceptable manufacturers: Cutler-Hammer, Square D, Siemens.
-

PART 3 - EXECUTION

3.1 INSTALLATION .1 Install circuit breakers as indicated before shipment.

PART 1 - GENERAL

- 1.1 GENERAL .1 This section pertains only to the electrical connection of motors.

PART 2 - PRODUCTS

- 2.1 MOTORS .1 Motors are supplied with associated mechanical, and process equipment.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Install wiring, flexible connections and grounding.
- .2 Terminate wiring as per Section 26 05 20. Alternately, use a CSA approved motor lead pigtail splice kit.
- .3 Use liquid tight flexible conduit for connections to motors.
- .4 Check rotation before coupling to driven equipment.
- .5 Confirm electrical installation does not interfere with rotation, operation or maintenance of equipment.

PART 1 - GENERAL

1.1 REFERENCES

- .1 ANSI C82.11-2011, Specifications for High Frequency Fluorescent Lamp Ballasts.
- .2 SCTE 81-2012, Surge Withstand Test Procedure.
- .3 CAN/CSA-C 654-2014 Fluorescent Lamp Ballast Efficiency Measurements.
- .4 FCC CFR47, USA Federal Communications Commission Frequency Allocations and Radio Treaty Matters; General Rules and Regulations.
- .5 IEEE C62.45-02, IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage (1000V or less) AC Power circuits.
- .6 IESNA-RP7-2004, American National Standard - Practice for Industrial Lighting.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
- .2 Submit shop drawings for the following:
 - .1 Luminaire.
 - .2 Lamp for each luminaire type.
 - .3 Ballast for each luminaire type.
- .3 Shop Drawings:
 - .1 Shop drawings to clearly indicate the following:
 - .1 Luminaire ID number as identified in contract documents.
 - .2 Fixture specification as identified in Part 2.
 - .3 Lamp specification as identified in Part 2.
 - .4 Ballast specification as identified in Part 2.
 - .5 Photometric data for each luminaire type.
- .4 Catalogue cuts lacking sufficient detail to indicate compliance with Contract documents will not be acceptable.

1.2 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .5 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant. Photometric data to include:
- .1 VCP Table, spacing criterion;
 - .2 Total input watts;
 - .3 Candlepower summary, candela distribution, zonal lumen summary;
 - .4 Luminaire efficiency, C.I.E. type, coefficient of utilization;
 - .5 Lamp type;
 - .6 Lumen ratings;and
 - .7 Summary in accordance with IES procedures.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 All T8 lamps and ballasts must be high performance type and eligible for Efficiency Nova Scotia's point-of-sale incentive program.

2.2 LAMPS

- .1 Linear fluorescent lamps

Lamp Type	Wattage	Base	Initial Lumens	Rated Life h	Colour Temp	CRI	Additional Info
T8	32W	MedBipin	2950	20,000	3500K	85	--

2.3 BALLASTS

- .1 Fluorescent Electronic Programmed Rapid Start ballast:
- .1 Performance requirements:
 - .1 Independent Lamp Operation (ILO) for Rapid Start ballasts allowing remaining lamps(s) to maintain full light output when one or more lamps fail.
 - .2 Auto restart circuitry in order to restart lamps without resetting power.
 - .3 Operate from 60 Hz input source of 120V, 277V or 347V as applicable with sustained variations of +/- 10% voltage and frequency with no damage to the ballast.

2.3 BALLASTS
(Cont'd)

.1 (Cont'd)

.1 (Cont'd)

.4 High frequency electronic type and operate lamps at a frequency between 20 kHz and 30 kHz or above 42 kHz to avoid interference with infrared devices and eliminate visible flicker.

.5 Power factor greater than 0.98 for primary lamp.

.6 Minimum ballast factor of 9.85 for primary lamp.

.7 Lamp current crest factor of 1.7 or less in accordance with lamp manufacturer recommendations.

.8 Total harmonic distortion (THD) of less than 10% when operated at nominal line voltage with primary lamp.

.9 Class A sound rating for all 4' (1200mm) lamps and smaller.

.10 Minimum starting temperature of -18C (0F).

.11 Ability to tolerate sustained open circuit and short circuit output conditions without damage.

.12 Polychlorinated Biphenyl (PCB)free.

.2 Regulatory requirements:

.1 Underwriters Laboratories (UL) listed, Class P and Type 1 Outdoor; and Canadian Standards Association (CSA) certified.

.2 Meet or exceed ANSI C62.41 Category A for Transient protection.

.3 Meet or exceed ANSI C82.11 where applicable.

.4 Meet or exceed the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

.5 Ballast must meet or exceed the requirements of CSA Standard C654 for ballast efficiency.

.6 Provide ballast with integral leads color coded per ANSI C82.11.

.3 Warranty:

.1 Ballast to carry a five-year warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a minimum case temperature of 70C.

2.4 LUMINAIRES

.1 As indicated on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do not scale electrical drawings for exact location of luminaires. Coordinate installation with all other services.
- .2 Connect luminaires to lighting circuits as indicated.
- .3 Install each luminaire properly and safely.
- .4 For luminaires applied to a surface mounting outlet box, utilize a finishing ring.
- .5 Install a separate "fixture drop" to each lighting fixture from a junction box located in the ceiling space.
- .6 Support luminaires independently and from the building structure.
- .7 Align luminaires mounted individually parallel or perpendicular to building grid lines, or as indicated.
- .8 Provide 5% of the total quantity of each lamp type as spares, to a minimum of five (5) lamps.

3.2 LUMINAIRE
CLEANING

- .1 Clean all luminaires one (1) week prior to Substantial Completion.
- .2 Replace blemished, damaged, or unsatisfactory luminaries as directed.

3.3 MAINTENANCE

- .1 Obtain from the supplying lighting manufacturers, for each type of luminaire, a recommended maintenance manual including:
 - .1 Tools required.
 - .2 Types of cleaners to be used.
 - .3 Replacement parts identification lists.
 - .4 Final, as-built shop drawings.

PART 1 - GENERAL

- 1.1 SHOP DRAWINGS
AND PRODUCT DATA
- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
 - .2 Data to indicate system components, mounting method, source of power and special attachments.

PART 2 - PRODUCTS

- 2.1 BATTERY UNIT-
TYPE EML1
- .1 As indicated on drawings.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install unit equipment as indicated.
 - .2 Direct heads as indicated.
 - .3 Make connections.
 - .4 Test and verify operation of units upon loss and restoration of normal ac power. Verify 30 minute battery life upon loss of power.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section and its associated drawings specifies the requirements for the supply, calibration, installation, cabling, termination, testing and commissioning of the instrumentation and controls equipment.
- .2 The Work also includes the following:
- .1 Supply, calibrate, store, install, cable, terminate, test and commission the new instrumentation and controls equipment as identified on the drawings and specified herein.
- .2 Supply and install termination junction boxes as indicated on the drawings and specified herein.
- .3 Install and terminate process equipment specified in other divisions. Refer to the vendor shop drawings for the instrumentation and controls equipment installation and termination details.
- .4 Assist the process equipment vendors as necessary during testing and commissioning of the new wastewater treatment system and associated controls and instrumentation.
- 1.2 RELATED WORK .1 Electrical - General Requirements: Section 26 05 00
- .2 Packaged Wastewater Treatment Facility: Section 44 42 11.
- 1.3 REFERENCES .1 Carry out the Work under this section in accordance with all applicable Federal, Provincial, Municipal and other laws, ordinances and with the latest edition of the following standards which shall be deemed to be and form part of this specification:
- .1 American Society of Mechanical Engineers.
- .2 Institute of Electrical and Electronic Engineers.
- .3 American Society for Testing Materials.
- .4 Manufacturers Standardization Society.
- .5 Canadian Standards Association.
- .6 Instrument Society of America.
- .7 Canadian Electrical Code.
-

- 1.3 REFERENCES
(Cont'd)
- .2 In the event of a conflict between the above mentioned standards, this specification, or the attached drawings, notify the Consultant who will then advise on which standard is to be followed.
 - .3 Have all Instrumentation works (Instrumentation mounting, tubing, cabling, terminating, calibration and commissioning) carried out by certified inter-provincial ticketed Instrument Tradesmen. Include these services in the Contract Price.
- 1.4 SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00. Have shop drawings reviewed and approved by the Consultant before ordering any equipment.

PART 2 - PRODUCT

- 2.1 TERMINATION
JUNCTION BOXES
- .1 Generally, instrumentation and control cables will run directly from the field device to the associated PLC/RTU cabinet. Where junction boxes are indicated, or otherwise deemed necessary, provide as follows:
 - .1 Termination junction boxes must be NEMA 4X (stainless steel) for exterior applications or in Process areas. In mechanical rooms, all termination junction boxes must be NEMA 12 (steel).
 - .2 All termination junction boxes to have a pre-drilled and tapped copper ground bar and to be provided with a grounding lug for a #6 AWG external ground connection.
 - .3 Terminal blocks must be rated for at least 600V, 32A, minimum of 6mm wide, capable of accepting a 10 AWG conductor size, DIN rail mounted, complete with white marking tags with black lettering. The standard of acceptance is Weidmuller WDU4, or approved equivalent.
 - .4 Termination Junction Boxes must be adequately sized by the Supplier to accommodate the required hardware, terminal blocks, etc., as well as the number of cables to be glanded (bottom entry).
 - .5 Provide spare terminals in minimum quantities of 20% of used terminals of any one (1) strip.
 - .6 Wire analog and digital I/O signals to separate terminals strips and separate by a barrier.
 - .7 Provide junction boxes with hinged covers.
-

2.1 TERMINATION
JUNCTION BOXES
(Cont'd)

- .1 (Cont'd)
- .8 All junction box hardware (hinges, latches, etc.) must be 316 SS. Provide all panels and junction boxes complete with a back mounting plate.
- .9 Individually label all termination junction boxes with a lamicaid tag on the outside of the door and include the cabinet tag number. Nameplates to have a white background with black undercut lettering (316 SS screw mounted). Minimum lettering size to be 13mm.
- .10 Arrange terminal blocks so that no more than two (2) wires are terminated on any one (1) terminal block (including field wiring). The use of "wire jumpers" between terminal blocks will not be permitted. Only terminal block vendor approved "cross-connection systems" can be used for cross wiring between terminal blocks.

2.2 INSTRUMENTATION
CABLING/WIRING

- .1 24 Vdc instrumentation signal cables to be single or multi-paired (or triad), individually and overall shielded, #16 gauge copper conductors, 600V, XLPE insulation, with overall PVC jacket.
- .2 120 Vac instrumentation digital control cables to be multiconductor industrial control cable, #14 or #16 gauge copper conductors, 600V, RW90 insulation with overall PVC jacket.
- .3 Handle, install and support cables in accordance with manufacturer's guidelines.
- .4 Ground shields for 24 VDC twisted pair and triad Instrumentation signal cables on the end supplying the loop power, and tape on the opposite end. All shield grounds must be continuous through any intermediate field junction boxes (individually terminated).
- .5 Ground 120 VAC multiconductor control cable grounds on both ends. When run through intermediate junction boxes, 120 VAC cable grounds are brought to a common junction box ground bar, and connected to earth ground via the junction box ground.
- .6 Ground control panels and termination junction boxes to nearest ground using a #6 green copper grounding conductor in conduit.

2.2 INSTRUMENTATION
CABLING/WIRING
(Cont'd)

- .7 All cables and conduits must enter field instruments, control panels and junction boxes from the bottom only in process areas, wet/damp areas and outside. Use grounding bushings when terminating in non-conductive boxes or plates.
- .8 Identify conductors using wire markers (Weidmuller PT transparent sleeves with TM-I labels, or approved equivalent). Mark conductors with their corresponding instrument tag number and instrument terminal block number (ex: HS3004/C, where HS3004 is the Instrument tag number, and "C" is the Instrument terminal block number the conductor is terminated on). This "conductor identifier" must remain the same through any intermediate junction boxes, etc.
- .9 Clearly identify all cables at both ends with its cable number using flexible PVC slip-on wire markers on a carrier strip and fastened to the cable using chemical resistant ty-raps (Electrovert K-Markers, or approved equivalent). Provide labelling at all cable terminal points and on the armour at the point of junction box/instrument entry.
- .10 Leave conductors being terminated within a junction box/control panel long enough to be removed from its assigned terminal block and reassigned to anywhere within the junction box/control panel.
- .11 Coil spare conductors of a cable together inside its associated junction box/control panel and clearly identified with the cable number (ex: Spare-JB3000), unless indicated to be terminated on spare terminals. Leave adequate length to run the spare conductors anywhere within the junction box/control panel. Terminate spare conductors where identified.
- .12 Fit stranded conductors with vinyl insulated wire end ferrules when terminating to terminal blocks, and vinyl insulated locking fork terminal connectors when terminating to screw terminals.

PART 3 - EXECUTION

3.1 TERMINATION
JUNCTION BOXES

- .1 Install all termination junction boxes. The panel shop fabricator must include installation instructions for the proper handling and installation of the equipment.
- .2 Install and terminate all cables and equipment as per the drawings and the manufacturer's instructions.
- .3 Ground all cabling, patch panels, racks and equipment as per manufacturer's instructions (use min. #6).
- .4 Mount and position all equipment, etc., in such a way as to allow for easy access for maintenance purposes.
- .5 Store materials in a manner to ensure the preservation of their quality and fitness for the work, and to facilitate inspection by the Consultant at any time. Keep equipment clean and protect against damages, dirt and moisture.
- .6 The panel fabricator is to test (power-up) all panel components and auxiliary devices to confirm functionality, and verify all internal panel wiring, and conduct functionality testing in accordance with the control schematics prior to delivery to site.

3.2 INSTALLATION

- .1 Install equipment neatly and per manufacturer's instructions.
 - .2 Install all instrumentation and control equipment being supplied by, or issued to, where and as indicated on the drawings, and in accordance with the manufacturer's instructions. Manufacturer's installation instructions must be strictly adhered to.
 - .3 The Drawings indicate the extent and general arrangement of the electrical system. Exact installation locations, distances and levels will be governed by actual field conditions.
-

3.2 INSTALLATION
(Cont'd)

- .4 If any departures from the original intent of the Drawings and/or the Specifications are deemed necessary by the Contractor, submit details of such departures with Drawings is necessary, together with reasons for the departure the Consultant as soon as practical for approval. No such departure will be made without prior written consent of the Consultant.
- .5 Fabricate and erect all support brackets and mounting brackets required. Contractor supplied instruments must be purchased with all necessary mounting brackets from the instrument vendor.
- .6 Locate instruments to minimize the possibility of damage from high temperature, vibration or humidity, and shall not interfere with, or be damaged by, maintenance of other equipment. Instrument installation must also provide for easy accessibility for operation, inspection, and maintenance purposes.
- .7 Protect installed equipment against water or dirt until it is commissioned. Use clear plastic sheeting of not less than 8-mil thickness for this purpose.
- .8 Coordinate equipment delivery, storage and installation requirements with other Division package vendors.

3.3 TESTING AND
CALIBRATION
EQUIPMENT

- .1 Calibrate all test and calibration equipment to an industry recognized standard and have affixed proof of calibration along with date of next calibration.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for clearing, grubbing and disposal.
- 1.2 RELATED SECTIONS .1 Excavating, Trenching and Backfilling: Section 31 23 10
- 1.3 DEFINITIONS .1 Clearing: cutting, burning, chipping and disposal of all designated trees and brush within rights-of-way and other areas as indicated including felled trees, previously up-rooted trees, and surface debris.
- .2 Grubbing: excavation and disposal, removal of all stumps, roots, embedded timber, rock fragment, humus, rootmat and topsoil.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not applicable.

PART 3 - EXECUTION

- 3.1 GENERAL .1 Obtain permitting as required by the authorities having jurisdiction.
- .2 Comply with conditions of permits.
- .3 Do not remove trees or brush from outside limits indicated except for any tree or branch considered unsafe.
- .4 Cut trees and brush close to ground leaving no stump higher than 300mm.
- .5 Grub out stumps and roots to not less than 200mm below ground surface.
-

-
- 3.1 GENERAL
(Cont'd)
- .6 Grub out visible rock fragments and boulders, greater than 300mm in greater dimension, but less than 0.25 m3.
- 3.2 REMOVAL AND DISPOSAL
- .1 Remove cleared and grubbed material off-site unless permitted otherwise in writing.
- .2 If permitted, bury in designated areas only. Consolidate and cover with minimum 500mm thick soil and finish surface.
- .3 If permitted, burn in area designated under constant care of fire watch. Avoid surrounding vegetation, adjacent property or anything to remain.
- .4 If permitted, chip or mulch and stockpile or spread vegetation matter on-site as directed. Dispose of surplus chips off-site.
- 3.3 FINISHED
- .1 Leave ground surface in condition suitable for immediate grading operation.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Sanitary Sewer: Section 33 31 00
 - .2 Hydraulic Seeding: Section 32 92 21
- 1.2 REFERENCES
- .1 ASTM D698-2012, Standard Test Methods for Laboratory Compaction Characteristics Of Soil Using Standard Effort (12,400 FT-LBF/FT³(600 KN-M/M³)).
 - .2 ASTM C33-2013, Standard Specification for Concrete Aggregates.
- 1.3 DEFINITIONS
- .1 Unsuitable Material: all organic or other excavated material which is not suitable for use in work must be disposed of as defined by the Consultant.
 - .2 Rock: solid rock which requires drilling and blasting, wedging, sledging or barring or breaking up with power operated tools for its removal and boulders and pieces of concrete masonry exceeding one cubic metre (1m³) in volume.
 - .3 Common: materials of whatever nature, which are not included under the definition of solid rock including dense tills, hardpan and partially cemented materials which can be ripped and excavated with heavy construction equipment.
 - .4 Surplus material: excavated material not required for re-use.
- 1.4 PROTECTION OF EXISTING FEATURES
- .1 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing excavation work, notify the Consultant or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
-

1.4 PROTECTION OF
EXISTING FEATURES
(Cont'd)

- .1 (Cont'd)
- .3 Confirm locations of buried utilities by careful test excavations.
- .4 Maintain and protect from damage, water, sewer, gas, electric, telephone, process pipes and other utilities and structures encountered.
- .5 Where utility lines or structures exist in area of excavation, obtain direction of the Consultant before removing or re-routing. Advise the Consultant of existing lines in area of excavation that require removal or relocation and cost for such work.
- .6 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing surface features:
- .1 Conduct, with the Consultant, a condition survey of existing buildings, lawns, fencing, pipe racks, wires, pavement, survey bench marks and monuments which may be affected by work.
- .2 Protect existing buildings and surface features from damage while work is in progress. In event of damage, immediately make repair to approval of the Consultant.

1.5 EXISTING
CONDITIONS

- .1 Be aware that underground pipelines are located within site boundaries. Prior to starting any excavation work, review any available as-built information to identify these pipelines clearly in the field. Investigate and determine the presence of any underground utilities and repair any damage and/or pay all costs associated with damage to these existing utilities.
- .2 A Geotechnical investigation has been carried out for the Site. Geotechnical Report #034-195 dated July 14, 2016 by Conquest Engineering is available for viewing upon request. Any extrapolation or interpretation of its findings are solely at the discretion of the Contractor and the Consultant cannot be held liable for its contents or for interpretation and extrapolations made by the Contractor.
-

1.6 SUPPORT OF
EXCAVATION

- .1 Suitably slope or properly shore sides of excavations according to site conditions, all in accordance with local requirements. Provide use of support as necessary.
- .2 The choice of any method of support shall be the responsibility of the Contractor. However, drawings and calculations for the method of support selected, designed by a qualified professional engineer in accordance with the local safety requirements, are to be submitted to the Consultant for review before its use.
- .3 If it is desirable that any support, other than that which may be shown on the Drawings, be left in the excavations, then the Consultant will issue instructions accordingly.
- .4 Take every precaution against slips or falls, but if any should occur, at once make good the same. If any such slip or fall affects or may affect the stability of the permanent work, execute such remedial work as necessary, including filling up of any space left by the slip or fall with approved granular material. Submit proposed remedial work to the Consultant for review.

1.7 PERMITS

- .1 Obtain any required excavation permits for all areas to be excavated prior to starting any excavation.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Select Backfill Material: common which is free from stumps, trees, roots, sod, organics; rocks, boulders and masonry larger than 200mm in any dimension; and other deleterious materials.
- .2 Granular Materials: crushed and screened, hard, durable stone, free from clay and organic matter, and graded as follows:
 - .1 Clear stone, 28mm:

2.1 MATERIALS .2 (Cont'd)
(Cont'd)

<u>Sieve Designation (micrometre)</u>	<u>Cum. % Passing</u>
28 000	5-100
14 000	25-60
5 000	0-10

.2 Clear Stone, 80mm:

<u>Sieve Designation (micrometre)</u>	<u>Cum. % Passing</u>
80 000	100
56 000	25-60
28 000	0-5

.3 Granular Materials: crushed and screened rock or gravel, consisting of approved hard and durable stone particles, free from flat, elongated or other objectionable pieces. Gradation to be dense, uniform and as follows:

.1 Type 1:

<u>Sieve Size (micrometre)</u>	<u>Percent Passing</u>
20,000	100
14,000	50-85**
5,000	20-50
160	5-12
080	3-8*

.2 Type 2:

<u>Sieve Size (micrometre)</u>	<u>Percent Passing</u>
80,000	100
56,000	70-100
28,000	50-80
14,000	35-65
5,000	20-50
160	5-12
080	0-7*

2.1 MATERIALS

.2 (Cont'd)

* For gravel sources not classified as quarries the allowable percentage passing the 080 sieve shall be 3 to 5%.

** For gravel sources classified as quarries the allowable percentage passing the 14,000 sieve shall be 50 to 90%.

.3 ASTM C33 #7, stone (crushed):

<u>Sieve Size (mm)</u>	<u>Percent Passing</u>
19,000	100
12,500	90-100
9,500	40-70
4,750	0-15
2,360	0-5

.4 ASTM C33 #8 stone (crushed):

<u>Sieve Size (mm)</u>	<u>Percent Passing</u>
12,500	100
9,500	85-100
4,750	10-30
2,360	0-10

.4 Sand bedding: hard granular, sharp freshwater material, well-graded from coarse to fine, free of impurities, chemicals and organic matter, and graded as follows:

<u>Sieve Size (mm)</u>	<u>Cum. % Passing</u>
5.0	100
0.16	0-5

.5 Granular bedding materials: well graded, clear stone conforming to concrete aggregate as follows:

<u>Sieve Size (mm)</u>	<u>Cum. % Passing</u>
28	100
19	90-100
9.5	20-55
5	0-10
2.5	0-5

2.1 MATERIALS
(Cont'd)

- .6 Structural Fill: crushed quarry-run material, nominal size 150mm or as determined by the Consultant as conditions dictate.
- .7 Underground warning tape:
 - .1 Detectable metallic tape, 50mm wide clearly marked as follows:
 - .1 "CAUTION - BURIED SEWER LINE", colour GREEN.
 - .2 Polyethylene, 3.5 mils thick, 75mm wide, clearly marked as follows:
 - .1 "CAUTION - BURIED ELECTRICAL CONDUIT", colour RED.
 - .3 Acceptable product: Brady Identoline or approved equivalent.

PART 3 - EXECUTION

3.1 STOCKPILING

- .1 Stockpile excavated materials for re-use in areas designated by the Consultant Stockpile imported materials in manner to prevent segregation. Cover all materials to seal against rain.

3.2 SHORING AND BRACING

- .1 Construct temporary works to depths, heights and locations as approved by the Consultant.
- .2 During backfill operation:
 - .1 Unless otherwise as indicated or as directed by the Consultant, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .3 Upon completion of substructure construction:
 - .1 Remove shoring and bracing.
 - .2 Remove excess materials from site as directed by the Consultant.

3.3 EXCAVATION - GENERAL

- .1 Advise the Consultant forty-eight (48) hours before starting earthworks.

3.3 EXCAVATION -
GENERAL
(Cont'd)

- .2 Excavate in all kinds of materials including rock encountered on Site and make own computations of amounts and nature of excavation required.
- .3 Select method of excavation, support and dewatering suitable for the works. Submit proposed method to the Consultant for review.
- .4 Protect property or structures above or below ground in accordance with the Contract.
- .5 Where excavation is to be performed through pavement or concrete, cut along neat, straight lines.
- .6 Bear foundations or underside of all structures including pipe surrounds on the material as shown on the Drawings and finish all bearing surfaces to the required levels and grades.
- .7 Earth bottoms of excavations to be undisturbed soil, free from loose, soft, or organic matter. Remove any soil softened due to standing water prior to placing structures.
- .8 Excavation to greater depth than is shown on the Drawings shall be at no additional cost to the Contract, unless ordered by the Consultant. Make good trench bottom with approved granular material adequately compacted as approved by the Consultant or with concrete as may be necessary for the safety or stability of the Works.
- .9 Pile excavated material a safe distance away from sides of trench so it will not endanger personnel and the work, reduce sight distances, and obstruct roadways.
- .10 Leave existing utility controls unobstructed and accessible at all times.
- .11 Do not obstruct drainage ditches and natural watercourses.
- .12 The Consultant reserves the right to require surplus material to be placed for embanking, general grading or other improvement or use on site.

3.3 EXCAVATION -
GENERAL
(Cont'd)

- .13 Control grading so that the surface of the ground will be properly sloped to prevent water from running into excavated areas. Promptly remove any water which accumulates in excavations.

3.4 DRAINING,
PUMPING AND
THAWING

- .1 Keep excavations and trenches free of water. Control excavations to prevent surface water running into excavated areas.
- .2 Do work in connection with dewatering and supply and maintain on the work, pumps, in number and capacity sufficient to keep bottom of excavations dry and free from water so placing of pipe, manholes, and concrete will be done in the dry. Operate equipment for as long as necessary.
- .3 Dispose of water removed from excavations in a manner that will prevent injuries to public health or private property or to any operation of the work completed or under construction. Do not pump water containing silt or other material in suspension into streams or drainage courses.
- .4 All disposal of water from excavations to be done in accordance with the requirements of the local authority having jurisdiction.
- .5 Confirm sub-drains, sump holes, wells or the like required for dewatering shall not endanger the stability of the Works. On completion of the work completely backfill and consolidate excavations.

3.5 STRUCTURE
EXCAVATION

- .1 Excavate to lines, grades, dimensions and elevations shown on Drawings.

3.6 TRENCH
EXCAVATION

- .1 Trenches for piping, conduit, and related excavations must be of sufficient width and depth at all points to allow pipes to be laid, joints to be formed, and appurtenance structures to be built in a workmanlike manner, and when needed, to allow for sheeting and shoring, pumping, draining, and for removing and replacing all materials unsuitable for foundations.

3.6 TRENCH
EXCAVATION
(Cont'd)

- .2 Excavate trenches so pipe can be laid to the alignment and depth required. Excavation length to be not more than pipe length that can be laid and backfilled in one day. Brace and drain trench so workers may work safely and efficiently.
- .3 Remove organic material and soft deposits to a depth where medium dense to dense materials are encountered as designated by the Consultant.
- .4 Do not stockpile excavated materials alongside trench if the bearing soil will cause trench side failure or bottom uplift and affect pipe alignment.

3.7 UNSUITABLE
MATERIAL
EXCAVATION AND
BACKFILLING

- .1 Notify the Consultant when materials unsuitable for use in the work are encountered and remove to depth and extent as directed by the Consultant.
- .2 Backfill excavations with foundation material or selected backfill material as directed by the Consultant.
- .3 Dispose of unsuitable material off-site, at no additional cost to the Contract.

3.8 GRANULAR
BEDDING & SURROUND

- .1 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness to depth as indicated.
- .2 Shape bed true to grade to provide continuous uniform bearing surface for pipe. Do not use blocks when bedding pipe.
- .3 Shape transverse depressions in bedding as required to suit joints.
- .4 Carry bedding material across actual trench width. Mounding bedding shall not be permitted.
- .5 Compact each layer full width of bed to at least 95% of standard Proctor dry density.
- .6 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material or foundation material as directed by the Consultant.

3.8 GRANULAR
BEDDING & SURROUND
(Cont'd)

- .7 After pipe installation, place and compact bedding to haunch line of pipe. Place and compact bedding material from haunch line of pipe to top of pipe in maximum 200mm layers. Place remaining bedding material to 300mm above top of pipe before further compaction. Compact to a density of 95% of standard Proctor density as determined by ASTM D698.

3.9 BACKFILLING-
GENERAL

- .1 Do not proceed with backfilling operation until the Consultant has inspected and approved installations.
- .2 After pipelines, and structures have been built, backfill trenches and other excavated areas with materials shown on Drawings or as specified. Remove timber and debris from excavation before backfilling is commenced. Do not cover up or put out of view any work until it has been examined, measured and approved by the Consultant. If any work is covered without approval of the Consultant it must, if required, be uncovered for examination at no extra cost.

3.10 BACKFILLING
STRUCTURES

- .1 Excavation to be cleaned of trash and debris. Backfilling consists of material shown on Drawings. Place material to meet following requirements and approval of the Consultant.
- .1 Place backfill in horizontal layers not more than 300mm deep.
- .2 Compact each layer by rollers, mechanical tampers, or other suitable equipment to obtain a density of not less than 100% standard Proctor density, unless noted otherwise.
- .2 Backfilling of tanks to meet manufacturer requirements as per latest installation guidelines.

3.11 BACKFILLING
TRENCHES

- .1 Backfill trench from top of bedding to top of subgrade using materials shown on Drawings.
- .2 Place backfill in 300mm layers and compact to 95% standard Proctor density. Thoroughly compact each layer before placing next layer.

3.11 BACKFILLING TRENCHES .3 Leave surface of backfill initially high and repair settlement of trench backfilling.
(Cont'd)

3.12 MARKER TAPE .1 Place marker tape and plank in trenches above electrical conduits and pipes, where indicated.

3.13 REINSTATEMENT .1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects as directed by the Consultant.
.2 Reinststate disturbed areas to condition, elevation and thickness equal to or better than that, which existed before excavation.
.3 Clean and reinststate areas affected by work as directed by the Consultant.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for the supply and installation of chain link fences and gates.
- 1.2 RELATED WORK .1 Cast-in-Place Concrete: Section 03 30 00
- 1.3 REFERENCES .1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A90/A90M-13, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - .3 ASTM A121-13, Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - .4 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
 - .2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
 - .3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
 - .4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
 - .5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- 1.4 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
- .2 Shop Drawings to indicate: dimensions, size of components and anchorage details.
- 1.5 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling.
-

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - .1 Concrete mixes and materials: in accordance with Section 03 30 00.
 - .2 Chain-link fence fabric: to CAN/CGSB-138.1.
 - .1 Type 1, Class A, medium style, Grade 2.
 - .2 Height of fabric: as indicated.
 - .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
 - .4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.
 - .5 Tie wire fasteners: steel wire.
 - .6 Tension bar: to ASTM A653, 5 x 20mm minimum galvanized steel.
 - .7 Double gates to CAN/CGSB-138.4.
 - .8 Gate frames: to ASTM A53, galvanized steel pipe, standard weight 45mm outside diameter pipe for outside frame, 35mm outside diameter pipe for interior bracing.
 - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.
 - .2 Fasten fence fabric to gate with twisted selvage at top.
 - .3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
 - .4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.
 - .9 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy, galvanized steel, malleable or ductile cast iron.
 - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
 - .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
 - .3 Overhang tops to provide waterproof fit.
-

2.1 MATERIALS
(Cont'd)

- .9 (Cont'd)
 - .4 Projection of approximately 300mm long to project from fence at 45 degrees above horizontal.
 - .5 Turnbuckles to be drop forged.
- .10 Organic zinc rich coating: to CAN/CGSB-1.181.

2.2 FINISHES

- .1 Galvanizing:
 - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
 - .2 For pipe: 550 g/m² minimum to ASTM A90.
 - .3 For other fittings: to ASTM A123.

PART 3 - EXECUTION

3.1 GRADING

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
 - .1 Provide clearance between bottom of fence and ground surface of 50mm to 100mm.

3.2 ERECTION OF FENCE

- .1 Erect fence along lines as indicated and to CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions indicated by methods approved by the Consultant.
- .3 Space line posts 3m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not to exceed 150m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150m.
- .5 Install additional straining posts at sharp changes in grade and where directed by the Consultant.
- .6 Install corner post where change in alignment exceeds 10 degrees.
- .7 Install gate posts on both sides of gate openings.

3.2 ERECTION OF
FENCE

(Cont'd)

- .8 Install end posts at end of fence where fence ties into existing fence line.
- .9 Place concrete in post holes then embed posts into concrete to minimum 900mm depth.
 - .1 Extend concrete 50mm above ground level and slope to drain away from posts.
 - .2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
- .10 Do not install fence fabric until concrete has cured minimum of five (5) days.
- .11 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface.
 - .1 Install braces on both sides of corner and straining posts in similar manner.
- .12 Install overhang tops and caps.
- .13 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .14 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .15 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300mm intervals.
 - .1 Knuckled selvedge at bottom.
 - .2 Twisted selvedge at top.
- .16 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450mm intervals.
 - .1 Give tie wires minimum two twists.
- .17 Install barbed wire strands and clip securely to lugs of each projection.

3.3 INSTALLATION OF
GATES

- .1 Install gates in locations as indicated.

- 3.3 INSTALLATION OF GATES
(Cont'd)
- .2 Level ground between gate posts and set gate bottom approximately 100mm above ground surface.
 - .3 Determine position of centre gate rest for double gate.
 - .1 Cast gate rest in concrete as directed.
 - .2 Dome concrete above ground level to shed water.
 - .4 Install gate stops where indicated.
- 3.4 CLEANING
- .1 Clean and trim areas disturbed by operations.
 - .1 Dispose of surplus material as directed by the Consultant.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Reinstatement: Section 32 98 00

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 33 00.
- .2 Provide product data for:
- .1 Topsoil.
 - .2 Seed.
 - .3 Mulch.
 - .4 Tackifier.
- .3 Submit in writing to the Consultant four (4) days prior to commencing work:
- .1 Size of truck slurry tank in litres.
 - .2 Quantity of material to be used per tank based on size of slurry tank.
 - .3 Number of tank loads required per hectare to achieve specified slurry mixture per hectare.

1.3 SCHEDULING

- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.

1.4 DELIVERY AND STORAGE

- .1 Deliver seed in original containers showing:
- .1 Analysis of seed mixture
 - .2 Percentage of pure seed
 - .3 Year of production
 - .4 Net mass
 - .5 Date when tagged and location
 - .6 Percentage germination

1.5 TESTING

- .1 Test soil prior to seeding. Apply lime or other soil amendment at rate determined from soil sample to bring pH level to 5.5 to 7.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Topsoil:
 - .1 Friable loam, neither heavy clay nor of very light sandy nature, containing minimum 4% organic matter for clay loam, and 2% for sandy loam, to maximum 20% by volume.
 - .2 Containing no toxic elements or growth inhibiting materials.
 - .3 Free from debris, subsoil, vegetation, and stones and roots over 50 mm diameter.

- .2 Soil amendments:
 - .1 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5mm.
 - .2 Limestone:
 - .1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0mm sieve, 50% passing 0.125mm sieve.
 - .3 Fertilizer:
 - .1 Complete, commercial, with 35% soluble nitrogen.

- .3 Seed: Canada "Common No. 1" grade in accordance with Government of Canada "Seeds Act and Regulations".
 - .1 Grass seed mixture:
 - .1 40 % Creeping Red Fescue
 - .2 20 % Reubins Canada Bluegrass
 - .3 15 % Perennial Ryegrass
 - .4 15 % Birdsfoot Trefoil xx inoculated
 - .5 10 % Alsike Clover x inoculated
 - .2 In containers with original tags.

- .4 Mulch:
 - .1 Fibre: wood or wood cellulose fibre free of germination or growth-inhibiting ingredients, capable of dispersing in water to form homogenous slurry, and forming blotter- like green ground cover allowing absorption and percolation of water.

- .5 Fertilizer:

- 2.1 MATERIALS .5 (Cont'd)
 (Cont'd)
- .1 Type 1: (in slurry) complete synthetic, minimum 65% water soluble nitrogen. Ratio 1:4:4.
 - .2 Type 2: (during establishment) complete synthetic, slow release, with maximum 35% water soluble nitrogen. Ratio 2:1:1.
- .6 Tackifier: water dilutable liquid dispersion containing polyvinyl acetate terpolymer emulsion.
- .7 Water: potable, free of impurities that would inhibit germination.

- 2.2 EQUIPMENT .1 Truck:
- .1 Slurry tank: approved commercial hydraulic equipment.
 - .2 Pumps capable of maintaining continuous non-fluctuating flow of solution.

PART 3 - EXECUTION

- 3.1 WORKMANSHIP .1 Take care to prevent contamination by seeding slurry of structures, signs, fences and utilities.
- .2 Where contamination occurs, remove seeding slurry to satisfaction of, and by means approved by the Consultant.
- .3 Do not perform work under adverse field conditions such as wind speeds over 20 km/h, or on frozen ground or ground covered with snow, ice or standing water.
- .4 Perform hydraulic seeding in the spring after snow has melted.

- 3.2 PLACING TOPSOIL .1 Do not spread topsoil until subgrade has been inspected by the Consultant.
- .2 Spread topsoil in uniform layer over dry subgrade where seeding is indicated. Do not place topsoil on frozen subgrade.
-

- 3.2 PLACING TOPSOIL
(Cont'd)
- .3 Bring topsoil to finished grade.
 - .4 Apply topsoil to depth of 100 mm unless otherwise indicated.
 - .5 Fine grade topsoil to lines and elevations indicated, leaving material surface smooth and uniform with fine loose texture.
 - .6 Obtain the Consultant's approval of topsoil grade and depth before starting seeding.
- 3.3 SLURRY APPLICATION
- .1 Slurry mixture applied per 100 m².
 - .1 Seed: 2 kg.
 - .2 Mulch: 10 kg.
 - .3 Tackifier: 55 kg (if required)
 - .4 Fertilizer: 0.5 kg, Type 1, 5-20-20.
 - .5 Water: quantity as required to form slurry in accordance with manufacturer's recommendations.
 - .2 Apply seed slurry uniformly.
 - .3 Blend applications into adjacent grass, sodded areas and previous applications to form uniform surface.
 - .4 Re-shoot areas where application is not uniform.
- 3.4 ESTABLISHMENT
- .1 Perform following operations from time of seed application until final acceptance by the Consultant.
 - .1 Water seeded area as required to maintain optimum soil moisture level and to ensure germination and continued growth of grass. Control watering to prevent washouts.
 - .2 Fertilize seeded areas one month after seeding. Spread evenly and water in well. Use Type 2 fertilizer, ratio 2:1:1 at rate determined by soil test. Postpone fertilizing until following spring if application falls within four week period prior to expected end local growing season.
 - .3 Repair dead or bare spots to allow establishment of seed prior to acceptance.
-

3.5 ACCEPTANCE

- .1 Areas will be accepted by the Consultant at the end of the maintenance period provided that:
 - .1 Seeded areas are properly established.
 - .2 Area is free of bare and dead spots.
- .2 Areas seeded in the fall will be accepted the following spring one (1) month after the start of the growing season provided acceptance

3.6 MAINTENANCE
DURING WARRANTY
PERIOD

- .1 Perform following operations from time of acceptance until end of maintenance period:
 - .1 Water sodded Turfgrass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
- .2 Repair and resod dead or bare spots to satisfaction of the Consultant.
- .3 Cut grass and remove clippings that will smother grass to height as follows:
 - .1 Turfgrass Nursery Sod:
 - .1 40 mm during normal growing conditions.
 - .2 65 mm at end of growing season and during periods of high temperatures and low precipitation.
 - .2 Cut grass at two (2) week intervals or as directed by the Consultant, but at intervals so that approximately one third of growth is removed in single cut.
 - .3 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
 - .4 Eliminate weeds by mechanical means to extent acceptable to the Consultant.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Excavation, Trenching and Backfilling: Section 31 23 10
 - .2 Hydraulic Seeding: Section 32 92 19
- 1.2 MAINTENANCE
- .1 Take care and maintain all reinstated areas until final acceptance of the work.
 - .2 Repair damaged areas to the approval of the Consultant.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Granular material: Type 1 and Type 2 gravel as specified in Section 31 23 10.
 - .2 Grass surfaces: to Section 32 92 19.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 Maintain surfaces to be reinstated level with adjoining existing surfaces until final reinstatement.
- 3.2 GRAVEL SURFACES
- .1 Replace gravel in areas where existing gravel surfaces have been affected by the Works. Place gravel as shown on the drawings and compact to 98% standard Proctor density. Limits of gravel reinstatement will be as directed by the Consultant.
- 3.3 GRASS SURFACES
- .1 Repair grassed areas using the hydroseeding method to match existing.
-

3.4 MAINTENANCE
DURING WARRANTY
PERIOD

- .1 Maintain all areas reinstated throughout the Maintenance Period. Respond to requests from the Consultant to repair areas that are in dis-repair during this twelve (12) month period.

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Trenching, Backfilling and Compaction: Section 31 23 10
- 1.2 REFERENCES .1 ASTM D1599-14E1, Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings.
- .2 ASTM D2564-2012, Specification for Solvent Cements for Poly(Vinyl-Chloride) PVC Plastic Piping Systems.
- .3 ASTM D3035-15, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
- .4 ASTM F714-2013, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .5 CSA B1800 Series-2015, Plastic Non-pressure Pipe Compendium.
- 1.3 SHOP DRAWINGS .1 Provide shop drawings for all pipe, fittings, and all other items necessary for a complete installation in accordance with Section 01 33 00. Include details showing dimensions and tolerances of pipe and joint proposed.
- 1.4 QUALITY ASSURANCE .1 All materials used, manufacturing operations, finished pipes and fittings will be subject to inspection by the Consultant. Furnish all labour necessary to assist the Consultant or or inspectors to inspect materials.
- 1.5 MATERIAL CERTIFICATION .1 At least two (2) weeks prior to commencing work, submit manufacturer's test data and certification that pipe materials meet requirements of this Section.

- 1.6 MATERIAL HANDLING AND STORAGE
- .1 Handle and store pipe and fittings in such a manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore.
 - .2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.
 - .3 Store PVC pipe under opaque tarps.

PART 2 - PRODUCTS

- 2.1 GRAVITY SEWER PIPE AND FITTINGS
- .1 Polyvinyl Chloride (PVC): to CSA-B182.2, DR28, Gasketted Bell and Spigot.

- 2.2 TRANSITION COUPLINGS
- .1 Concrete to PVC: sleeve and end rings to be cast iron with epoxy coating gaskets SBR Rubber, Fasteners 304 S.S.

- 2.3 MARKER TAPE
- .1 As specified in Section 31 23 10.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Clean pipes, fittings and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.
 - .2 Provide proper implements, tools and facilities approved by the Consultant, for the safe and convenient prosecution of the work. Take every precaution to prevent foreign material from entering the pipe.

- 3.2 TRENCHING AND BACKFILL
- .1 Do trenching and backfill work in accordance with Section 31 23 10.
-

3.3 PIPE BEDDING

- .1 Place granular bedding material to details indicated or directed.
- .2 Shape bed true to grade to provide continuous uniform bearing surface for pipe exterior. Do not use blocks when bedding pipe.
- .3 Shape transverse depressions in bedding as required to make joints.
- .4 Carry granular bedding material horizontally across actual trench width. Mounding bedding material will not be permitted.
- .5 After pipe installation, place and compact bedding material to center line of pipe. Place and compact bedding material from center line of pipe to top of pipe. Place remaining bedding material to 100 mm above top of pipe before further compaction.
- .6 Compact granular bedding to 95% relative density to ASTM D4254.

3.4 PIPE LAYING

- .1 Carefully lower pipe into the trench in such a manner as to prevent damage to coatings and linings. Do not drop or dump materials into trench.
 - .2 Firmly and accurately set pipe to line and elevation on bedding material to the depth shown on the Drawings.
 - .3 Check profiles at the commencement of work. Confirm grades and depths. Any variation will be made only at the order of the Consultant. Set line of pipe by offset centreline. Set elevation by a method approved by the Consultant.
 - .4 Start laying pipe at lowest pipe and lay upgrade unless approved otherwise by the Consultant. Confirm pipe maintains a positive upward slope.
 - .5 Do not lay pipe when trench bottom is frozen or underwater or when trench conditions or weather are unsuitable.
-

- 3.4 PIPE LAYING .6 Temporarily support all pipe during assembly and
 (Cont'd)
- 3.5 PIPE JOINTING .1 Align pipes carefully before jointing.
- .2 Install gaskets to manufacturer's recommendations.
 Support pipes with hand slings or crane as required
 to minimize lateral pressure on gaskets and maintain
 concentricity until gaskets are properly positioned.
- .3 Maintain pipe joints clean and free from foreign
 materials.
- .4 Complete each joint before laying next length of
 pipe.
- .5 Apply sufficient pressure in making joints to ensure
 that joint is completed to manufacturer's
 recommendations. Minimize deflection after joint has
 been made to avoid damage.
- .6 Install mechanical joint restraint on all 45 and 90
 degree bends for pressure piping only.
- 3.6 MARKER TAPE .1 Place marker tape in trench where indicated.
- 3.7 PIPE FLUSHING .1 After installation and prior to testing, clean
 piping to remove foreign materials.
- .2 Notify the Consultant 24 hours before flushing.
- .3 Flush pipe with water through available outlets with
 sufficient flow to produce minimum velocity in main
 of 1.5 ft/s, for 10 minutes. Flush until foreign
 materials have been removed, and water is clear.
 Allow flush water to flow over land away from
 disturbed area.
- .4 Slowly open and close valves to ensure thorough
 flushing.
-

3.7 PIPE FLUSHING
(Cont'd)

.5 If satisfactory results cannot be achieved by flushing, swab pipes by approved methods and reflush.

3.8 TESTING

.1 Gravity sanitary testing:
.1 If water used for flushing or testing is obtained from a potable water supply, the potable water supply is to be continuously separated from the service being flushed or tested by an air gap or a level or protection equal to or greater than that provided by a double check valve backflow prevention device.
.2 Notify the Consultant at least 24 hours in advance of all proposed tests. Perform tests in presence of the Consultant.
.3 Flush sewers and related appurtenances to remove foreign materials per Section 3.7.
.4 Test pipes by filling tank per Section 44 42 00.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for constructing pressure sewers and appurtenances. Work includes supply, installation and testing of pipe, fittings and service connections.
- 1.2 RELATED SECTIONS .1 Concrete: Section 03 30 00
- .2 Metal Fabrications: Section 05 50 00
- .3 Excavating, Trenching and Backfilling: Section 31 23 10
- .4 Reinstatement: Section 32 98 00
- 1.3 REFERENCE STANDARDS .1 ANSI/ASME B16.1-2015, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
- .2 ANSI/AWWA C110/A21.10-2012, Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., (75mm Through 1200mm) for Water and Other Liquids.
- .3 ANSI/AWWA C111/A21.11-2012, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 ANSI/AWWA C151/A21.51-2009, Ductile-Iron Pipe, Centrifugally Cast, for Water.
- .5 ANSI/AWWA C153/A21.53-2011, Ductile Iron Compact Fittings, 3 Inch Through 16 Inch, for Water and Other Liquids.
- .6 ANSI/AWWA C900-16, Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution.
- .7 AWWA C905-2010, Polyvinyl Chloride Water Transmission Pipe, Nominal Diameters 14 Inches to 48 Inches (350mm Through 1200mm) for Water Transmission and Distribution.
- .8 CAN/CSA B137 Series-2013, Thermoplastic Pressure Piping Compendium.
-

1.3 REFERENCE
STANDARDS
(Cont'd)

- .9 CAN/ULC S701-2011, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 for pipe and fittings.

1.5 CERTIFICATES

- .1 Submit manufacturer's test data and certification that products and materials meet requirements of this Section in accordance with Section 01 33 00 for pipe and fittings.
- .2 For fusion butt jointing for polyethylene pipe provide certification that personnel are trained by manufacturer in current methods and use of equipment.

1.6 HANDLING AND
STORAGE

- .1 Handle and store pipe, valves, fittings, in such a manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore. Do not damage coatings or linings.
- .2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

PART 2 - PRODUCTS

2.1 POLYVINYL
CHLORIDE PIPE AND
FITTINGS

- .1 Pipe and Joints: to CSA B137.3 or B137.3.1, AWWA C900, AWWA C905, or AWWA 909, cast-iron outside diameter, gasketed bell-end Joint.
- .2 Fittings:
.1 PVC: to CAN/CSA B137.
.2 Gray or ductile-iron: to AWWA C110 and C153, cement mortar lined, minimum pressure rating 1035 kPa for cast, 1720 kPa for ductile iron.
.3 Cement mortar lining: to AWWA C104. Provide internal seal coat.
.4 Joints, mechanical or push-on: to AWWA C153.
- .3 Fusible PVC pipe and joints:

- 2.1 POLYVINYL CHLORIDE PIPE AND FITTINGS
(Cont'd)
- .3 (Cont'd)
- .1 100mm diameter and larger: to CSA B137.3, AWWA C900 or AWWA C905.
- .2 Joints: thermal butt fusion.
- .3 Have fusion services performed by a qualified and certified fusible PVC technician.
- 2.2 THRUST RESTRAINT
- .1 Thrust blocks and anchors: 20 MPa Portland cement concrete and 15 M, Grade 400 reinforcing steel where indicated.
- .2 Mechanical joint restraint device: (100mm to 600mm) ductile iron follower gland to AWWA C153 and AWWA C111 with multiple wedge restraining mechanism, minimum pressure working rating 2410 kPa and minimum safety factor of 2:1 Lugs to have twist-off torque nuts.
- 2.3 INSULATION
- .1 Insulation: to CAN/ULC S701, Type 4, extruded polystyrene.
- PART 3 - EXECUTION
- 3.1 PREPARATION
- .1 Inspect material for defects and remove defective materials from site.
- .2 Before installation, remove any water, debris, and foreign material from interior of pipe and fittings.
- 3.2 TRENCHING, BEDDING AND BACKFILLING
- .1 Do trenching, bedding and backfilling to Section 31 23 10.
- 3.3 PIPE INSTALLATION
- .1 Lay and join pipe and fittings, as specified herein and according to manufacturer's published instructions.

3.3 PIPE
INSTALLATION
(Cont'd)

- .2 Lay pipe and fittings on prepared bed, true to line and grade indicated, within following tolerances:
Horizontal Alignment: 150mm Vertical Alignment: 75mm
- .3 Face bell ends in direction of laying. On grades of 5% or greater lay pipe up grade.
- .4 Do not exceed maximum joint deflection recommended by manufacturer.
- .5 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.
- .6 Join pipes in accordance with manufacturer's published instructions.
- .7 Install gaskets in accordance with manufacturers published instructions. Use only lubricant supplied by manufacturer. During cold weather store gaskets in heated area to promote flexibility.
- .8 Align pipes before joining.
- .9 Support pipes as required to assure concentricity until joint is properly completed.
- .10 Keep pipe joints free from soil or other foreign materials.
- .11 Avoid displacing gasket or contaminating with dirt, petroleum products or other foreign material. Remove, clean, re-install and lubricate gaskets so disturbed.
- .12 Complete each joint before laying next length of pipe.
- .13 Where deflection at joints is permitted, deflect only after joint is completed.
- .14 At structures provide flexible joint not more than 1 metre from outside face of structure.
- .15 Cut pipe as required for specials, fittings or closure pieces, square to centerline, and as recommended by manufacturer. Do not damage pipe lining or coating and leave smooth bevelled edge.

3.3 PIPE
INSTALLATION
(Cont'd)

- .16 Provide concrete thrust blocks to undisturbed ground on all tees, bends, plugs and caps. Construct as indicated and keep joints and couplings free of concrete.
- .17 Install mechanical joint restraint to AWWA C111 and tighten lug nuts until all wedges are in firm contact with pipe surface. Continue to tighten alternating between bolts until lug nuts twist off.

3.4 UNDERCROSSING

- .1 Provide shop drawings showing proposed method of installation for pipe in undercrossing
- .2 Excavate working pit according to reviewed shop drawings.
- .3 Dewater areas of excavation and undercrossing.
- .4 Place jacking, boring or tunneling equipment in working pit to approved line and grade of the proposed pipe.
- .5 Install encasing pipe to proposed line and grade as indicated.
- .6 Use mechanical or welded type joints for encasing pipe.
- .7 After encasing pipe has been installed, check line and grade for approval.
- .8 Remove any soil that remains in the casing pipe.
- .9 Insert pipe into encasement pipe starting from the working pit.
- .10 Place pipe one length at time outside encasement pipe. Maneuver pipe into position
- .11 Use approved blocking method to guide pipe in true alignment.

3.5 HYDROSTATIC AND
LEAKAGE TESTING

- .1 Notify the Consultant at least 24 hours in advance of all proposed tests. Perform tests in presence of the Consultant.
-

3.5 HYDROSTATIC AND LEAKAGE TESTING
(Cont'd)

- .2 If water used for flushing or testing is obtained from a potable water supply, continuously separate the supply from the service being flushed or tested by an air gap or a level of protection equal to or greater than that provided by a double check valve backflow prevention device.
- .3 Provide labour, equipment and materials required to perform hydrostatic and leakage tests.
- .4 Backfill prior to testing.
- .5 Open all valves in test section.
- .6 Expel air from main by slowly filling with water. Install corporation stops at high points where no air-vacuum release valves are installed. After testing, remove corporation stops and install plugs.
- .7 Fill concrete pipe 24 hours before testing to allow for absorption of water.
- .8 Apply test pressure of 1035 kPa or pressure equal to 1.5 times working pressure, whichever is greater, measured at lowest point in test section. Conduct the test over a full two (2) hour period, maintaining a constant test pressure. No leakage is permitted by the test process.
- .9 Locate and repair defects if test fails. Retest.

3.6 FLUSHING

- .1 Notify the Consultant 24 hours in advance of flushing.
- .2 If water used for flushing or testing is obtained from a potable water supply, the supply is to be continuously separated from the service being flushed or tested by an air gap or a level of protection equal to or greater than that provided by a double check valve backflow prevention device.
- .3 Flush mains with water through available outlets with sufficient flow to produce minimum velocity in main of 1.5 m/s, for 10 minutes. Flush until foreign materials have been removed and water is clear.
- .4 Slowly open and close valves to confirm thorough flushing.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for constructing culverts and precast concrete headwalls. Work includes supply and installation of pipe and fittings.
- 1.2 RELATED SECTIONS .1 Cast-in-Place Concrete: Section 03 30 00
- .2 Metal Fabrications: Section 05 50 00
- .3 Excavation, Trenching and Backfilling: Section 31 23 10
- .4 Reinstatement: Section 32 98 00
- 1.3 REFERENCE STANDARDS .1 ASTM D1056-14, Flexible Cellular Materials - Sponge or Expanded Rubber.
- .2 CAN/CSA B1800 Series-15, Thermoplastic Non-Pressure Piping Compendium.
- .3 National Association of Sewer Service Companies (NASSCO) Specification Guidelines.
- 1.4 CERTIFICATES .1 Upon request, submit manufacturers' test data and certification that products and materials meet requirements of this Section in accordance with Section 01 33 00 for:
- .1 Culvert pipe.
- .2 Headwalls.
- 1.5 HANDLING AND STORAGE .1 Handle and store pipe and fittings in such a manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore.
- .2 Store gaskets in accordance with the manufacturer
-

PART 2 - PRODUCTS

2.1 HDPE PIPE AND FITTINGS .1 Double walled HDPE: to CAN/CSA B1800 with smooth interior surfaces.

.2 Fittings: bell and spigot as indicated.

2.2 HEADWALLS .1 Precast concrete to CSA A23.4.

PART 3 - EXECUTION

3.1 PREPARATION .1 Inspect products for defects and remove defective products from site.

.2 Confirm pipe and fittings are clean before installation.

3.2 EXCAVATING BEDDING AND BACKFILLING .1 Perform excavation, bedding and backfilling in accordance with Section 31 23 10.

3.3 PIPE INSTALLATION .1 Lay and join pipe and fittings as specified herein and according to manufacturer's published instructions.

.2 Lay pipe and fittings on prepared bed, true to line and grade indicated within following tolerances:
.1 Horizontal Alignment: 50mm.
.2 Vertical Alignment: the lesser of 13mm or one half the rise per pipe length.

.3 Commence laying at outlet and proceed in upstream direction with bell ends facing upgrade.

.4 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.

3.3 PIPE
INSTALLATION
(Cont'd)

- .5 Install gaskets in accordance with manufacturer's published instructions.
- .6 Align pipe before joining.
- .7 Support pipes as required to achieve concentricity until joint is properly completed.
- .8 Keep pipe joints free from mud, silt, gravel or other foreign material.
- .9 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.
- .10 Complete each joint before laying next length of pipe.
- .11 Where deflection at joints is permitted, deflect only after the joint is completed. Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .12 Where a flexible joint is not integral to the structure, provide flexible joint not more than 1 metre from outside face of structure.
- .13 Install plastic pipe in accordance with CAN/CSA B1800.
- .14 Cut pipe as required for fittings or closure pieces, square to centreline, and as recommended by manufacturer.

3.4 HEADWALL
INSTALLATION

- .1 Place precast concrete headwall on prepared bedding as shown on the Project Drawings and as specified in Section 31 23 10.

3.5 INSPECTION

- .1 The Consultant may require inspection of installed sewers by television camera, photographic camera or by other visual method.

3.6 DEFLECTION
TESTING - PLASTIC
PIPE

- .1 Measure deflection by pulling deflection gauge through each pipe from manhole to manhole after backfilling.
- .2 Provide deflection gauges to measure a 5% and 7-1/2% deflection. Gauges to be a "Go-No-Go" device.
- .3 Within thirty days after installation, pull a deflection gauge measuring 5% deflection through the installed section of pipeline. If this test fails proceed with 7-1/2% deflection test. If 7-1/2% deflection test fails, locate defect and repair. Retest using same methodology.
- .4 Thirty days prior to completion of warranty period, pull a deflection gauge measuring 7-1/2% deflection through the installed section of pipeline. If 7 1/2% deflection test fails, locate defect and repair. Retest using same methodology.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This section specifies requirements for providing perimeter foundation drainage pipe where shown on the Drawings and as specified herein.
- 1.2 RELATED WORK .1 Excavating, Trenching and Backfilling: Section 31 23 10
- .2 Granular Material: Section 31 37 10
- 1.3 REFERENCES .1 ASTM D4254-14, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- .2 CSA B1800 SERIES-15, Thermoplastic Non-pressure Pipe Compendium.

PART 2 - PRODUCTS

- 2.1 PERIMETER DRAINAGE .1 Rigid plastic pipe and fittings (100 dia.): to CSA-B1800, size as indicated, straight PVC, DR35, perforated, complete with fittings. Pipe perforated with 2 rows of 14 mm dia. holes at 4:00 and 8:00 position at 400 mm c.c.
- 2.2 BEDDING AND SURROUND MATERIALS .1 Bedding: 28 mm clear stone as specified in Section 31 23 10.
- 2.3 GEOTEXTILE WRAP .1 Geotextile material: non-woven, needle-punched polyester filter fabric. Permittivity to be in the range of 1.4 - 1.75 sec-1 with flow rate in the range of 75-88 L/sec/m2. Material to have a minimum grab strength of 670 N, puncture strength of 350 N and an apparent opening size between 0.15 and 0.21 mm.
-

- 2.3 GEOTEXTILE WRAP .1 (Cont'd)
(Cont'd)
- .1 Acceptable product: Terrafix 360R, Armtec 200 or approved equivalent.

PART 3 - EXECUTION

- 3.1 INSPECTION
- .1 Confirm graded base conforms with required drainage pattern before placing bedding material.
 - .2 Confirm improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions are corrected to approval of Consultant.
 - .3 Confirm foundation wall and waterproofing have been inspected by Consultant before placing bedding material or drainage composite.

- 3.2 PLACING OF GRANULAR BEDDING AND GEOTEXTILE
- .1 Cut trenches in base and install geotextile of sufficient width to receive clear stone bedding and pipe, and have minimum 450 mm of overlap.
 - .2 Wrap perimeter drainage pipe and bedding in geotextile as shown on the drawings. Place clear stone bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
 - .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipe.
 - .4 Shape transverse depressions, as required, to suit joints.
 - .5 Carry granular bedding material horizontally across actual trench width. Mounding bedding will not be permitted.
 - .6 After installation of pipe, place and compact bedding to haunch line of pipe. Place and compact bedding material from haunch line of pipe to 150 mm above the top of pipe. Compact to 70% relative density to ASTM D4254.

3.2 PLACING OF
GRANULAR BEDDING
AND GEOTEXTILE
(Cont'd)

- .7 Cover bedding material with the overlapping geotextile and secure in place with the first lift of backfill material.

3.3 PIPE
INSTALLATION

- .1 Ensure pipe interior and coupling surfaces are clean before laying.
- .2 Lay perforated pipe minimum to slope as indicated. Face perforations and coupling slots downward.
- .3 Grade bedding to establish pipe slope.
- .4 Install end plugs at ends of collector drains to protect pipe ends from damage and ingress of foreign material.
- .5 Connect pipe to storm sewer by appropriate adapters manufactured for this purpose.

3.4 BACKFILL
MATERIAL

- .1 Place backfill material above pipe surround in uniform layers in accordance with Section 31 23 10.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Excavation, Trenching and Backfilling: Section 31 23 10

1.2 REFERENCES .1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 211.2-06(R2011), Rigid PVC (Unplasticized) Conduit.

PART 2 - PRODUCTS

2.1 PVC DUCTS AND FITTINGS .1 Rigid PVC conduit: to CSA C22.2 No. 211.2, with moulded fittings, for direct burial.
.2 Rigid PVC conduit bends, couplings, reducers, bell end fittings, plugs, caps, adaptors of same product material as conduit, to make complete installation.
.3 Rigid PVC conduit 90° and 45° bends.
.4 Rigid PVC conduit 5° angle couplings.
.5 Expansion joints where conduits exit ground.

2.2 SOLVENT WELD COMPOUND .1 Solvent cement for PVC conduits.

2.3 CABLE PULLING EQUIPMENT .1 6 mm stranded polypropylene pull rope, tensile strength 5 kN, continuous throughout each duct run with 3 m spare rope at each end.

2.4 MARKERS .1 Refer to Section 26 05 44 for markers.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install underground conduits in accordance with manufacturer's instructions.
- .2 Clean inside of conduits before laying.
- .3 Open trench completely before conduits are laid and ensure that no obstructions will necessitate change in grade of conduits.
- .4 Provide full, even support every 1.5 m throughout conduit length.
- .5 Install conduits at elevations and slope ducts with 1 to 400 minimum slope.
- .6 During construction, cap ends of conduits to prevent entrance of foreign materials.
- .7 Pull through each duct mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of conduit, followed by stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each conduit immediately before pulling-in cables.
- .8 In each conduit, install pull rope continuous throughout each conduit run with 3 m spare rope at each end.
- .9 Install markers as specified in Section 26 05 44.

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Packaged Wastewater Treatment Facility: Section 44
42 11
- 1.2 REFERENCES .1 CSA B137 Series-13, Thermoplastic Pressure Piping
Compendium.
.2 CSA B1800-15, Plastic Non-pressure Pipe Compendium.
- 1.3 SAMPLES .1 Submit to the Consultant test results from a
certified soils laboratory showing that all granular
materials meet the specifications listed in this
section prior to commencing work, include the cost
of testing in the tender price submitted.

PART 2 - PRODUCTS

- 2.1 SAND FILTER
MATERIALS .1 Filter sand: clean, washed, complete with gradation
as shown below:
D10 = 1.5 - 2.5 mm
Uc = 1 - 3
- | <u>Sieve Size</u> | <u>% Passing</u> |
|-------------------|------------------|
| 3/8 in | 100 |
| No. 4 | 70 - 100 |
| No. 8 | 5 - 78 |
| No. 16 | 0 - 4 |
| No. 30 | 0 - 2 |
| No. 50 | 0 - 1 |
| No. 100 | 0 - 1 |
| No. 200 | 0 - 1 |
- .2 Clear stone: washed, durable gravel or crushed
stone, 6mm to 37mm size.
- .3 Pea gravel: round stone, opaque, non- porous,
washed, free from fines, moisture, ice and snow
complete with gradation as shown below:

2.1 SAND FILTER

MATERIALS

(Cont'd)

<u>Sieve Size</u>	<u>% Passing</u>
1/2"	100
3/8"	50 - 100
No. 4	6 - 84
No. 8	0 - 24
No. 16	0 - 1
No. 30	0 - 1
No. 100	0 - 1

- .4 Topsoil: as specified in Section 32 92 19.
- .5 Selected backfill material: as specified in Section 31 23 10.
- .6 Liner: PVC, 30 mil thick. All pipe penetrations to be made with pre-manufactured pipe boots.
 - .1 Acceptable product: Solmax 230-0000 or approved equivalent.

2.2 SAND FILTER
DISTRIBUTION PIPING

- .1 PVC: to CSA B137.3, diameter as indicated, materials as follows. Provide PVC schedule 40 fittings where required. Join pipe sections with solvent agent.
 - .1 Laterals: schedule 40 PVC pipe and fittings, solvent weld joints. Pre-drilled holes in bottom of pipe as indicated on drawings.
 - .1 PVC ball valves on each lateral (as specified in Section 44 42 11).
 - .2 Orifice shields PVC, snap fit on bottom of lateral.
 - .2 Pressure zone headers: PVC Schedule 40 with schedule 40 PVC fittings, solvent welded.

2.3 EFFLUENT
COLLECTION PIPE

- .1 Rigid plastic pipe and fittings to CSA-B182.1, 100mm diameter PVC, Sch. 40, perforated or non-perforated as shown on the drawings.
- .2 Perforated Pipe: 2 rows of 13mm diameter holes at 4 o'clock and 8 o'clock position at 400 C.C.

PART 3 - EXECUTION

3.1 SAND FILTER
INSTALLATION

- .1 Install sediment control fencing at locations shown on the Drawings and as directed by the regulatory agency having jurisdiction.
- .2 Excavate area for sand filter to depth indicated.
- .3 Construct berms to grades and depths indicated on the drawings.
- .4 Place compacted bedding as indicated on drawings.
- .5 Install liner. Bury edge of liner in trench as shown. Lap liner min. 12" at joints and seal. Ensure that no puncture exists in liner prior to continuance of any further works.
- .6 If a liner puncture should occur, consult the manufacturer for repair procedures.
- .7 Connect lengths and place effluent collection pipe on clear stone as indicated and cover with clear stone and pea gravel as indicated. Seal any holes made in liner for piping with approved pipe boots.
- .8 Place filter sand to levels indicated. Wet sand during installation, do not compact.
- .9 Place pea gravel to levels indicated.
- .10 Install distribution piping in clear stone as indicated and place clear stone over distribution piping to levels indicated.
- .11 Place remaining select backfill as indicated.
- .12 Do not cover sand filter area until pipe grade and alignment have been approved by Consultant and authority having jurisdiction.
- .13 Grade area surrounding sand filter as indicated.
- .14 Place topsoil and hydroseed all areas as indicated.

PART 1 - GENERAL

- 1.1 WORK INCLUDED .1 This Section specifies requirements for supplying and installing the Packaged WWTF as shown on the drawings and as specified.
- 1.2 RELATED WORK .1 Electrical: Division 26
- .2 Excavating, Trenching and Backfilling: Section 31 23 10
- .3 Sanitary Sewer: Section 33 31 00
- .4 Recirculating Sand Filter Bed: Section 43 31 14
- 1.3 REFERENCES .1 ASTM A123-2015, Standard Specification for Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM D698-2012, Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .3 ASTM D1785-15, Standard Specification for PolyVinyl Chloride Plastic Pipe.
- .4 ASTM D3034-16, Standard Specification for Type PSM PolyVinyl Chloride Sewer Pipe and Fittings.
- .5 ASTM D2321-2014E1, Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- .6 ANSI/AWWA D120-09, Thermosetting Fibreglass Reinforced Plastic Tanks.
- 1.4 DESIGN PARAMETERS .1 Average wastewater flow = 10 m³/day.
- .2 Peak wastewater flow = 20 m³/day.
-

1.4 DESIGN
PARAMETERS
(Cont'd)

- .3 Waste Type = elementary school untreated wastewater quality.
 - .1 BOD: 200-400 mg/l
 - .2 TSS: 100-300 mg/l
- .4 Effluent performance limits:
 - .1 BOD: 20 mg/l.
 - .2 TSS: 20 mg/l.
 - .3 E.Coli: 200 colonies per 100 ml.
 - .4 pH: 6.5 to 9.

1.5 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for fibreglass septic tanks and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit shop drawings for all equipment in this section.
 - .2 Pre-Cast Shop Drawings: to CSA A23.4.
 - .1 Indicate on drawings:
 - .1 Design calculations for items designed by manufacturer.
 - .2 Finishing schedules.
 - .3 Methods of handling and erection.
 - .4 Storage facilities.
 - .5 Openings, sleeves, inserts and related reinforcement.

1.6 DELIVERY,
STORAGE AND
HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .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 and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
-

- 1.6 DELIVERY,
STORAGE AND
HANDLING
(Cont'd)
- .3 (Cont'd)
 - .2 Store and protect septic tanks from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

- 2.1 METALS
- .1 Stainless steel: Type 316.
 - .2 Steel: to CSA G40.21, 300W.
 - .3 Galvanizing: non-stainless steel metal components to be galvanized by hot-dip method with minimum zinc coating of 600 g./m² conforming to ASTM A123
- 2.2 FRP TANKS
- .1 Provide single wall FRP underground tanks complete with tie down anti-flotation system, with baffles, internal piping, and openings complete with risers to surface per drawing. Alternatively the PVC risers as specified can be attached to the tank after delivery.
 - .2 Provide tanks designed to ANSI/AWWA D120.
- 2.3 ACCESS RISERS
WITH ACCESS LIDS
- .1 Risers: ribbed PVC or HDPE to CSA B182.4. Length and diameter as shown on drawings complete with bolt-down access lids.
 - .2 Access lids: constructed of fibreglass, or reinforced polyethylene, or PVC. Provide a gasketed watertight fit on the top of the riser and at connection to tank, and provide four (4) stainless steel bolts to secure each lid. Attach 50mm thick insulation with stainless steel fasteners.
 - .3 Where piping penetrates the access risers, seal the penetration using grommets of a diameter equivalent to that of the pipe.
 - .4 Acceptable Products: Orenco Systems Inc., Polylok, Soleno, or approved equivalent.

2.4 RECIRCULATING
AND ANOXIC PUMP
SYSTEM

- .1 Pumping System:
 - .1 Duplex recirculation submersible effluent pumps: max. 1/2 Hp, 208 volt, three phase, 50mm dia. discharge, to deliver 190 Lpm at 15 m TDH and rated for a minimum 300 on/off cycles per day.
 - .2 Anoxic effluent pump: max. 1/2 Hp, 208 volt, three phase, 32mm dia. discharge, to deliver 38 Lpm at 2m TDH and rated for a minimum 300 on/off cycles per day.
 - .3 Pump discharge assemblies to be suitable for operation in winter conditions. Each includes a PVC ball valve and check valve with diameter equivalent to the discharge. Make connections to the pump discharge and the pressure sewer with PVC Schedule 40 unions. Provide the configuration such that the pumps may easily be removed.
 - .4 Provide a triple pump vault to house the pumps.
 - .5 Pump Power Cable: factory fitted with sufficient length of power cable to extend to junction box where shown on the drawings. Cable suitable for Class 1 Zone 1 environment.
 - .6 Pump to have thermal overload protection.
 - .7 Pumps: UL and CSA listed as an effluent pump and complete with a non-prorated, five (5) year warranty.

2.5 FLOAT SWITCHES

- .1 Mechanical type with small drawdown. Supply cable in sufficient length of cable to extend to junction box where shown on the Project Drawings.
- .2 Floats may be mounted as single assembly on float stem with float collars, or top mounted.
- .3 One (1) SPDT contact, rated for at least 5 amps at 120 VAC (continuous use).
- .4 Suitable for installation in a Zone 1 hazardous environment. Provide intrinsically safe relays.

2.6 RECIRCULATING
SPLITTER VALVE

- .1 Design flow rate is 190 Lpm. Valve to be corrosion resistant. Provide Schedule 40 PVC unions and couplings to match treatment system effluent piping. Valve to direct all flow to recirculation tank at low flows and discharge 20% to UV system at high flows.

2.7 DISTRIBUTION
VALVE ASSEMBLY

- .1 Provide as a complete assembly including inlet ball valve and vacuum breaker, distributing valve with six (6) outlet ports, Schedule 80 unions for removal and cleaning, and clear PVC ports for inspection. Valve manufactured of corrosion resistant ABS polymer, stainless steel, and die cast metal. Each distributing valve to include the following:
 - .1 Distributing valve assembly shall be enclosed in a 750mm diameter access riser with cover. The riser and lid combination must be watertight. Provide four (4) stainless steel bolts to secure lid.
 - .2 Rigid closed-cell foam insulation of 50mm thickness shall be mechanically attached to the underside of the lid. Use fasteners made of corrosion resistant stainless steel. Insulation to have an R-value of no less than 10 per 50mm increment.

2.8 VALVES

- .1 Ball Valves: PVC body with EPDM seals and PTFE seats. True union design rated at 150 psi.
- .2 Ball Check Valves: PVC body with EPDM seals. True union design rated at 150 psi, but operable at low head (3-30 ft).
- .3 Gate Valves: high impact PVC type II body with polypropylene paddle and non-rising stem with handle to within 300mm of lid.

2.9 SEPTIC TANK
EFFLUENT FILTER

- .1 System must be accessible at finished grade, rail mounted, and removable with handle to within 300mm of the surface, including all accessories and apparatus.
 - .2 Filter must be capable of removing all solids greater than 3mm in size at design flow conditions. Size filter to allow for removal by one person once a year for cleaning.
 - .3 Locate filter inlet holes at 50% of liquid depth.
 - .4 Provide float system to detect high liquid level indicating dirty filter.
-

2.10 LOCKS

- .1 Outfit all control panels with padlocks.
- .2 Padlocks to be weather resistant with stainless steel catches.
- .3 Locks to be minimum 38mm.
- .4 Provide two (2) master keys that will enable all locks to be opened.
- .5 All control panel locks to be keyed the same.
- .6 Acceptable product: Masterlock padlocks, or approved equivalent.

2.11 UV SYSTEM

- .1 General: one (1) stand alone U.V. disinfection system complete with power cable(s), level control device, U.V. lamps and lamp supports, electronic ballasts, UV intensity monitor GFCI receptacles and accessories as noted in this section.
 - .2 Application/Design: system to be designed to disinfect effluent from recirculating textile filter sewage treatment process to maximum E.coli concentration of 200/100 ml measured on a 30 day geometric average. Design system based on 50% UVT and Section 1.4 herein.
 - .3 Lamp Modules: individual lamp modules to contain ultraviolet lamps with electronic ballasts in an aluminum enclosure mounted on a 316 stainless steel frame. Do not expose electrical wires and connections to moisture.
 - .4 Effluent Channels: provide a single fabricated, modular, type 304 stainless steel channel. Fasten the channel to transition boxes, which are attached to an equipment pad as shown on the drawings. Connect the channel to a transition box on each end with 100mm inlet connection and 150mm outlet connection.
 - .5 Provide the following spare parts:
 - .1 Four (4) UV lamps.
 - .2 Four (4) Quartz sleeves.
 - .3 Four (4) lamp end seals.
 - .6 All components must be CSA approved.
-

2.11 UV SYSTEM
(Cont'd)

- .7 Power cables to be not less than 2m.
- .8 Acceptable Product: Trojan Technologies Model UV 3025 K-PTP, or approved equivalent.

2.12 FLOW
INSTRUMENTS

- .1 Magnetic flow meter as specified below:
 - .1 Flow tube must be hard rubber of the "formed" type, complete with SS grid backing. Flow tube diameter to be as indicated on the Project Drawings.
 - .2 Minimum 316 SS, self-cleaning electrodes.
 - .3 Supply grounding hardware in accordance to manufacturer's recommendations.
 - .4 Provide flow tube to be complete with integral flow transmitter.
 - .5 Flow transmitter and flow tube to have a minimum enclosure rating of NEMA 4X.
 - .6 Flow transmitter to be programmable locally using keypad via simple menu driven software, and to be complete with integral display showing flow rate with engineering units, and totalized flow.
 - .7 Online diagnostics of flow sensor and electronics, including process checks, linearity and calibration checks. Operator alarm notification via transmitter display, relay outputs, and output signal (4-20 mA upscale/downscale manipulation).
 - .8 4-20 mA output of flow rate, self-powered, isolated. Frequency pulse output (dry contact) for flow totalization.
 - .9 Minimum system flow accuracy to $\pm 0.5\%$ of reading.
 - .10 Have adjustable damping ability.
 - .11 An adjustable low flow cutoff.
 - .12 Transmitter language to be English.
 - .13 Acceptable manufacturers: ABB, Siemens, Foxboro, Krohne, Rosemount, or approved equivalent. Inclusion in this list does not exempt the requirement that any proposed model must be compliant with the above equipment specifications.

2.13 TREATMENT
SYSTEM CONTROL
PANEL

- .1 Provide recirculating sand filter (RSF) system controls in a stainless steel NEMA 4X enclosure suitable for mounting indoors. Power supply is 208 volts, 3 phase, 60 Hz.
 - .2 Control panel to be assembled as follows:
-

2.13 TREATMENT
SYSTEM CONTROL
PANEL
(Cont'd)

- .2 (Cont'd)
- .1 The HMI, HOAs, Reset buttons, data port, GFI receptacle and main disconnect are to be mounted through the enclosure door so as to be accessible to operations personnel without having to open the panel.
- .2 Enclosure to contain a main fuse type disconnect, motor starters, primary and secondary fused control transformers, microprocessor, ID cards, termination strips, anti-condensation heater, GFI receptacle, and all associated control components.
- .3 Panel to have separate HAND/OFF/AUTO selector switch for each pump. In AUTO, start/enable commands to be initiated from microprocessor.
- .4 The control panel microprocessor and I/O cards must have the ability to communicate via an ethernet communications network or serial communications with Modbus RTU protocol. Include surge and lightning protection for the processor and field I/O power supplies. Provide I/O cards. Adequate digital and analog I/O for this process plus 25% spare for each I/O type (provide a minimum of 4 spare for each I/O type). Wire I/O to an identified field wiring terminal strip.
- .1 Provide the Owner with the latest electronic copy of the microprocessor logic.
- .5 Control panel to contain a panel mounted local operator interface to facilitate local control (start/stop, set point adjustments, etc.), monitoring (equipment and process status), and troubleshooting (alarms, diagnostics, etc.) of the RSF treatment system equipment and controls.
- .6 RSF Treatment System Control:
- .1 Control panel microprocessor to control the timed and intermittent filter dosing and recirculation of effluent through the filters by activating the recirculation pumps in response to a timer and level control float inputs. Recirculation will be accomplished by pumping in an alternating duplex fashion on a timer with on/off, override, and high level alarm control floats. Anoxic pump will operate on a timed basis using the recirculation floats for control. The timer will be on as long as the on/off float is up. All timer functions must be capable of automatic trending and adjustment by the panel or manual operation and adjustment by the operator.

2.13 TREATMENT
SYSTEM CONTROL
PANEL

(Cont'd)

.2 (Cont'd)

.6 (Cont'd)

.2 Panel to monitor flow meter output, summarizing and data logging daily totalized flow while also displaying current flow readings on the system's HMI.

.3 Panel to receive and monitor alarms from UV system, and monitor and log UV intensity.

.7 Vendor to provide all system control and operator interface programming. Vendor will be responsible for communication I/O to the treatment system control including pump control floats, pump fault, fan thermistor and fan fault.

.8 All components must be NEMA design as manufactured by Square D or Allen Bradley, including door mounted pilot devices. Include motor current monitoring. All components must be CSA approved.

.9 Provide a main, heavy duty, fused disconnect switch for disconnection of power to the main control panel. Disconnect switch to be a quick-make, quick-break type of ampere rating and number of poles to match the load requirements of the control panel. Fuse holders must be suitable without adaptors for the size and type of fuse installed. The disconnect switch must be operable from either the front or side without opening the enclosure inner door and there must be provision for padlocking the disconnect switch in the off position by a minimum of three padlocks. Disconnect switch to have a defeatable door interlock to prevent the inner door from opening when the operating handle is on.

.10 Motor starters to be single phase magnetic starters, sized in accordance with manufacturer's instructions for the motor being controlled. Motor starters must be NEMA design. IEC equipment or half size motor starters are not acceptable. Motor starters to have a 120V, 60 Hz operating coil and have a minimum of one (1) spare normally open and one (1) spare normally closed run contact. Provide CT's to monitor pump current on each pump. Overload relays must be solid state with visible trip indication, adjustable overload protection, phase loss protection and ground fault protection. Re-settable without opening the inner door.

.11 Control transformers must have primary and secondary fuses. Transformer VA rating shall have 50% extra capacity in excess of the total operating requirements. Secondary fuses shall be HRC, Class CC. Primary fuses to be HRC, class J.

2.13 TREATMENT
SYSTEM CONTROL
PANEL

(Cont'd)

.2

(Cont'd)

- .12 Power fuses must be high rupturing capacity (HRC) type, minimum 200 kA interrupting rating (momentary RMS symmetrical). Use Class J, fast acting type for the main disconnect switch and for non-motor load circuits. Use Class J, time delay type (capable of carrying 500% of its rated current for 10 seconds minimum) for motor loads.
- .13 Provide Phoenix UK5N or equal field wiring terminal strips. Colour code and identify all interwiring at both ends.
- .14 Provide black and white phenolic name tags for inner door mounted devices.
- .15 Provide recommended spare parts.
- .16 Operator interface shall include the following as a minimum:
 - .1 Messages with colour, multi-character display and shall function as switches, timers, counter, lights, and alarm indication.
 - .2 Clearance of all microprocessor faults without use of external programmer.
 - .3 Display flow rate and daily totalized flow.
 - .4 Display system status parameters including but not limited to alarm status and history, pump status, float status and history, pump run time, pump cycle counts, average recirculation flow, discharge flow average denitrification flow, daily average pump amp draw.
 - .5 Log system parameters and operational data for one (1) year, and allow operator to download data using data port mounted through inner door, in readily accessible file format.
 - .6 Display motor run time in hours and pump start counters for all unit motors. Hour and start counter shall be pass-code non-resettable.
 - .7 Pump timer settings for normal and override conditions to be fully adjustable by operator and also automatically adjustable based on flow trending.
 - .8 Display specific alarm condition in words to facilitate troubleshooting.
 - .9 Alarm silence and alarm reset pushbuttons.
 - .10 Programming with security pass-code.
- .17 Control panel functions and displays must be remotely accessible to allow operator to operate plant through ethernet connection to internet.

2.13 TREATMENT
SYSTEM CONTROL
PANEL
(Cont'd)

- .2 (Cont'd)
- .17 (Cont'd)
 - .1 All data must be viewable and all adjustable parameters must be adjustable through remote, password secured connection.
 - .2 Alarms must be automatically called out to operator.
 - .3 No proprietary computer software needed for remote monitoring and control.
- .18 Submit with the quotation, a written description of the system operation.
- .19 Provide shop drawings that include a dimensional drawing of the outer door, a single line diagram and a complete set of component shop drawings. Do drawings in CAD. Hand-drawn drawings will not be accepted.

PART 3 - EXECUTION

3.1 GENERAL
INSTALLATION

- .1 Handle and install equipment in strict accordance with manufacturer's instructions. Issue instructions at time of shop drawing issue and make available on site when required.
- .2 Provide concrete equipment attachments as required by the equipment and as shown on the Drawings.
- .3 Provide small connecting pipework, fittings and valves whether shown on the Drawings or not but required for proper functioning and servicing of the equipment. Do work in accordance with the manufacturer's instructions at no additional cost to the Contract. Where pipe is connected to equipment, fit pipe in a manner such that neither pipe equipment is strained during the joining procedure.

3.2 FRP TANK
INSTALLATION

- .1 Refer to 31 23 10 for backfilling.
- .2 Tank will float until fully backfilled. Divert surface water and backfill tank before end of the work day.

3.2 FRP TANK
INSTALLATION
(Cont'd)

- .3 Hydrostatically test tank according to manufacturer's requirements. Repair any leaks and retest. Repeat until all leaks are repaired at no extra cost.
- .4 Once backfilled and all pipes connected fill 300mm up riser and repeat as above to test interconnecting pipes and pipe grommets.

3.3 LUBRICATION

- .1 Provide complete initial lubrication of all equipment in accordance with the equipment manufacturer's recommendations.

3.4 RESPONSIBILITY
OF TEMPORARY TRIAL
USAGE

- .1 Obtain written permission from the Consultant to use and test permanent equipment and systems prior to acceptance by the Consultant.
- .2 The guarantee period must not be affected by temporary trial use of the equipment.
- .3 Clean and renew equipment and systems used before acceptance. Restore to original or new working condition.
- .4 Protect equipment and systems openings from dirt, dust and other foreign materials during temporary usage.

3.5 INSPECTION,
TESTING AND
START-UP

- .1 Provide the services of competent servicemen, mechanics or other trained personnel of the equipment supplier's or manufacturer's to check the complete installation and be present for start-up of the equipment. Submit a written report signed by the equipment manufacturer's representative to the Consultant stating the following:
 - .1 That a satisfactory installation of equipment has been performed and outlining any modifications that have been made as a result of the commissioning or testing of the equipment at no additional cost to the Contract.
 - .2 That the equipment is now ready for permanent operation;
-

3.5 INSPECTION,
TESTING AND
START-UP
(Cont'd)

- .2 Test installed equipment with actual plant operation to verify hydraulic balancing, head loss and effluent quality. Make adjustments required to place equipment into operation and to optimize the treated water quality. Sample treated effluent 3-6 weeks after the plant is put into service and provide certified laboratory test results for BOD, TSS, pH and E.Coli to Consultant. Cost of sampling and testing to be included in the Contract.
- .3 The equipment manufacturer's representative will fully instruct the permanent operator of the equipment in the proper operation and maintenance of all equipment at no additional cost to the Contract.
- .4 Advise in writing at least one (1) week in advance of the proposed date for testing and start-up. Conduct all tests in the presence of the Consultant.
- .5 Replace defective material or equipment with new material or equipment. Bear costs including re-testing and repairing.
- .6 A minimum period of two (2) days on site for skilled supervision and instruction and a minimum of two (2) trips to the site should be assumed by the equipment manufacturer. Provide as many trips and days on site to complete the installation and put the equipment into satisfactory operation, including time at site required to inspect the progress of the construction works as it pertains to said equipment.
- .7 Provide training and demonstration of the equipment to the the facility's maintenance staff in accordance with Section 01 79 00.
- .8 Demonstrate that each pump can be easily removed from the lift station without obstruction or removal of any station equipment. Make any adjustments necessary to carry out pump removal in this manner.
- .9 Demonstrate the operation of all valves and make any adjustments necessary to permit the valves to be operated smoothly without obstruction.
- .10 Observe wet well piping during pump operation for leaks and/or loose connections. Repair any leaks identified.

3.5 INSPECTION, TESTING AND START-UP
(Cont'd)

.11 Test pump flow in accordance with specified pump curves stated for pump characteristics. Test pump flow by draw down test, flow meter or SCADA as directed by the Consultant.

3.6 IDENTIFICATION

.1 Locate manufacturer's nameplates so that they are easily read. Do not paint over plates.

Contract No. 160817

HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT

DRAWING LIST

<u>Dwg.</u>	<u>Drawing Title</u>
-	COVER SHEET
CIVIL	
C01	SITE PLAN
ARCHITECTURAL	
A01	BUILDING PLAN, SECTION AND ELEVATIONS
A02	MISCELLANEOUS DETAILS
PROCESS	
P01	WWTP PLAN
P02	WWTP SECTIONS
P03	RECIRCULATING SAND FILTER PLAN
P04	RSF SECTIONS AND MISCELLANEOUS DETAILS
ELECTRICAL	
E01	SITE LAYOUTS
E02	DIAGRAMS, DETAILS AND SCHEDULES



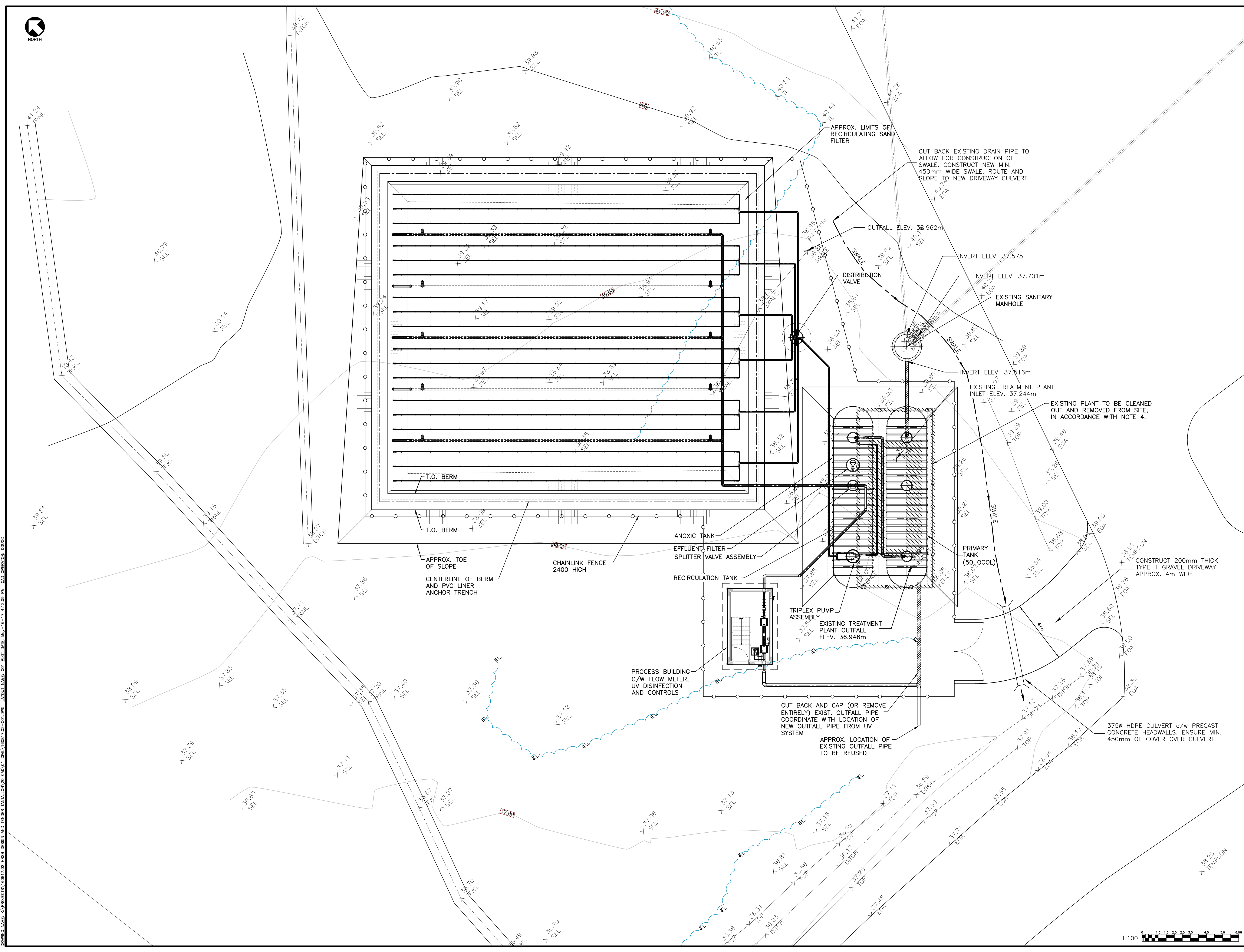
Project No. 160817.02

Issued for
Tender

May 17, 2017



DRAWING NAME: \\PROJECTS\160817\02 - WWTTP REPLACEMENT\02 - CIVIL\160817-02 - WWTTP REPLACEMENT\02 - CIVIL\160817-02 - WWTTP REPLACEMENT.dwg DATE: 16-11-2016 4:12:09 PM CAD: GREGORIO, DOUG



- CIVIL NOTES:**
- DRAWINGS IN GENERAL ARE TO SCALE BUT FIGURED DIMENSIONS TAKE PRECEDENCE. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE ACCURACY OF INFORMATION SCALED FROM THE DRAWINGS.
 - ALL DIMENSIONS USE METRIC UNITS. DIMENSIONS SHOWN IN MILLIMETERS AND POINT ELEVATIONS AS METERS (UNLESS NOTED OTHERWISE).
 - ELEVATIONS ARE REFERENCED TO THE CGVD28 VERTICAL DATUM. SURVEY IS IN NAD83 UTM ZONE 20. CONTRACTOR TO VERIFY SURVEY ELEVATIONS.
 - EXISTING WASTEWATER TREATMENT FACILITY TO REMAIN IN SERVICE DURING CONSTRUCTION FOR AS LONG AS POSSIBLE. TEMPORARY BYPASS OF EFFLUENT PIPE TO BE USED.
 - THE EXISTING INFLUENT AND EFFLUENT SANITARY SERVICES ARE TO BE MAINTAINED AS REQUIRED DURING THE EXECUTION OF PIPEWORK CONNECTIONS.
 - THE CONTRACTOR SHALL CHECK AND VERIFY ALL PROPOSED DIMENSIONS BEFORE PROCEEDING WITH CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
 - ALL WORK TO COMPLY WITH APPLICABLE CODES INCLUDING BUT NOT LIMITED TO CANADIAN ELECTRICAL CODE AND N.S. ONSITE TECHNICAL GUIDELINES.
 - SEPTIC TANK INSTALLATION WORK TO BE DONE BY LICENSED SEPTIC TANK INSTALLER.
 - ALL DISTURBED AREAS TO HAVE TOP SOIL APPLIED AND HYDROSEEDING UNLESS NOTED OTHERWISE AND TO BE REINSTATED AT COMPLETION OF WORK TO EQUAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER.
 - CONTRACTOR TO DESIGN, SUPPLY AND IMPLEMENT SILTATION CONTROL MEASURES. SUBMIT PLAN FOR APPROVAL TO OWNER'S ENGINEER.
 - LOCATION AND DIMENSIONS OF ENVIRONMENTAL PROTECTION MEASURES ARE SHOWN AS APPROXIMATE ONLY. CONTRACTOR TO MODIFY AS REQUIRED TO SUIT ON SITE CONDITIONS.
 - MAINTAIN ENVIRONMENTAL PROTECTION MEASURES FOR THE DURATION OF CONSTRUCTION.
 - SEE PROCESS DRAWING P01 FOR SITE PIPING PLAN, PROCESS NOTES, LEGEND AND ABBREVIATIONS.
 - SEE PROCESS DRAWING P03 FOR RECIRCULATING SAND FILTER.
 - SEE PROCESS DRAWING P04 FOR MISCELLANEOUS DETAILS.

No.	Description	Date	By
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B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

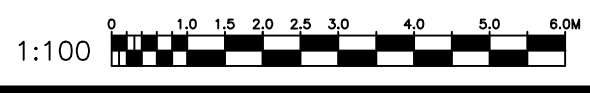
Revision or Issue

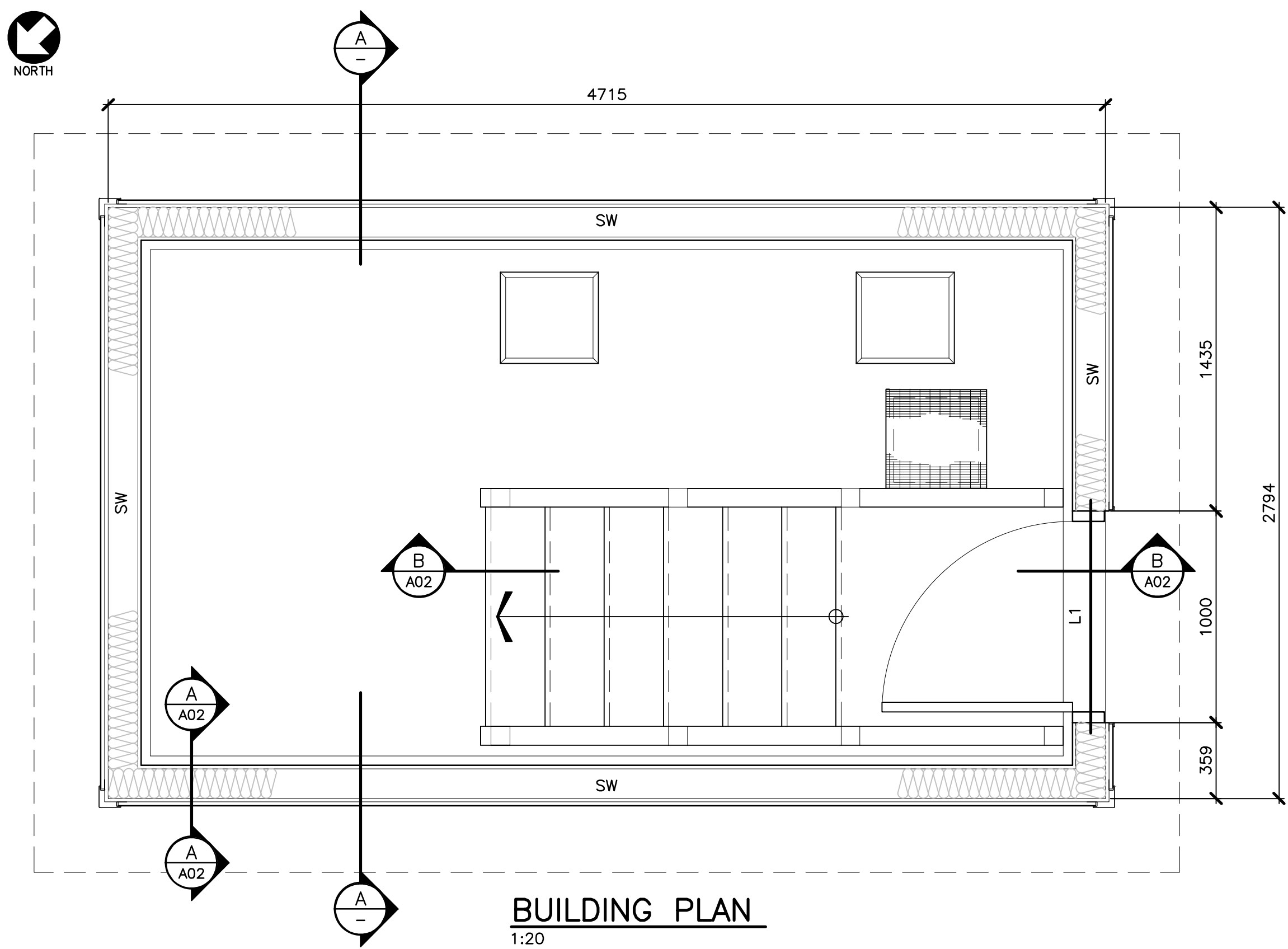
HALIFAX REGIONAL SCHOOL BOARD
TANTALLON ELEMENTARY SCHOOLS WWTTP REPLACEMENT
 CIVIL

SITE PLAN

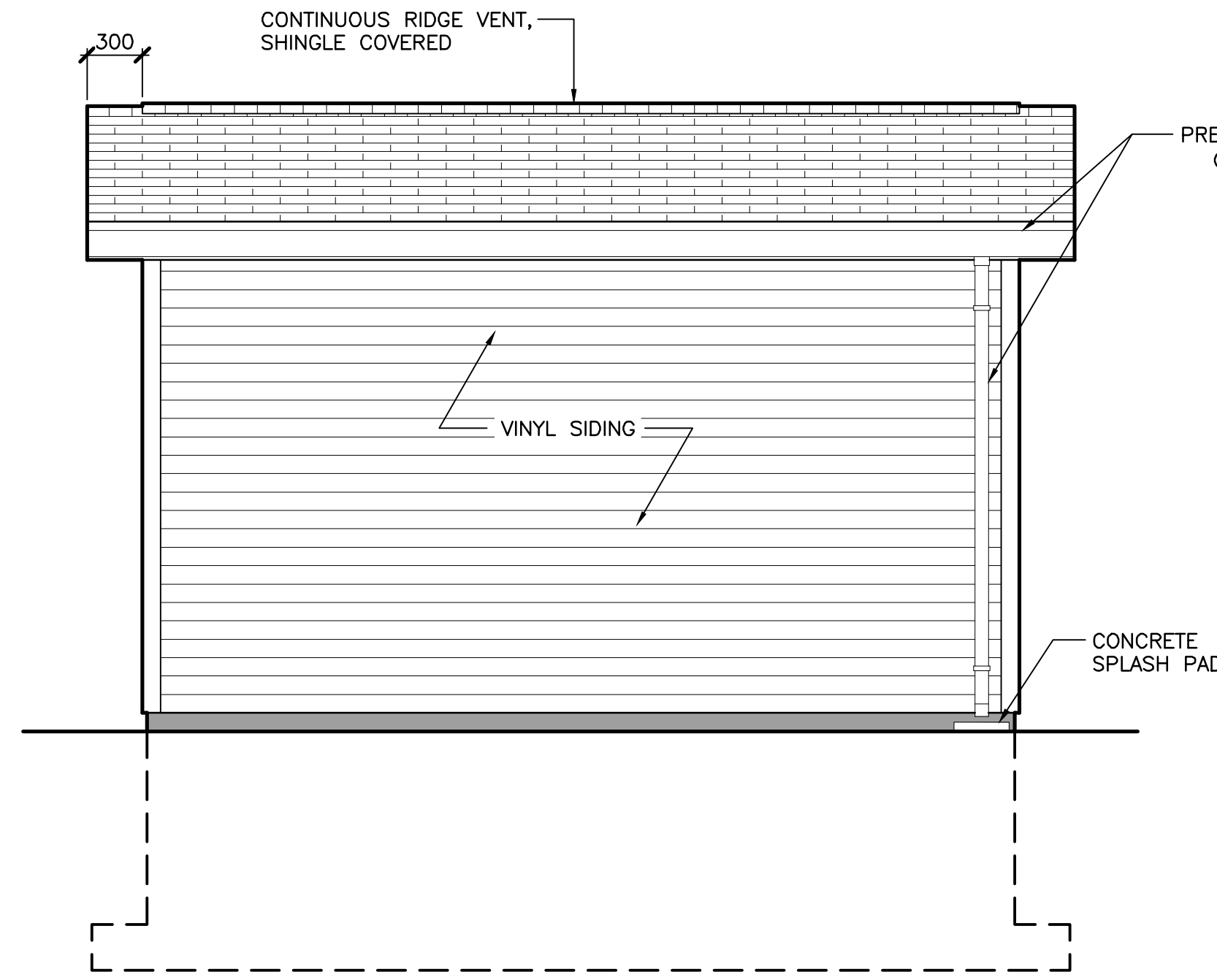


CBCL No 160817.02	Contract No -	Date NOV. 2016	Scale 1:100
Designed SHE	Drawn MAA	Checked WJD	Approved -
Sheet No 1 of 1			
Drawing No C01			

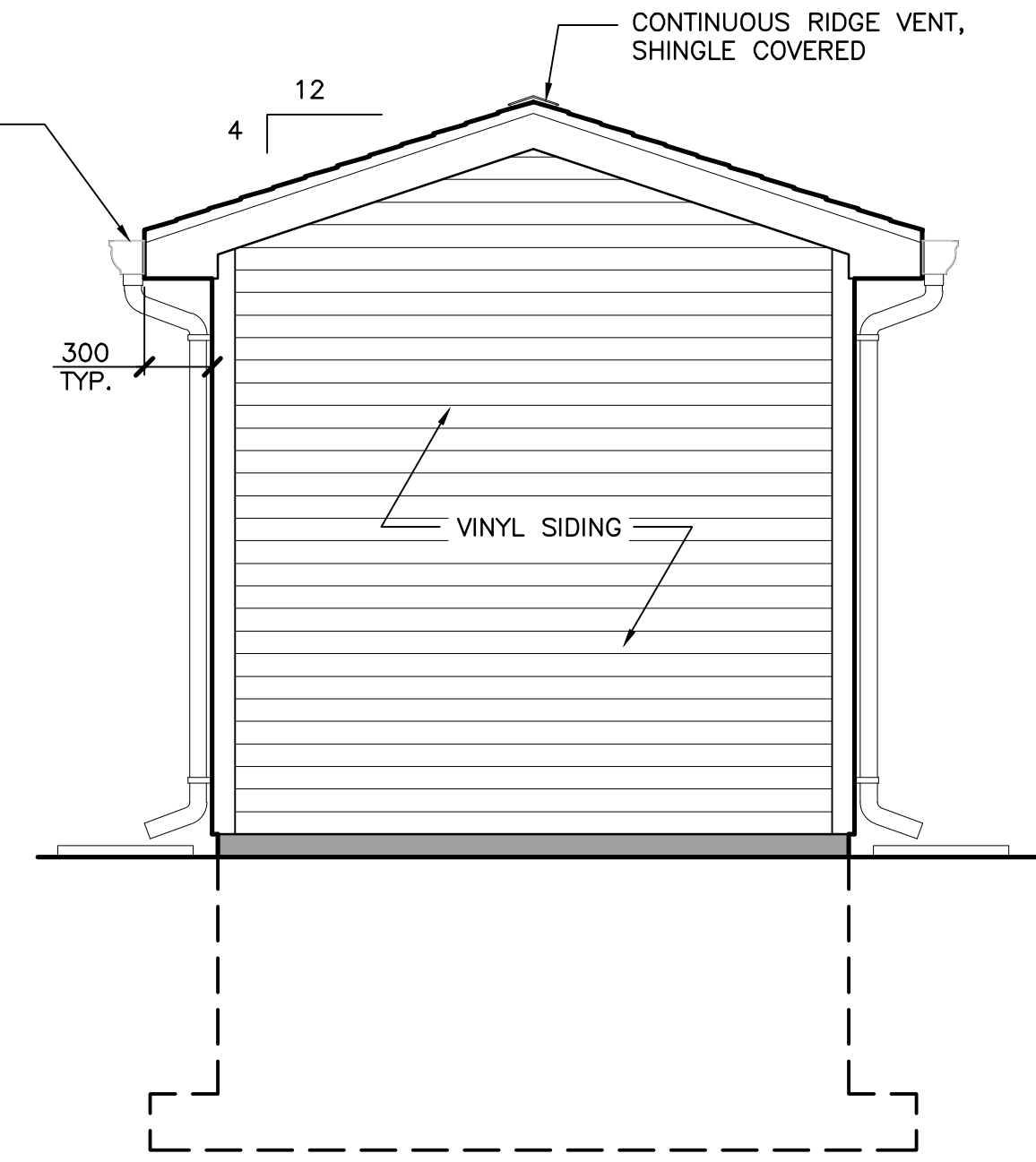




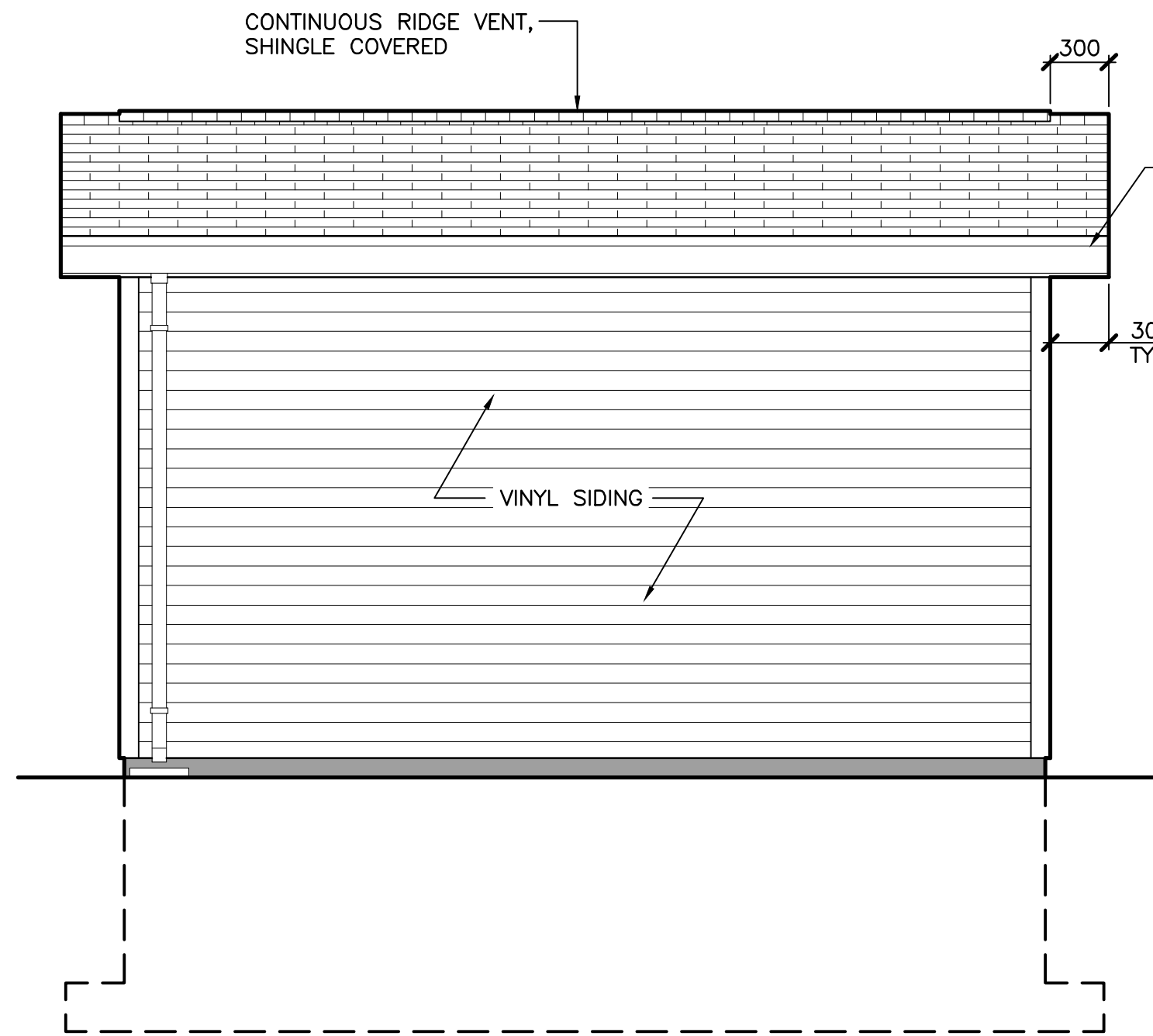
BUILDING PLAN
1:20



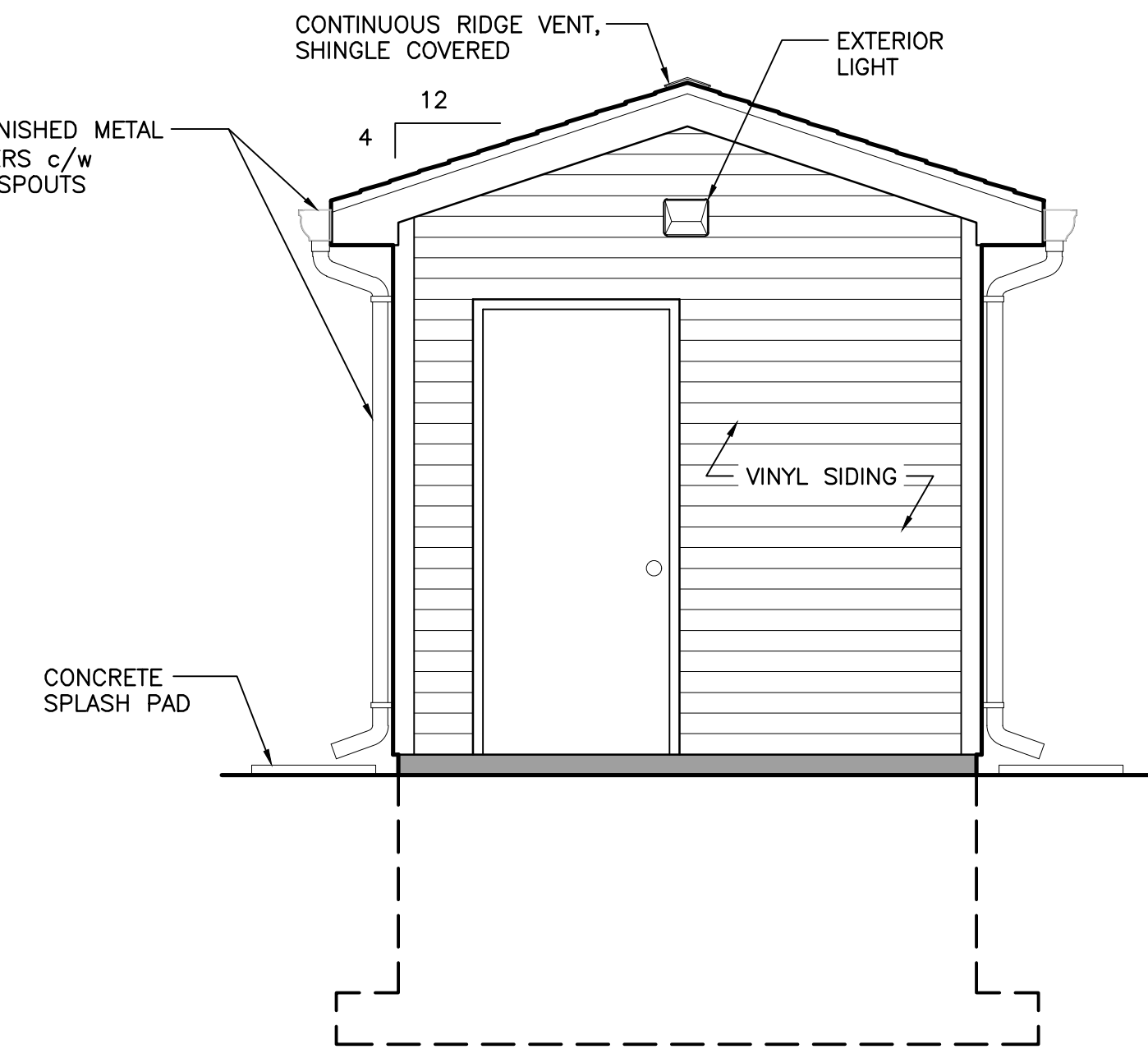
NORTH ELEVATION
1:30



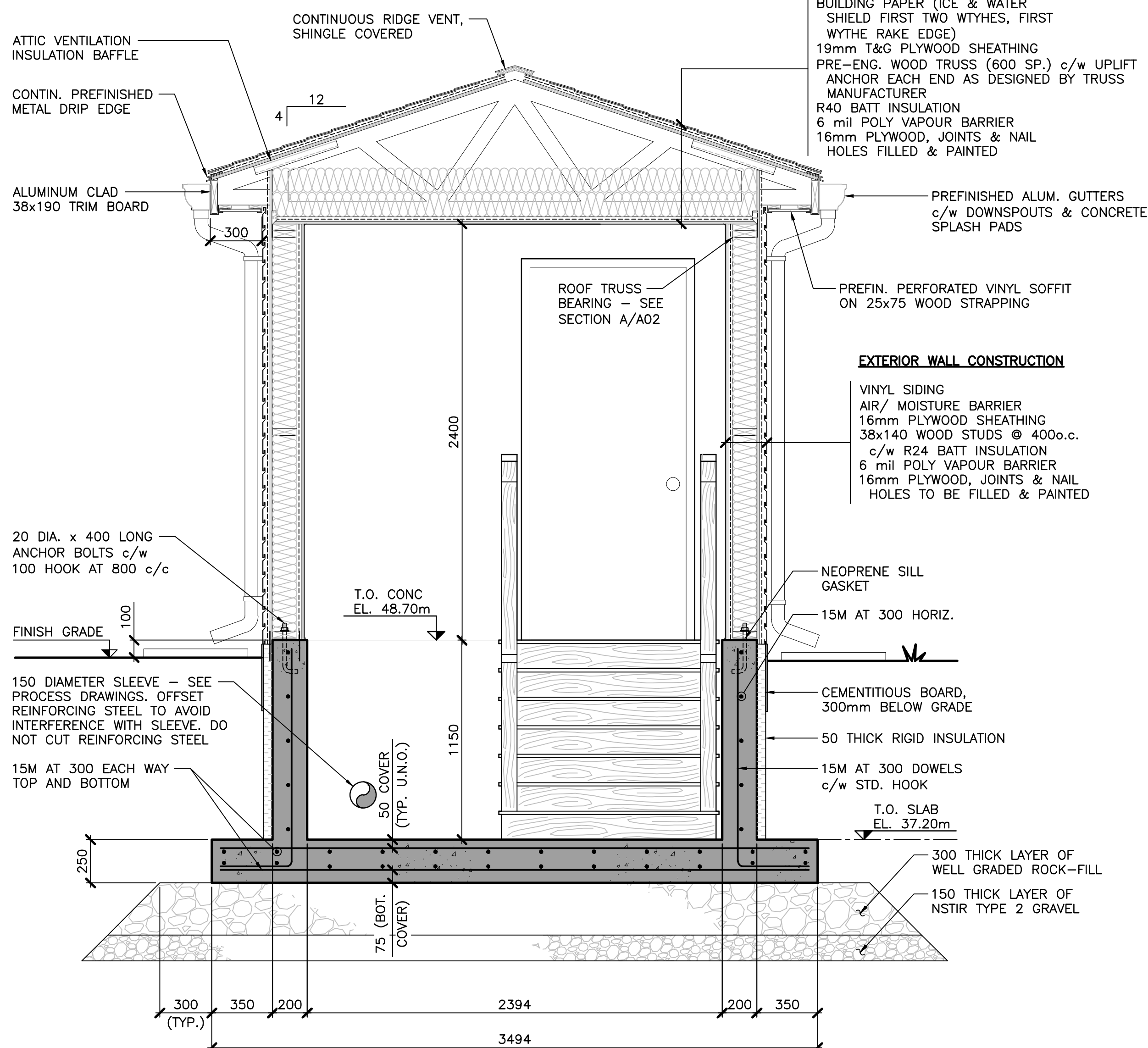
EAST ELEVATION
1:30



SOUTH ELEVATION
1:30



WEST ELEVATION
1:30



A-A BLDG SECTION
1:20

ROOF CONSTRUCTION

ASPHALT SHINGLES
BUILDING PAPER (ICE & WATER SHIELD FIRST TWO WYTHES, FIRST WYTHE RAKE EDGE)
19mm T&G PLYWOOD SHEATHING
PRE-ENG. WOOD TRUSS (600 SP.) c/w UPLIFT ANCHOR EACH END AS DESIGNED BY TRUSS MANUFACTURER
R40 BATT INSULATION
6 mil POLY VAPOUR BARRIER
16mm PLYWOOD, JOINTS & NAIL HOLES FILLED & PAINTED

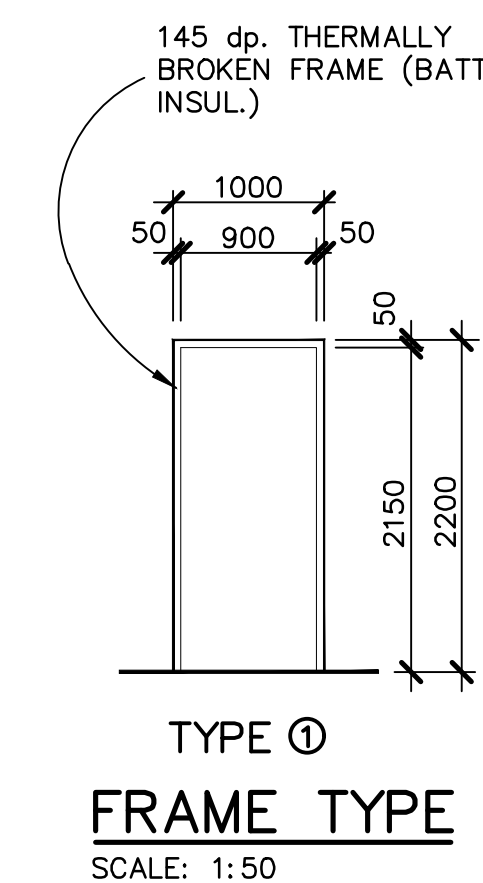
EXTERIOR WALL CONSTRUCTION

VINYL SIDING
AIR / MOISTURE BARRIER
16mm PLYWOOD SHEATHING
38x140 WOOD STUDS @ 400o.c. c/w R24 BATT INSULATION
6 mil POLY VAPOUR BARRIER
16mm PLYWOOD, JOINTS & NAIL HOLES TO BE FILLED & PAINTED

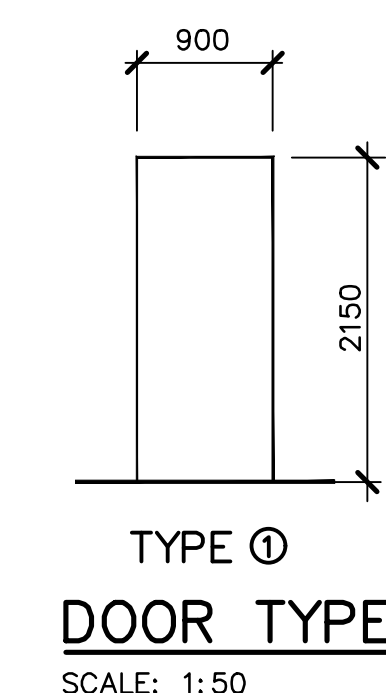
HARDWARE TYPE:

HARDWARE TYPE 1:

- | | | | |
|------------------------|------------------|-----|------|
| 3 BUTT HINGES | FBB191 114 X 101 | NRP | C260 |
| 1 EXIT DEVICE | 12-3828-28C | LL | EN |
| 1 DOOR CLOSER | 351-P3 | | EN |
| 1 OVERHEAD STOP | 598H | | C260 |
| 1 THRESHOLD | CT-47 | | AL |
| 1 WEATHERSTRIPPING SET | W-15 | | AL |
| 1 DOOR SWEEP | W-24S | | AL |
| 1 KICKPLATE | 190S | 305 | C28 |



FRAME TYPE
SCALE: 1:50



DOOR TYPE
SCALE: 1:50

NOTES:

1. FOR GENERAL NOTES AND SPECIFICATIONS - SEE DRAWING A02.

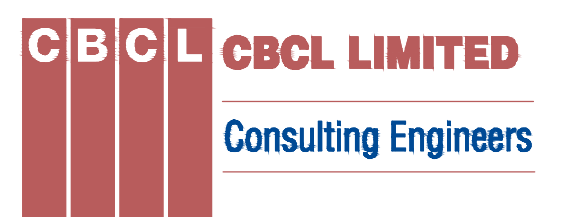
LEGEND:

- SW - STUD SHEAR WALL - SEE SCHEDULE.
L1 - LINTEL SEE SCHEDULE ON DRAWING A02.

No.	Description	Date	By
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B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

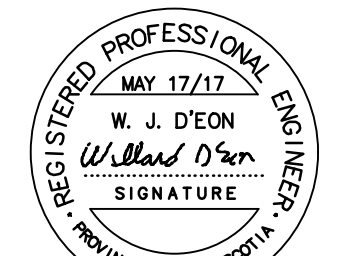
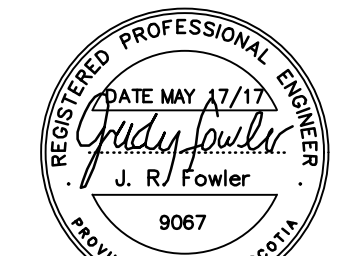
Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD
TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT
ARCHITECTURAL
BUILDING PLAN, SECTION AND ELEVATIONS



CBCL No 160817.02	Contract No -	Date DEC. 2016	Scale AS NOTED
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STRUCTURAL ONLY



Designed MRH	Drawn JVP
Checked MRH	Approved -

Sheet No
1 of 2

Drawing No
A01

DRAWING NAME: TA-PROJECTS\160817.02_HSB-BUILDING PLAN AND TENDER TANTALLON.W20 CAD/02 ARCH\160817.02_A01.DWG LAYOUT NAME: A01 PLOT DATE: May-16-17 12:19:13 PM CAD OPERATOR: MICHELLENE

GENERAL NOTES:

- ALL WORK AND MATERIALS TO CONFORM TO THE REQUIREMENTS OF THE NATIONAL BUILDING CODE OF CANADA, LATEST EDITION.
- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT OF NOVA SCOTIA.
- NO ALTERATIONS TO STRUCTURAL DETAILS TO BE MADE WITHOUT THE WRITTEN PERMISSION OF THE STRUCTURAL ENGINEER. ALL OPENINGS IN SLABS OR WALLS ARE TO BE PRE-FORMED AND ALL HOLES SLEEVED. CONSTRUCTION ERRORS ARE TO BE DOCUMENTED AND REPORTED TO THE STRUCTURAL ENGINEER BEFORE PROCEEDING WITH SUBSEQUENT WORK.
- PERIODIC AND DISCRETIONARY INSPECTIONS ARE MADE AT THE JOB SITE BY THE STRUCTURAL ENGINEER AND ARE NECESSARILY LIMITED IN SCOPE TO OBSERVATION OF WORK IN PROGRESS AT THE TIME OF THE INSPECTION. THESE INSPECTIONS DO NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO PROVIDE CONTINUOUS ON-SITE SUPERVISION OF ALL STRUCTURAL WORK TO ENSURE THAT BOTH THE INTENT AND DETAILS OF THE DRAWINGS AND SPECIFICATIONS ARE BEING FOLLOWED.
- THE CONTRACTOR MUST COORDINATE DETAILS SHOWN ON THE ARCHITECTURAL DRAWINGS WITH THE CIVIL, MECHANICAL, PROCESS AND ELECTRICAL DRAWINGS.
- THE CONTRACTOR MUST EXAMINE ALL DRAWINGS, CHECK ALL DIMENSIONS, AND REPORT ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
- ALL SPECIFIED LOADS ARE UNFACTORED UNLESS NOTED OTHERWISE.
- GRATING 38mm x 4.8mm TYPE 30-102 BY FISHER & LUDLOW. ALL GRATING TO BE GALVANIZED.
- SUBMIT SHOP DRAWINGS STAMPED BY ENGINEER LICENSED IN NOVA SCOTIA FOR THE FOLLOWING:
 - WOOD ROOF TRUSSES INCLUDING TRUSS DESIGN CALCULATIONS AND UPLIFT ANCHORS.

TIMBER NOTES:

- ALL MATERIALS AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE CURRENT EDITIONS OF THE FOLLOWING STANDARDS:
 - CODE FOR ENGINEERING DESIGN IN WOOD CSA 086, LATEST EDITION
 - NATIONAL BUILDING CODE OF CANADA, PART 4
- ALL NAILS, SPIKES AND STAPLES TO BE IN ACCORDANCE NBCC CLAUSE 9.23.3.
- LUMBER FOR LOAD BEARING STUD WALLS, POSTS, AND LINTELS TO BE NO. 1/NO. 2 SPF.
- ALL LOAD BEARING STUD WALLS TO BE SOLID BLOCKED AT ALL PLYWOOD PANEL EDGES OF THE WALL.
- STUD WALL TOP PLATES TO BE LAPPED AND HAVE 30 - 3" LONG NAILS (CINCHED) INSTALLED IN 2 ROWS. LAPS OF THE DIFFERENT ROWS TO BE STAGGERED.

ROOF FRAMING:

- PROVIDE TRUSS UPLIFT ANCHORS AT ALL ROOF TRUSS BEARING POINTS. UPLIFT ANCHORS TO BE DESIGNED BY TRUSS MANUFACTURER'S ENGINEER.
- ROOF SHEATHING TO BE 19mm TONGUE AND GROOVE PLYWOOD.
- ROOF SHEATHING TO BE NAILED WITH 2.5" LONG NAILS AT 150 c/c AT PANEL EDGES AND 2.5" LONG NAILS AT 300 c/c ALONG INTERMEDIATE FRAMING.
- CEILING SHEATHING TO BE 16mm TONGUE AND GROOVE PLYWOOD BLOCKED AT ALL UNSUPPORTED JOINTS. FASTEN WITH 2.5" LONG NAILS AT 150 c/c AT ALL PANEL JOINTS AND AROUND PERIMETER OF BUILDING. FASTEN TO INTERMEDIATE FRAMING MEMBERS WITH 2.5" LONG NAILS AT 300 c/c.

SHEAR WALL SCHEDULE:

- SW - 38 x 140 STUDS AT 400 c/c (No. 1/No. 2 SPF)
 16 THICK PLYWOOD SHEATHING EACH FACE, BLOCKED AT ALL UNSUPPORTED EDGES
 2.5" NAILS AT 150 c/c AT PANEL EDGES
 2.5" NAILS AT 300 c/c AT INTERMEDIATE FRAMING

HOLD DOWN ANCHOR SCHEDULE:

- HD - HDU2-SDS2.5 BY SIMPSON STRONG TIE (OR APPROVED EQUIVALENT) c/w 2 - 38 x 140 STUDS FULL HEIGHT AND NAILING PATTERN AS SHOWN IN DETAIL 1/A02. PROVIDE 3/8" DIAMETER SSTB16 CAST IN PLACE ANCHOR BOLT CENTERED IN TIMBER WALL (OR APPROVED EQUIVALENT).

REINFORCED CONCRETE NOTES:

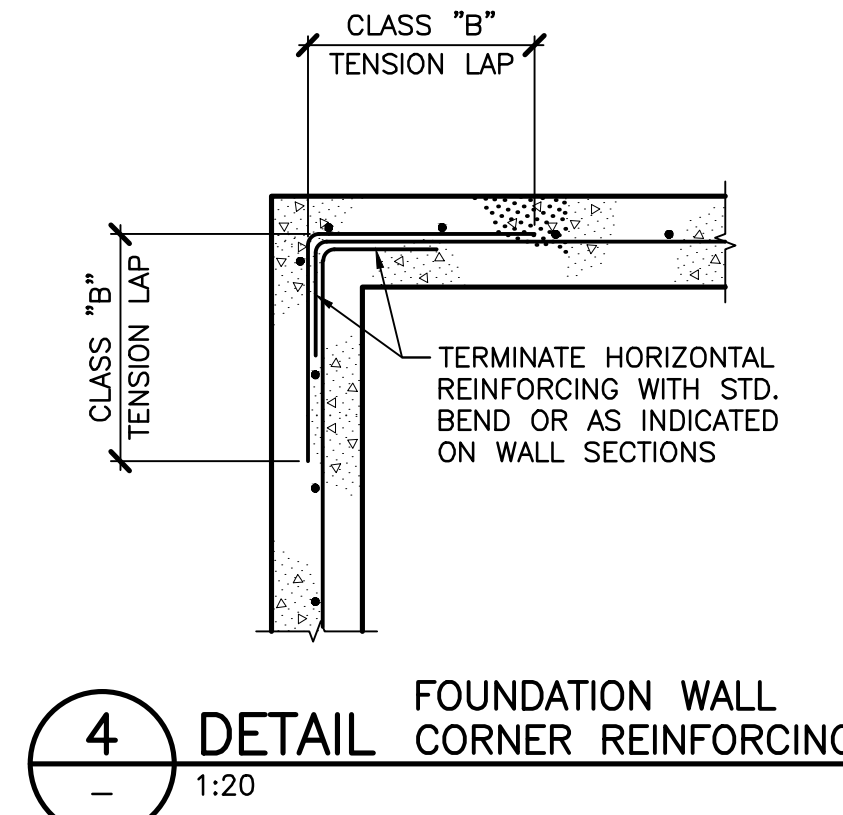
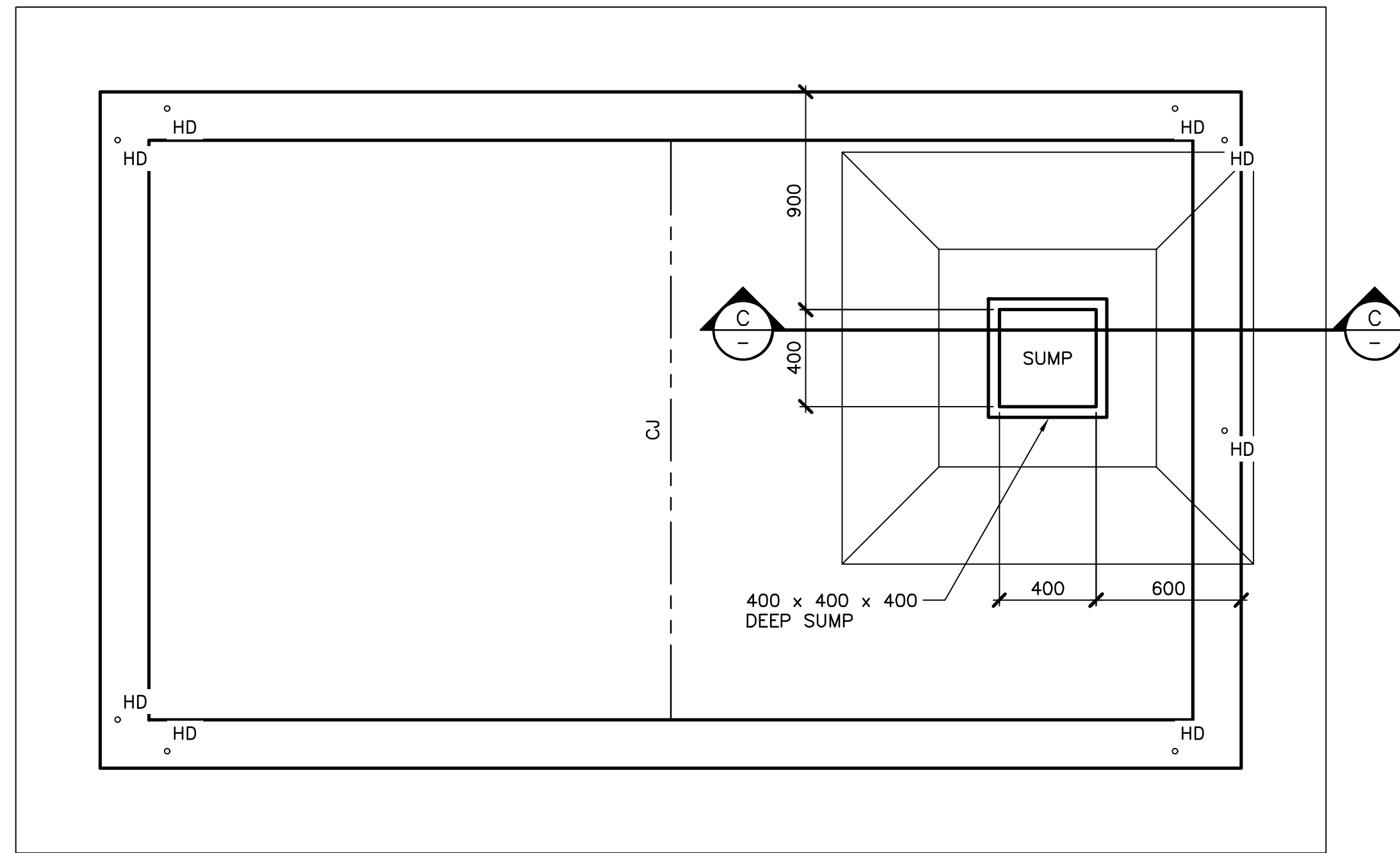
- ALL CONCRETE, CONCRETE MATERIALS, FORMS, WORKING PROCEDURES AND THE LIKE TO CONFORM TO CSA A23.1, LATEST EDITION, UNLESS NOTED OTHERWISE.
- MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS AND CLASS OF EXPOSURE TO BE AS FOLLOWS:
 - FOUNDATION WALLS AND SLAB:25 MPa/F-2
- CONCRETE COVER TO REINFORCEMENT UNLESS NOTED:
 - FOUNDATIONS:
 - CAST AGAINST FORMWORK, EXPOSED TO THE EARTH OR WATER:50mm
 - CAST AGAINST SOIL:75mm
 - WALLS:
 - FORMED AND EXPOSED TO EARTH OR WATER:.....50mm
- ALL REINFORCING STEEL MUST HAVE A MINIMUM YIELD POINT STRENGTH OF 400 MPa AND SHALL CONFORM TO CSA G30.18-M92.
- UNLESS NOTED OTHERWISE, REINFORCING STEEL TO BE PROVIDED WITH A CLASS 'B' TENSION LAP TO CSA A23.3 LATEST EDITION AT ALL SPLICE LOCATIONS.

LINTEL SCHEDULE:

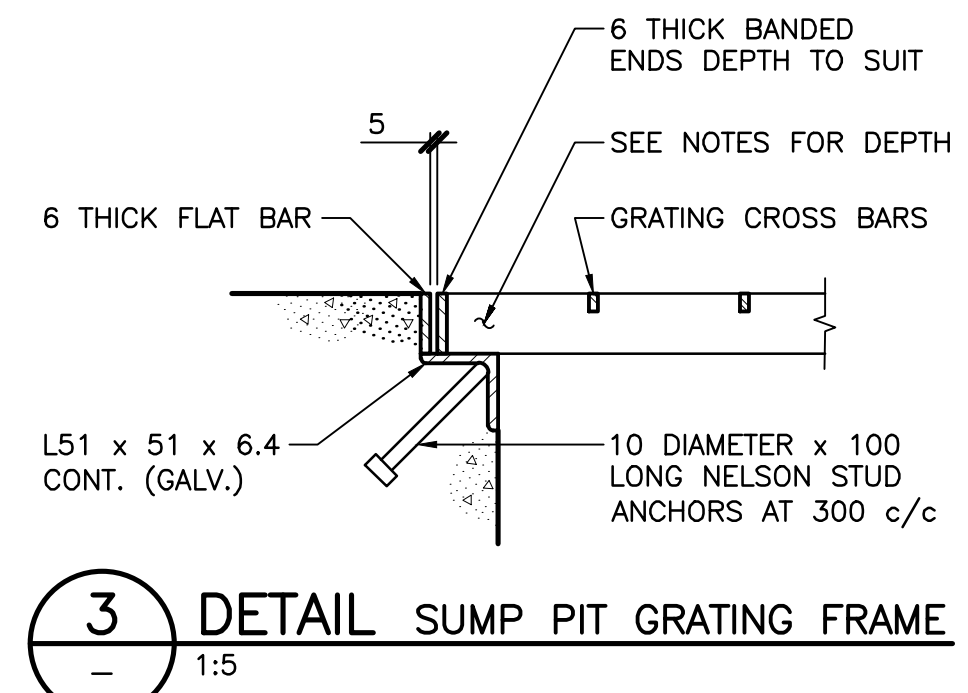
- L1 - 2 - 38 x 140 LINTEL c/w 1 JACK STUD + 1 FULL HEIGHT STUD EACH END
- NOTE: ALL LINTELS TO BEAR FULLY ON JACK STUDS. SEE SECTION D/A02 FOR TYPICAL LINTEL DETAIL.

ROOF DESIGN LOADS (POST DISASTER):

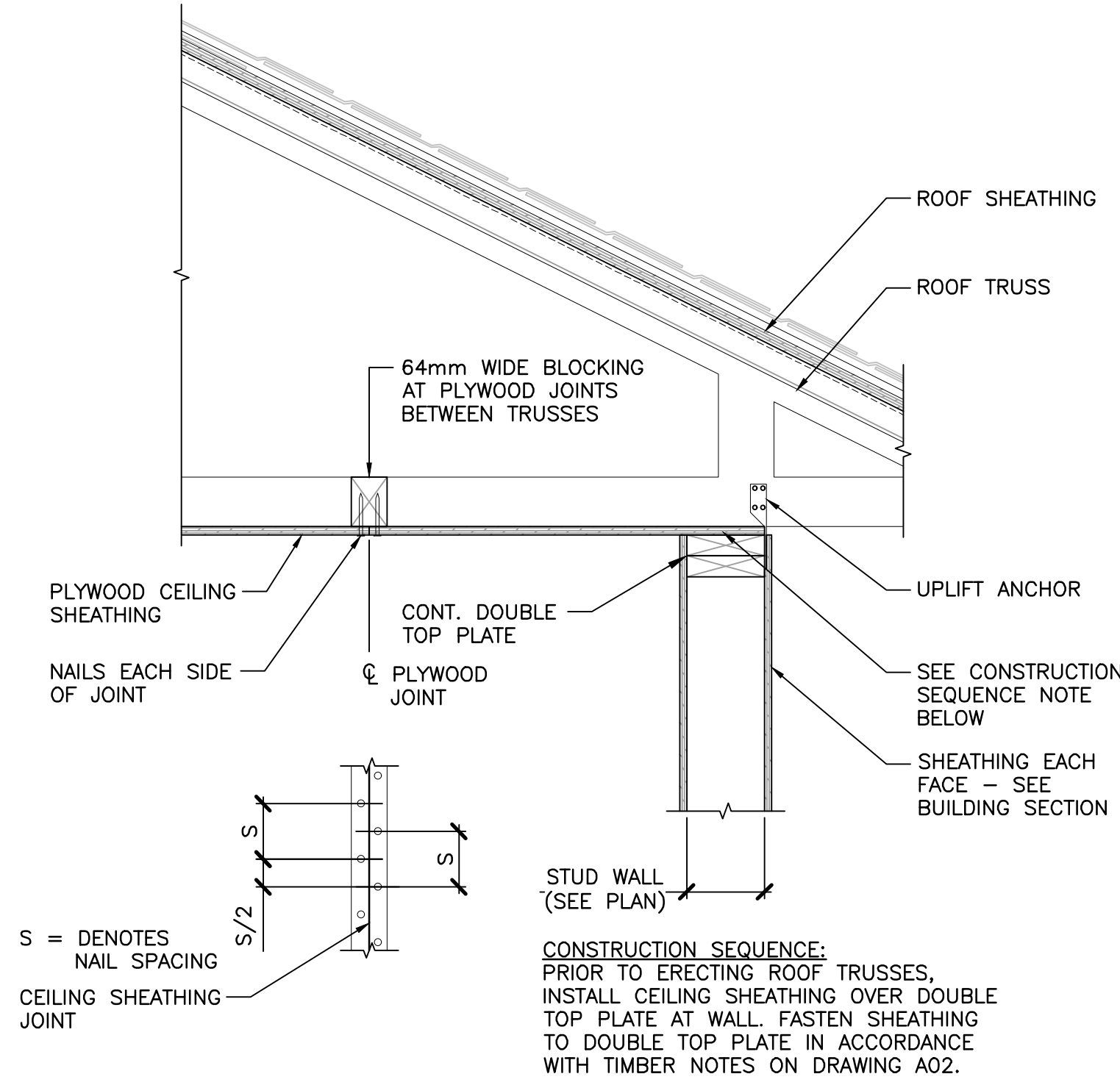
- DESIGN CRITERIA..... L/300 TYPICAL
- DEAD LOAD:**
- TOP CHORD..... 0.26kPa (EXCLUDING SELF WEIGHT)
 BOTTOM CHORD..... 0.24kPa (EXCLUDING SELF WEIGHT)
 BOTTOM CHORD SUSPENDED..... 0.25kPa
- LIVE LOAD:**
- BOTTOM CHORD..... 0.50kPa
- SNOW LOADS:**
- TOP CHORD..... 2.65kPa (CASE 1 UNIFORM)
 TOP CHORD..... 2.65kPa (CASE 2 UNBALANCED)
- GROSS WIND UPLIFT:**
- TOP CHORD..... 1.31kPa (END ZONE, WIDTH = 0.3m)
 TOP CHORD..... 0.85kPa (TYPICAL)
 BOTTOM CHORD..... 0.90kPa



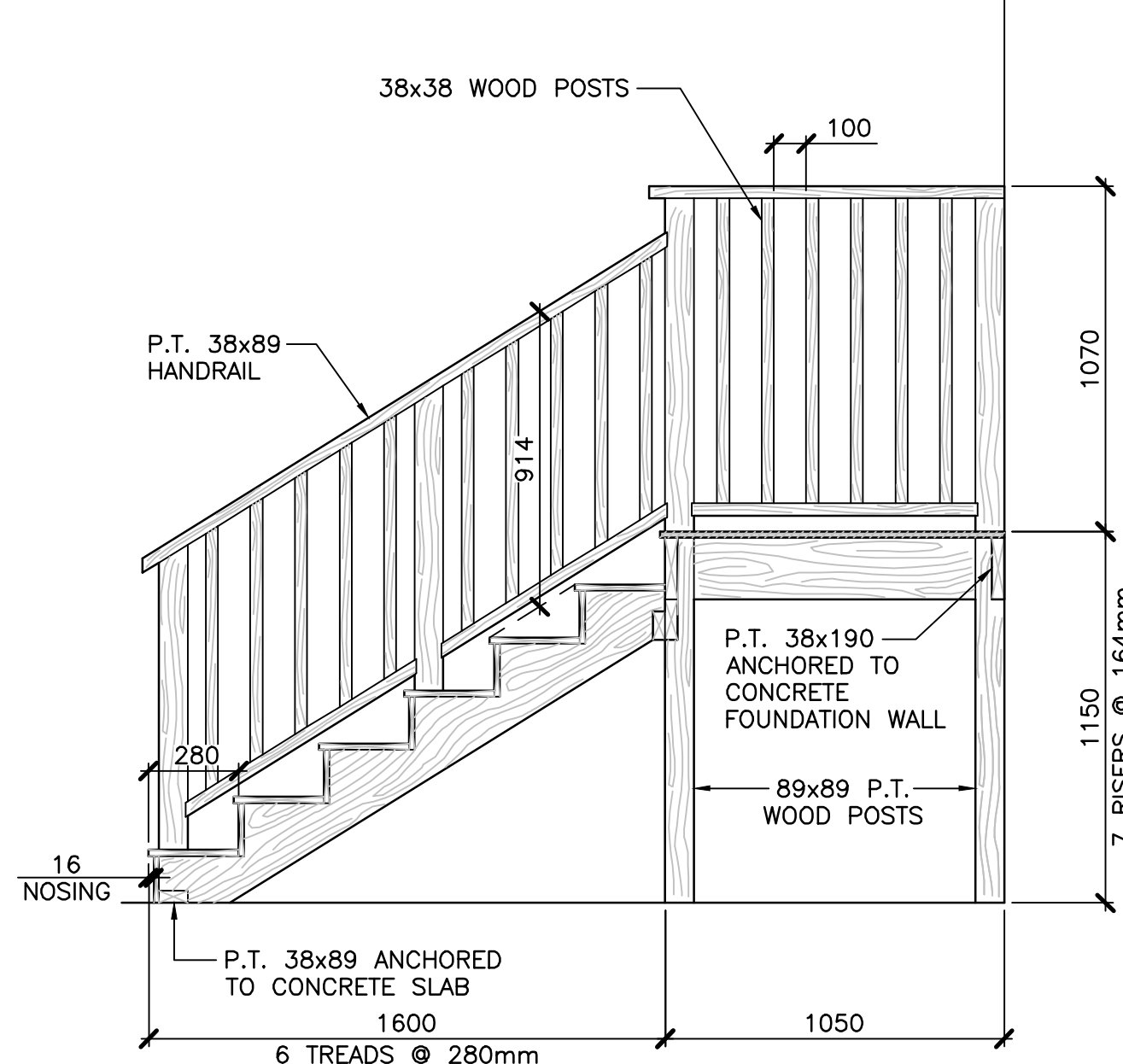
FOUNDATION PLAN
1:20



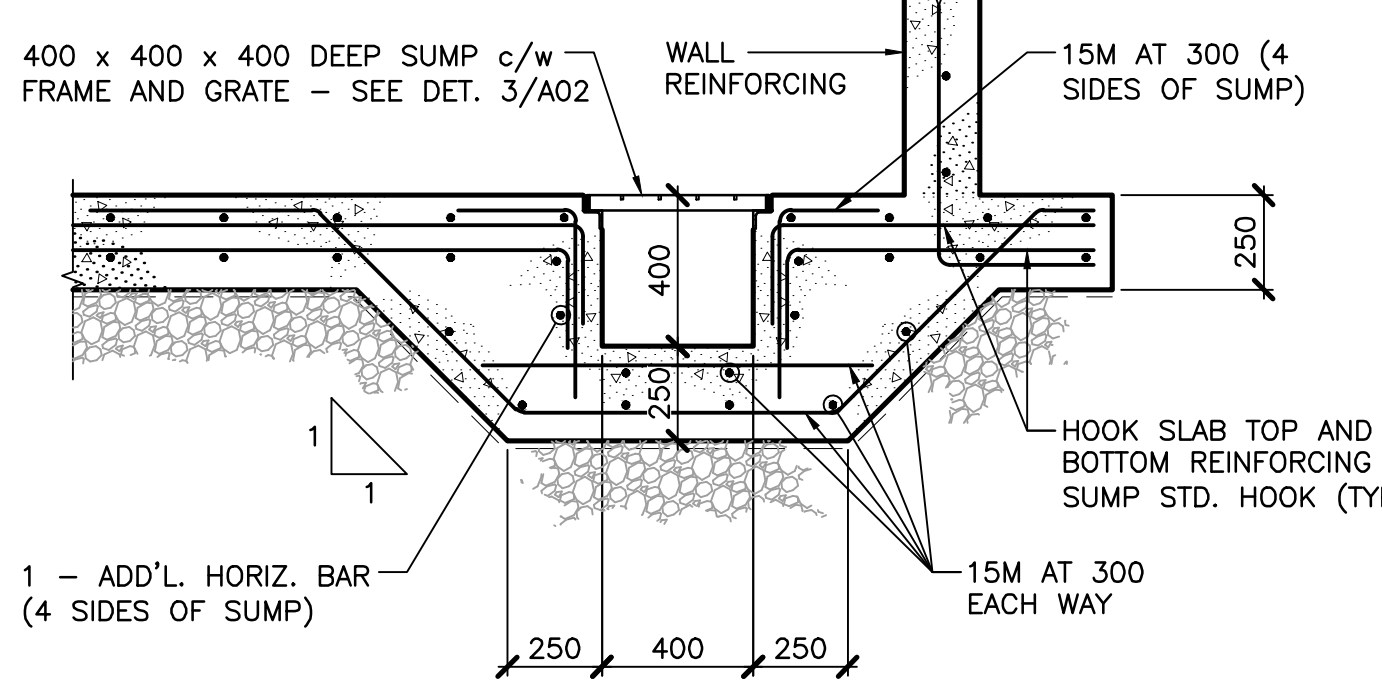
DETAIL 3 DETAIL SUMP PIT GRATING FRAME
1:5



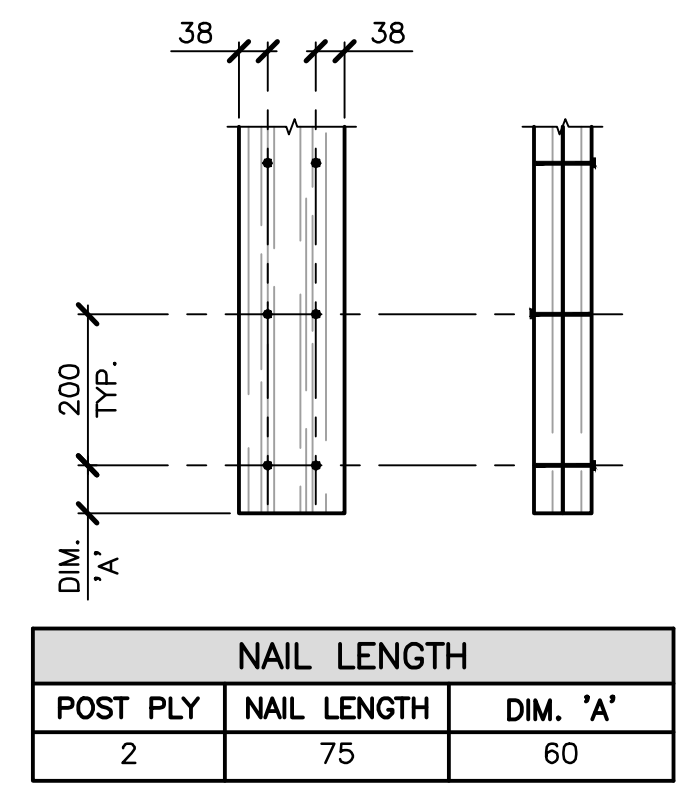
SECTION A SECTION ROOF TRUSS BEARING
1:10



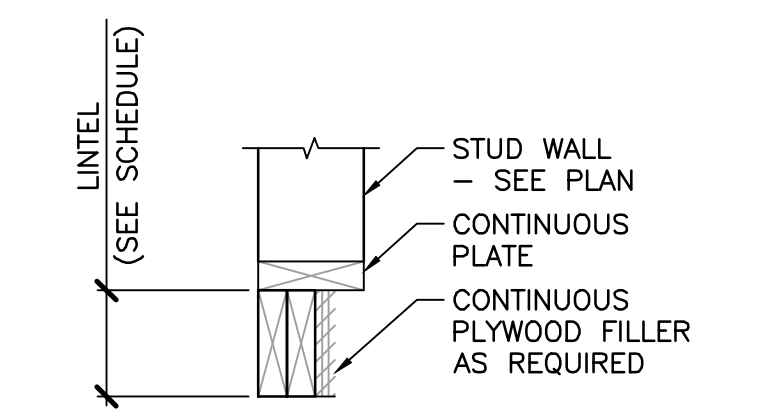
SECTION B STAIR SECTION
1:20



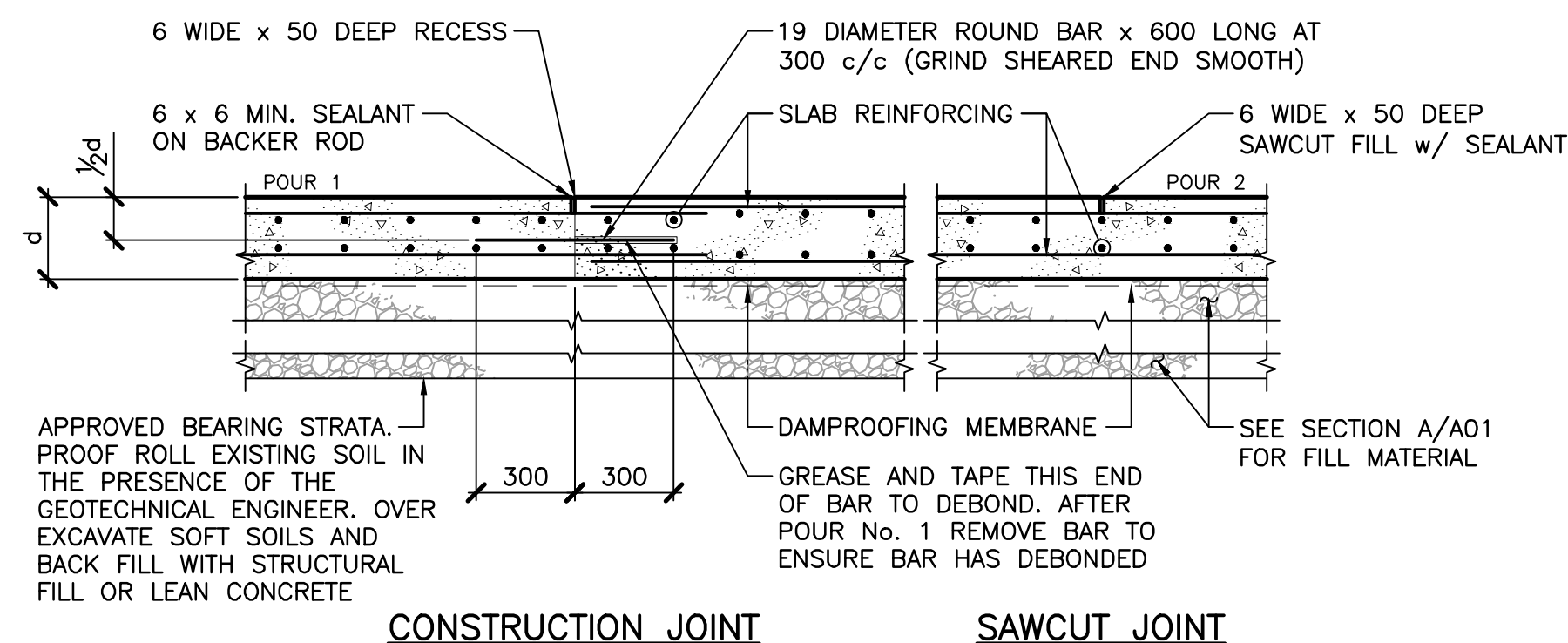
SECTION C SECTION TYPICAL SUMP PIT
1:20



DETAIL 1 TYPICAL POST NAILING PATTERN
1:10



SECTION D SECTION TYPICAL LINTEL
1:10



DETAIL 2 DETAIL TYPICAL CONSTRUCTION/CONTROL JOINT
1:20

LEGEND:

CJ	-	SLAB CONTROL JOINT - SEE DETAIL 2/A02.
HD	-	HOLD DOWN ANCHOR - SEE SCHEDULE.

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	JDF
B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD

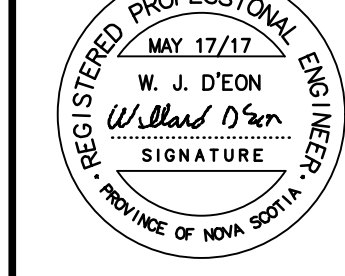
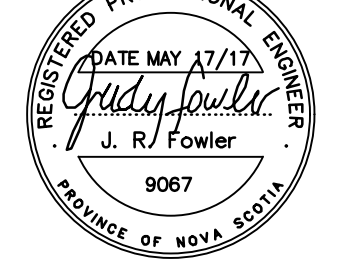
TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT ARCHITECTURAL

MISCELLANEOUS DETAILS

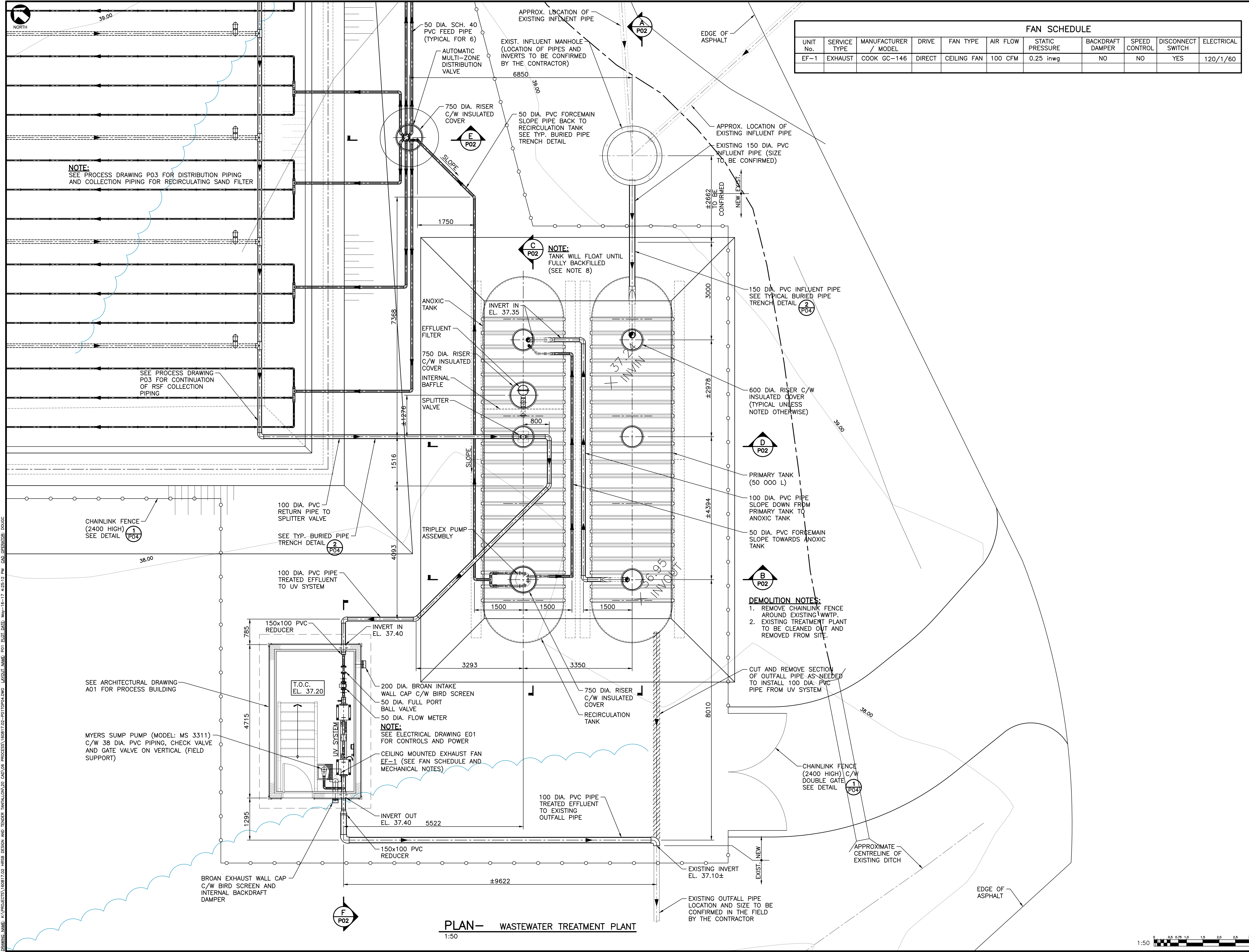


CBCL No 160817.02	Contract No -	Date DEC. 2016	Scale AS NOTED
Designed MRH	Drawn JVP	Checked MRH	Approved -
Sheet No 2 of 2		Drawing No A02	

STRUCTURAL ONLY



DRAWING NAME: TA PROJECTS\160817.02_HSSB DESIGN AND TENDER TANTALLON\20 CAD\02 ARCH\160817.02_A01.DWG LAYOUT NAME: A02 CAD CREATOR: MICHELENEB



FAN SCHEDULE										
UNIT No.	SERVICE TYPE	MANUFACTURER / MODEL	DRIVE	FAN TYPE	AIR FLOW	STATIC PRESSURE	BACKDRAFT DAMPER	SPEED CONTROL	DISCONNECT SWITCH	ELECTRICAL
EF-1	EXHAUST	COOK GC-146	DIRECT	CEILING FAN	100 CFM	0.25 inwg	NO	NO	YES	120/1/60

- PROCESS NOTES:**
- DRAWINGS IN GENERAL ARE TO SCALE BUT FIGURED DIMENSIONS TAKE PRECEDENCE. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE ACCURACY OF INFORMATION SCALED FROM THE DRAWINGS.
 - ALL DIMENSIONS USE METRIC UNITS. DIMENSIONS SHOWN IN MILLIMETERS AND POINT ELEVATIONS AS METERS (UNLESS NOTED OTHERWISE).
 - INSULATE PVC RISERS WITH 50 THICK CLOSED CELL SPRAY FOAM INSULATION C/W PREFINISHED ALUMINUM CLADDING ON SURFACES EXPOSED TO SUNLIGHT. ALSO INSULATE INSIDE OF COVER OR LID WITH 50 THICK HIGH DENSITY RIGID INSULATION.
 - ALL PIPE HANGERS, SUPPORTS AND ASSOCIATED HARDWARE WITHIN TANKS SHALL BE 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
 - ABSOLUTELY NO JUNCTION BOXES WITHIN TANKS OR RISERS.
 - FLOAT ELEVATIONS ARE TO BE CONFIRMED DURING SHOP DRAWING REVIEW.
 - TANKS TO BE INSTALLED TO MANUFACTURER'S REQUIREMENTS.
 - TANKS WILL FLOAT UNTIL FULLY BACKFILLED. PROTECT EXCAVATION FROM INFLOW AND SCHEDULE WORK SO THAT INSTALLED TANKS ARE BACKFILLED QUICKLY AND FILLED WITH WATER.
 - SEE CIVIL DRAWING C01 FOR EXISTING SITE PLAN.
 - SEE PROCESS DRAWING P02 FOR WWTP SECTIONS, DRAFTING LEGEND AND ABBREVIATIONS.
 - SEE PROCESS DRAWING P03 FOR RECIRCULATION SAND FILTER PLAN
 - SEE PROCESS DRAWING P04 FOR MISCELLANEOUS DETAILS.

- MECHANICAL NOTES:**
- EXHAUST FAN TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.
 - FIELD ROUTE AND SUPPORT INSULATED EXHAUST DUCT TO VENT CAP ON EXTERIOR WALL.
 - CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO STARTING CONSTRUCTION.

- DEMOLITION NOTES:**
- REMOVE CHAINLINK FENCE AROUND EXISTING WWTP.
 - EXISTING TREATMENT PLANT TO BE CLEANED OUT AND REMOVED FROM SITE.

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	MAA
B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT PROCESS

WWTP PLAN

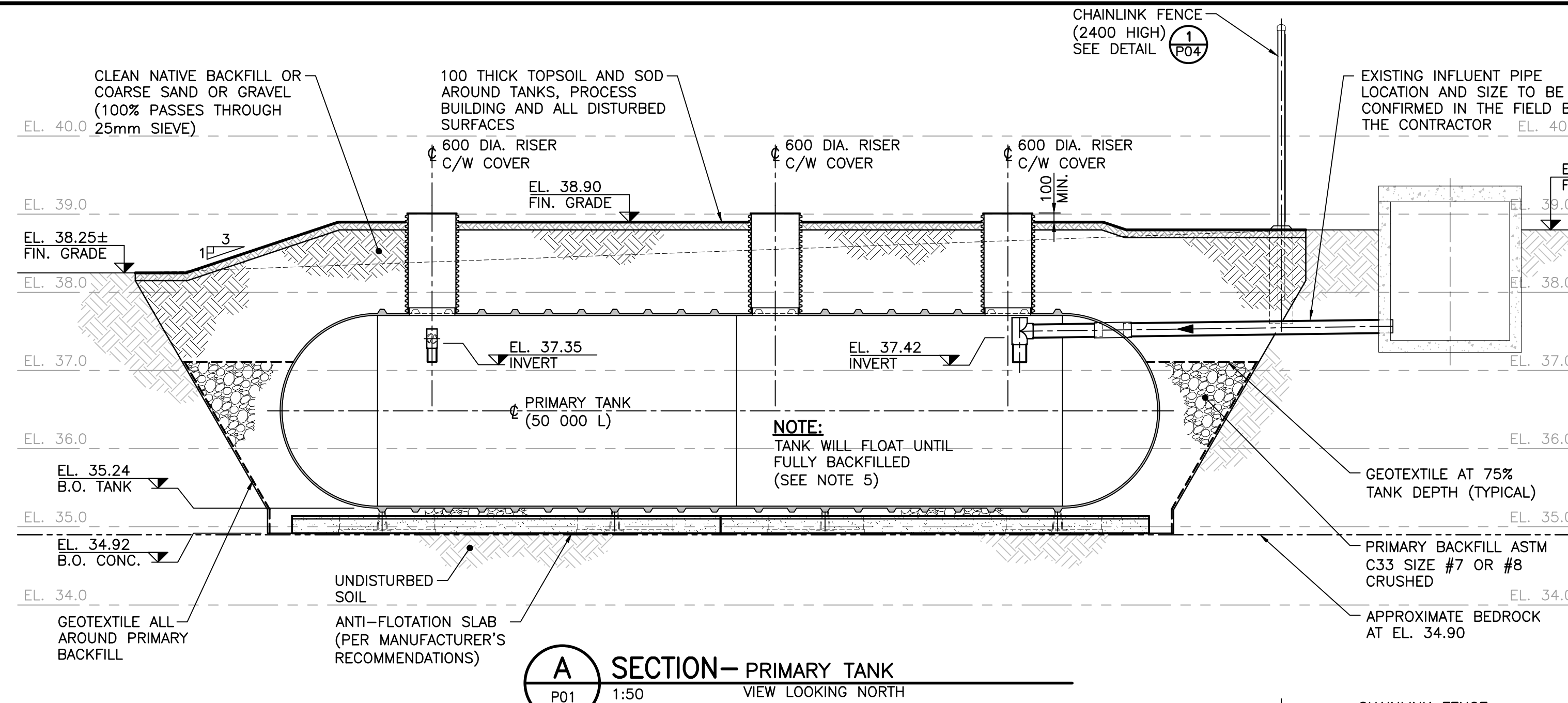


CBCL No. 160817.02	Contract No. -	Date NOV. 2016	Scale 1:50
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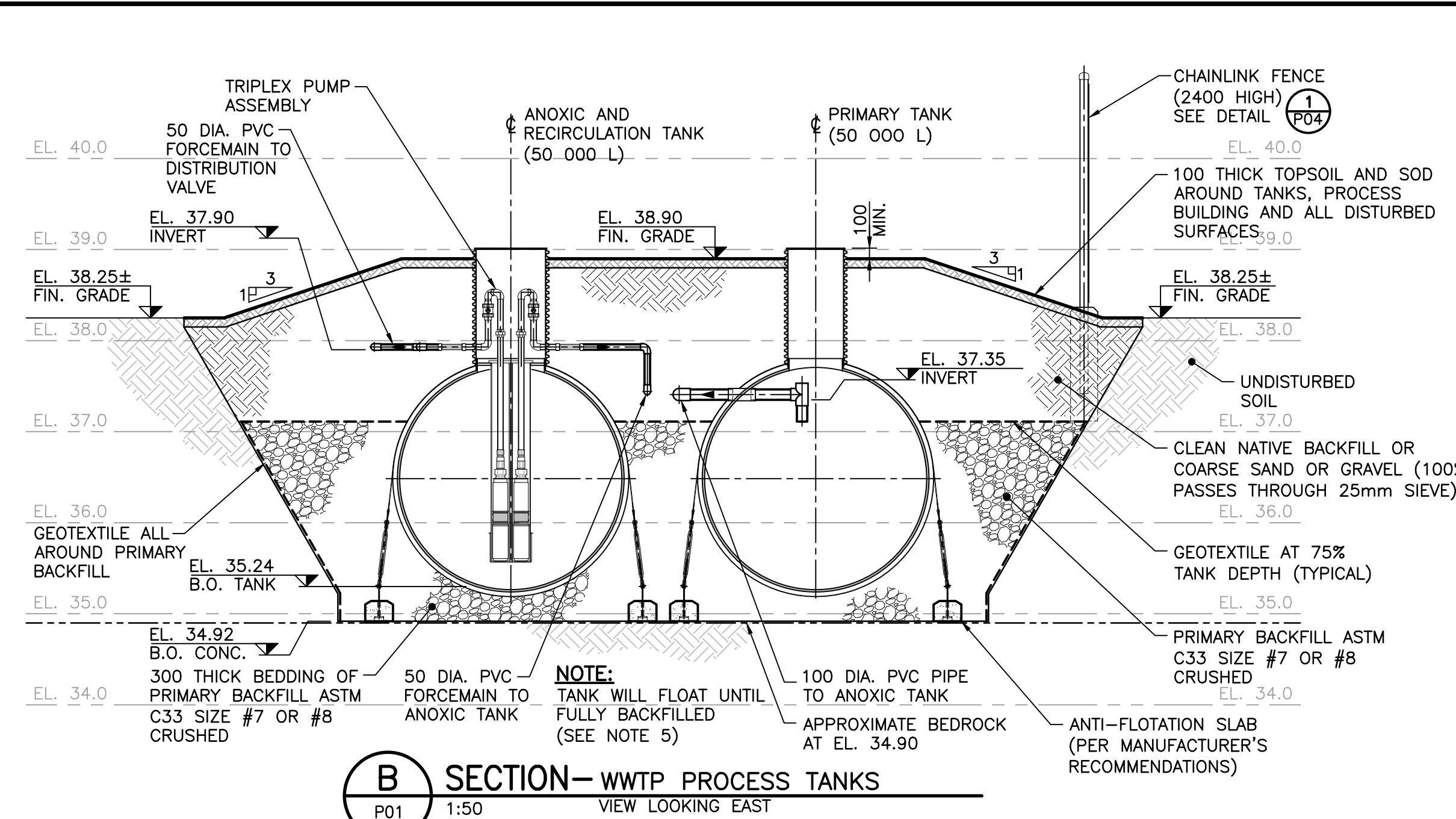
Designed SHE	Drawn MAA
Checked WJD	Approved -
Sheet No. 1 of 4	Drawing No. P01



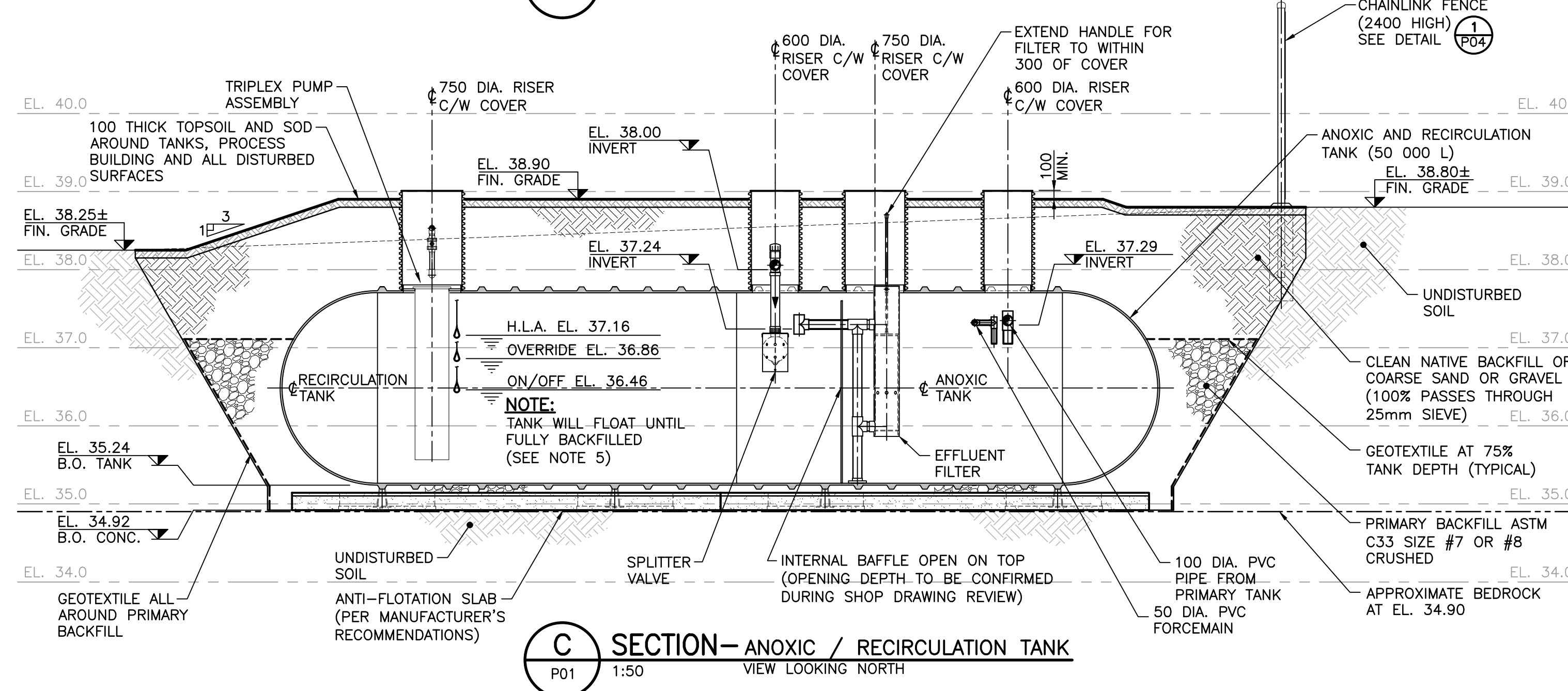
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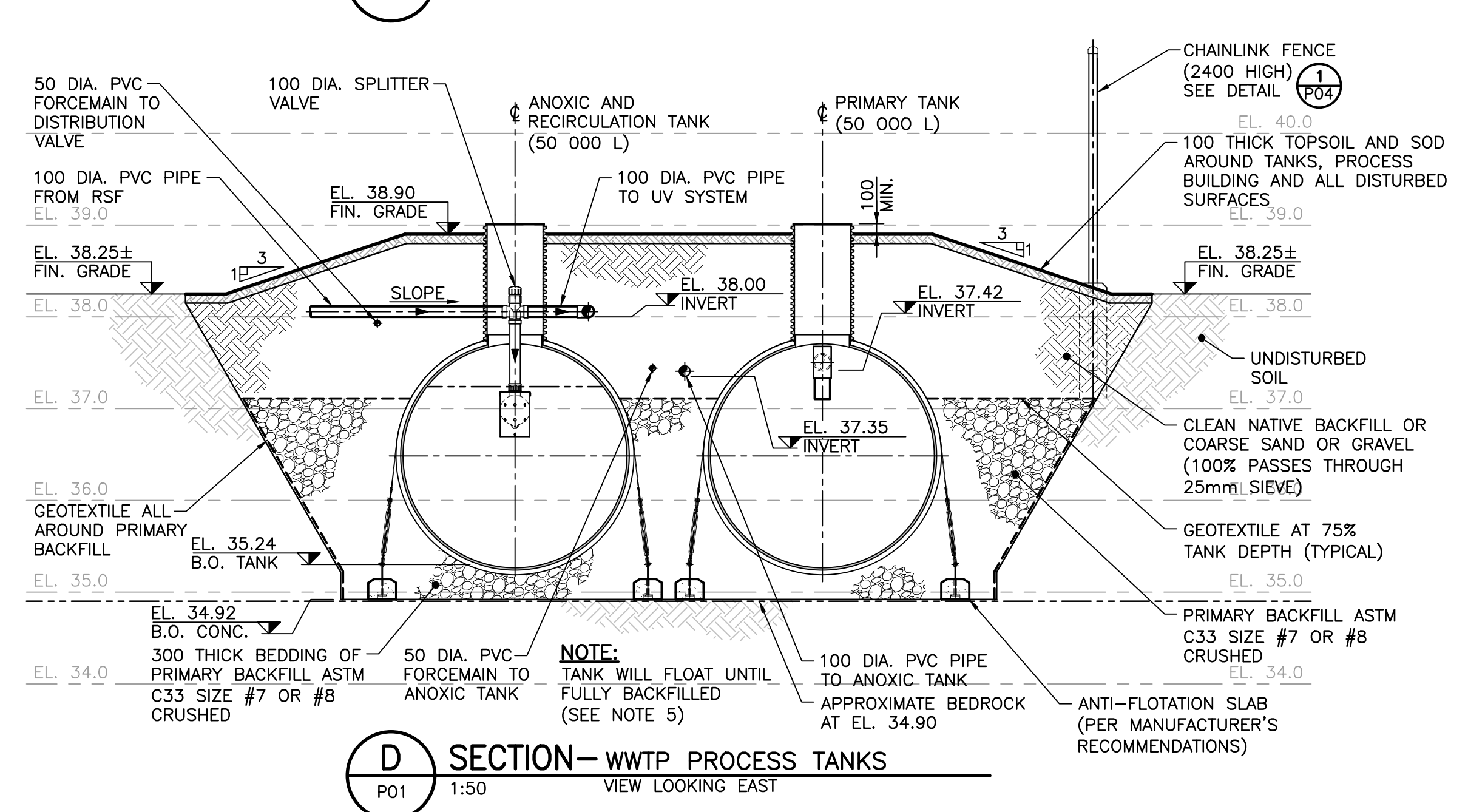
A SECTION- PRIMARY TANK
P01 1:50 VIEW LOOKING NORTH



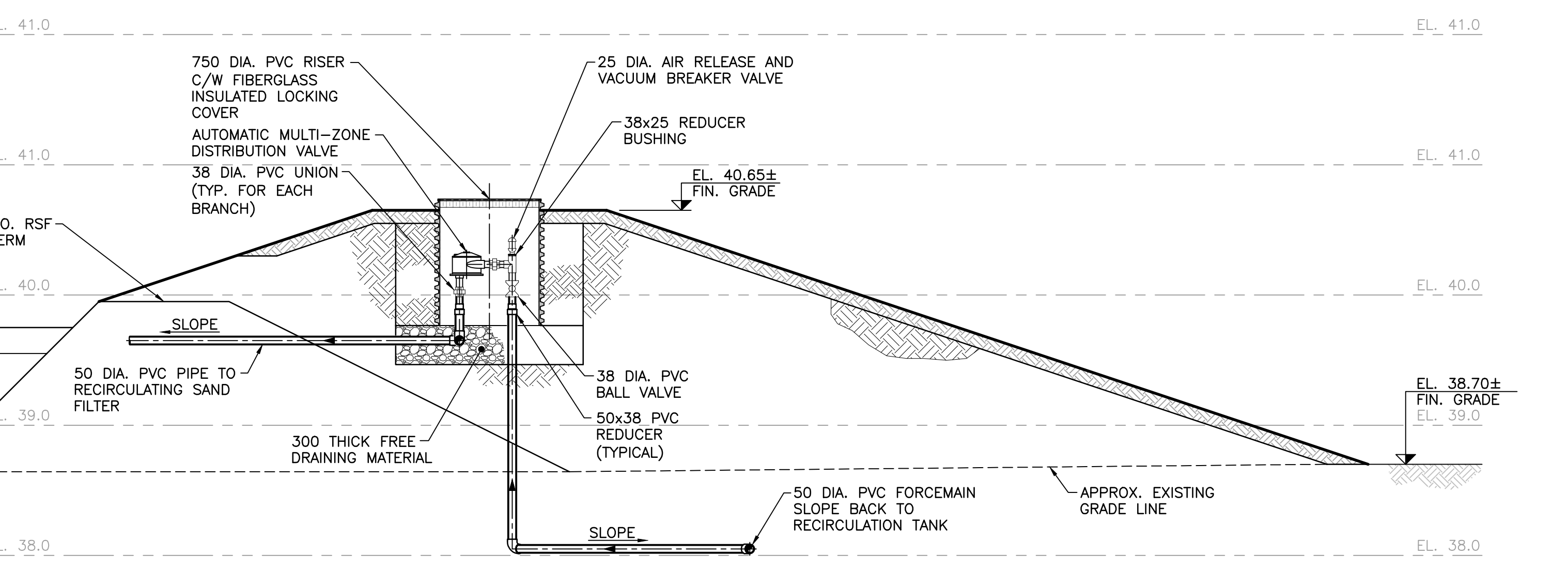
B SECTION- WWT PROCESS TANKS
P01 1:50 VIEW LOOKING EAST



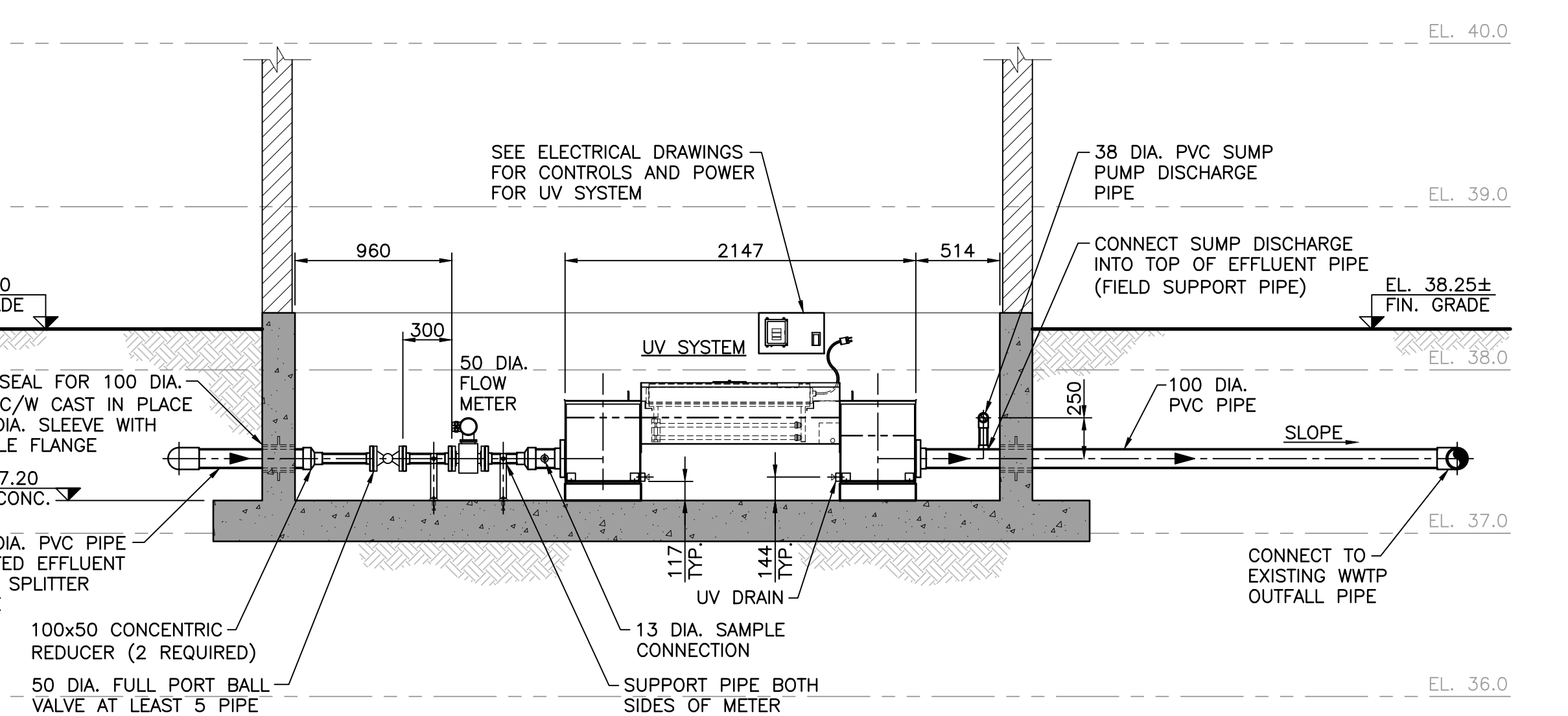
C SECTION- ANOXIC / RECIRCULATION TANK
P01 1:50 VIEW LOOKING NORTH



D SECTION- WWT PROCESS TANKS
P01 1:50 VIEW LOOKING EAST



E SECTION- DISTRIBUTION VALVE
P01 1:30 VIEW LOOKING EAST



F SECTION- UV DISINFECTION SYSTEM
P01 1:30 VIEW LOOKING SOUTH

NOTES:

- DRAWINGS IN GENERAL ARE TO SCALE BUT FIGURED DIMENSIONS TAKE PRECEDENCE. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE ACCURACY OF INFORMATION SCALED FROM THE DRAWINGS.
- ALL DIMENSIONS USE METRIC UNITS. DIMENSIONS SHOWN IN MILLIMETERS AND POINT ELEVATIONS AS METERS (UNLESS NOTED OTHERWISE).
- SEE CIVIL DRAWING C01 FOR SITE PLAN AND CIVIL NOTES.
- SEE PROCESS DRAWING P01 FOR SITE PIPING PLAN AND PROCESS NOTES. TANKS WILL FLOAT UNTIL FULLY BACKFILLED. PROTECT EXCAVATION FROM INFLOW AND SCHEDULE WORK SO THAT INSTALLED TANKS ARE BACKFILLED QUICKLY AND FILLED WITH WATER.
- SEE PROCESS DRAWING P04 FOR MISCELLANEOUS DETAILS.

DRAFTING LEGEND:

- DETAIL
- REF. DRAWING No.
- SECTION
- REF. DRAWING No.
- CENTERLINE
- MATCH LINE
- POINT ELEVATION

ABBREVIATIONS

- APPROX. - APPROXIMATE
- B.O. - BOTTOM OF
- B.O.C. - BOTTOM OF CONCRETE
- B.O.P. - BOTTOM OF PIPE
- B.O.S. - BOTTOM OF STEEL
- CONC. - CONCRETE
- C/W - COMPLETE WITH
- DIAM. - DIAMETER
- EXIST. - EXISTING
- EL. - ELEVATION
- FIN. - FINISHED
- H.H.W.L. - HIGH HIGH WATER LEVEL
- H.L.A. - HIGH LEVEL ALARM
- H.W.L. - HIGH WATER LEVEL
- I.D. - INSIDE DIAMETER
- INV. - INVERT
- MAX. - MAXIMUM
- MH - MANHOLE
- MIN. - MINIMUM
- No. - NUMBER
- N.W.L. - NORMAL WATER LEVEL
- N.T.S. - NOT TO SCALE
- O.D. - OUTSIDE DIAMETER
- PVC - POLYVINYL CHLORIDE
- REF. - REFERENCE
- RSF - RECIRCULATING SAND FILTER
- SCH. - SCHEDULE
- S.S. - STAINLESS STEEL
- T.O. - TOP OF
- T.O.C. - TOP OF CONCRETE
- T.O.S. - TOP OF STEEL
- TYP. - TYPICAL
- U/G - UNDERGROUND
- U.N.O. - UNLESS NOTED OTHERWISE
- WWT - WASTEWATER TREATMENT PLANT

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	MAA
B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD
TANTALLON ELEMENTARY SCHOOLS WWT REPLACEMENT PROCESS

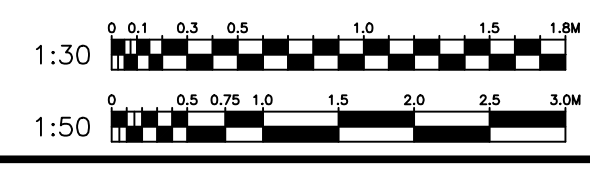
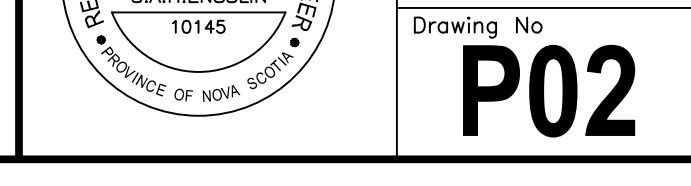
WWT SECTIONS



Contract No.	Date	Scale
160817.02	NOV. 2016	AS NOTED

Checked	Drawn
SHE	MAA
WJD	Approved

Sheet No. 2 of 4

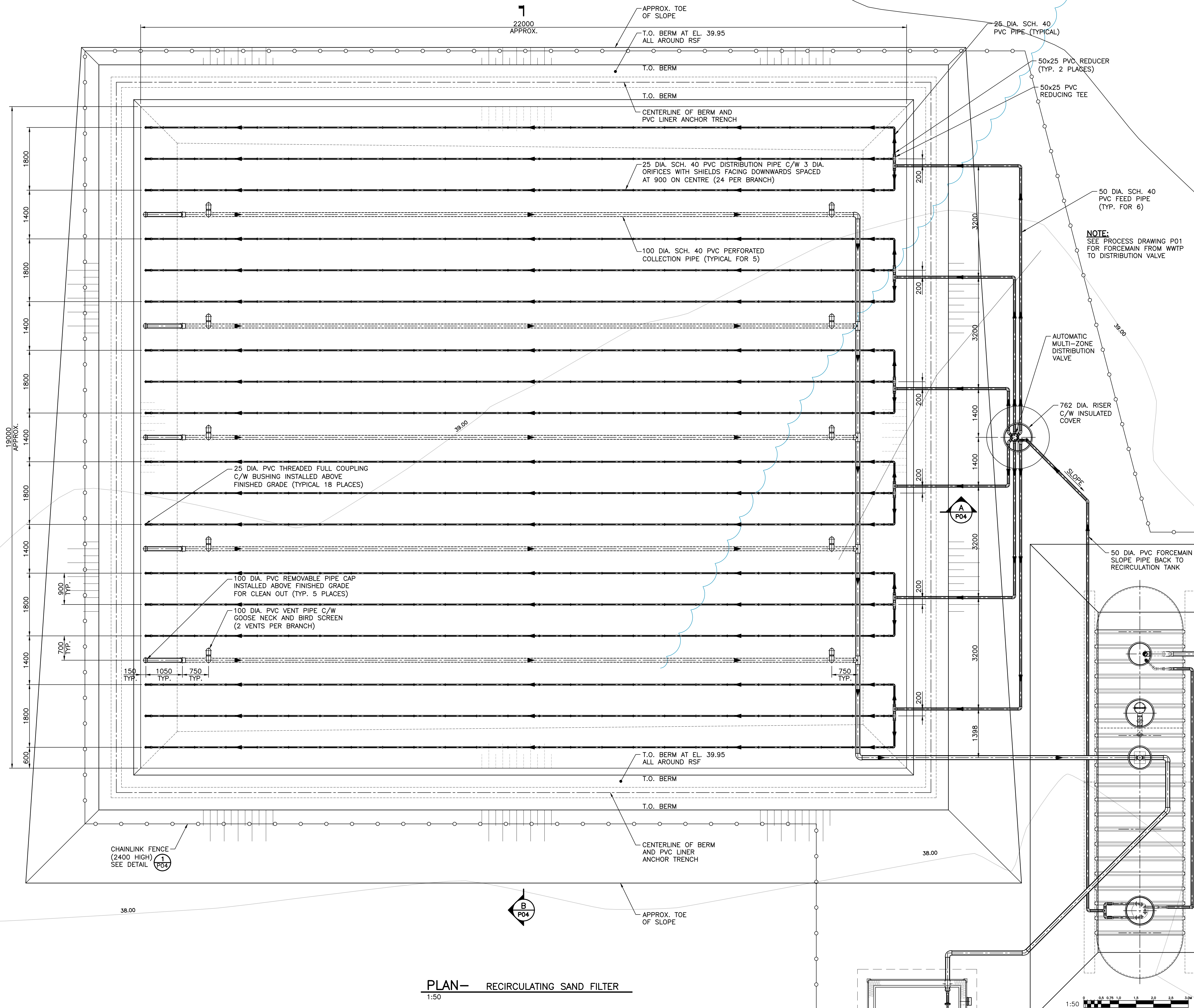


P02

DRAWING NAME: WWT PROJECTS\WWT17.02_MESS DESIGN AND TENDER\TANTALLON.DWG; PROJECT: WWT17.02_MESS DESIGN AND TENDER; TANTALLON.DWG; LAYOUT NAME: P02; PLOT DATE: May-16-17 4:17:17 PM; CAD GENERATOR: D0102



DRAWING NAME: \\PROJECTS\160817.02_WWTP_PROCESS\TANTALLON\20_CAD\06_PROCESS\160817.02-0101004.DWG; LAYOUT NAME: P01; PLOT DATE: May-17-17 10:42:31 AM; CAD OPERATOR: DOUGC



- NOTES:**
1. DRAWINGS IN GENERAL ARE TO SCALE BUT FIGURED DIMENSIONS TAKE PRECEDENCE. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE ACCURACY OF INFORMATION SCALED FROM THE DRAWINGS.
 2. ALL DIMENSIONS USE METRIC UNITS. DIMENSIONS SHOWN IN MILLIMETERS AND POINT ELEVATIONS AS METERS (UNLESS NOTED OTHERWISE).
 3. SEE CIVIL DRAWING C01 FOR SITE PLAN AND CIVIL NOTES.
 4. SEE PROCESS DRAWING P01 FOR WWTP PLAN AND PROCESS NOTES.
 5. SEE PROCESS DRAWING P02 FOR DRAFTING LEGEND AND ABBREVIATIONS.
 6. SEE PROCESS DRAWING P04 FOR RSF SECTIONS AND MISCELLANEOUS DETAILS.

NOTE:
SEE PROCESS DRAWING P01 FOR FORCEMAIN FROM WWTP TO DISTRIBUTION VALVE

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	MAA
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A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

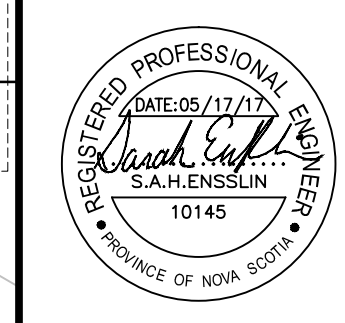
HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT PROCESS

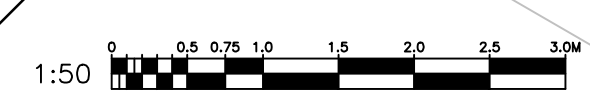
RECIRCULATING SAND FILTER PLAN

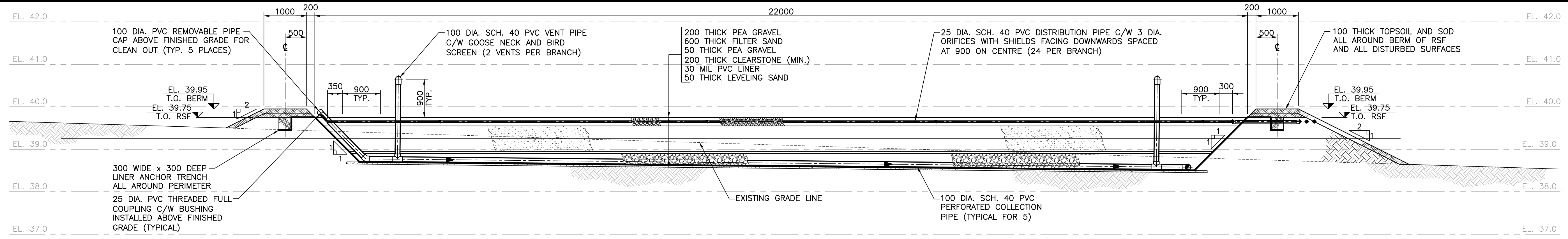


CBCL No 160817.02	Contract No -	Date NOV. 2016	Scale AS NOTED
Designed SHE	Drawn MAA	Checked WJD	Approved -
Sheet No 3 of 4		Drawing No 10145	

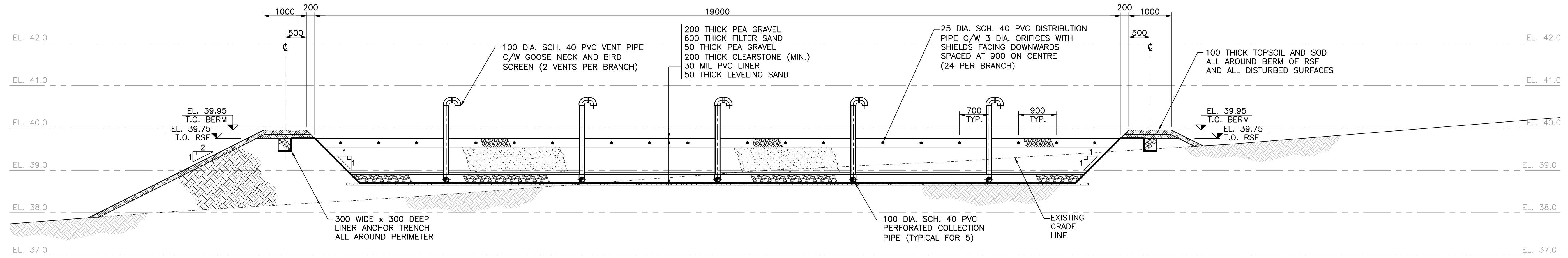


PLAN— RECIRCULATING SAND FILTER
1:50

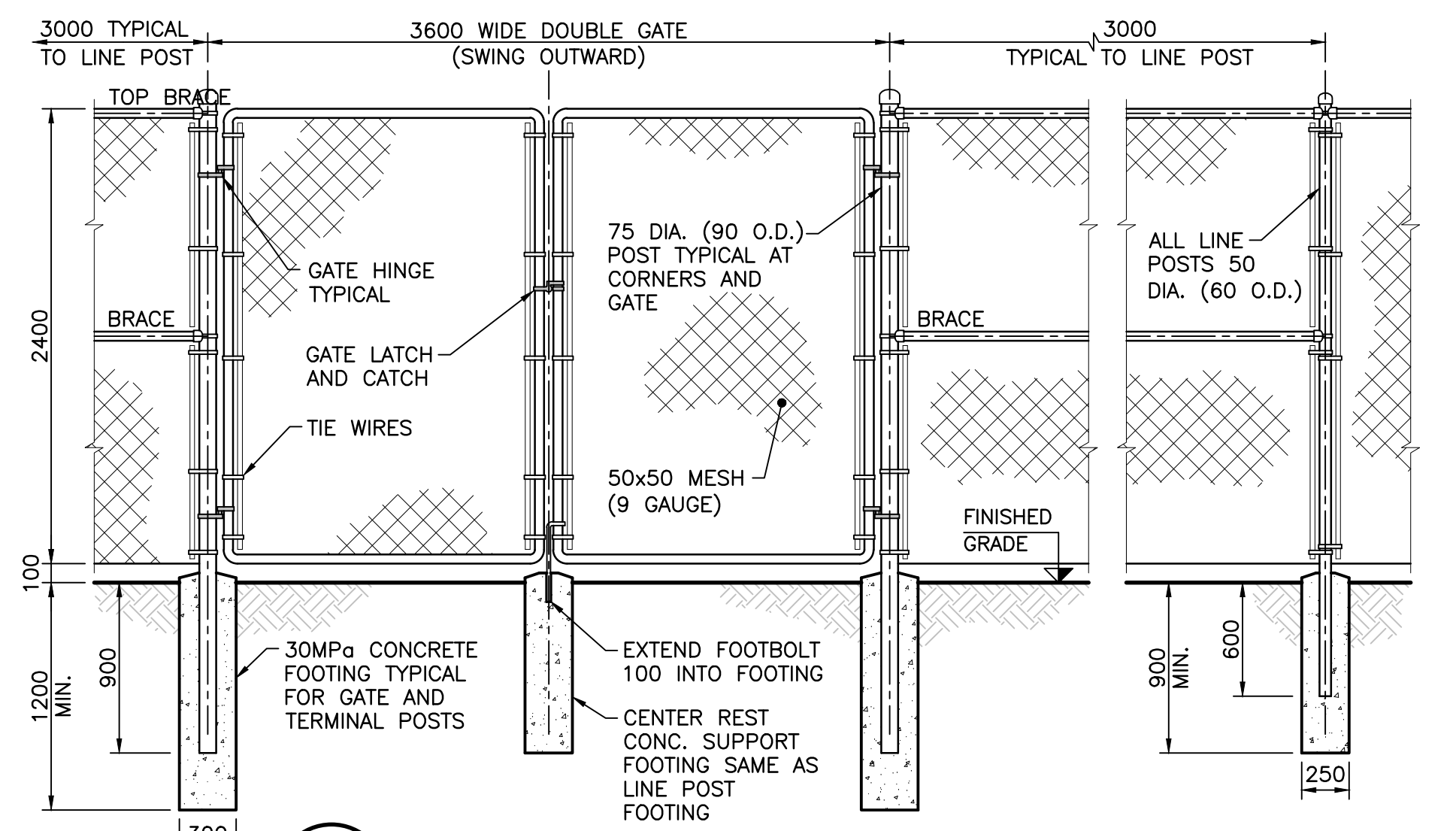




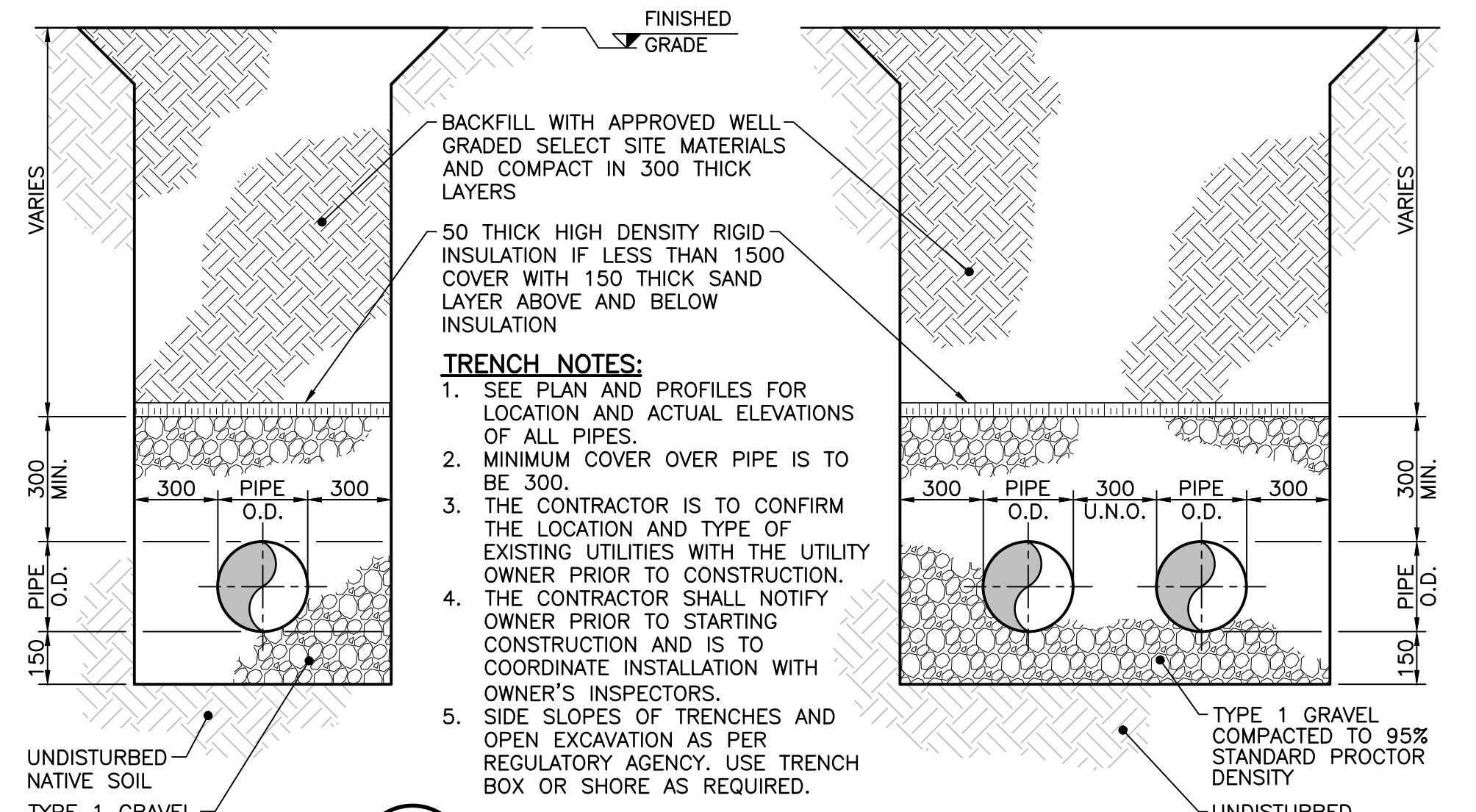
A SECTION— RECIRCULATING SAND FILTER
P03 1:50 VIEW LOOKING EAST



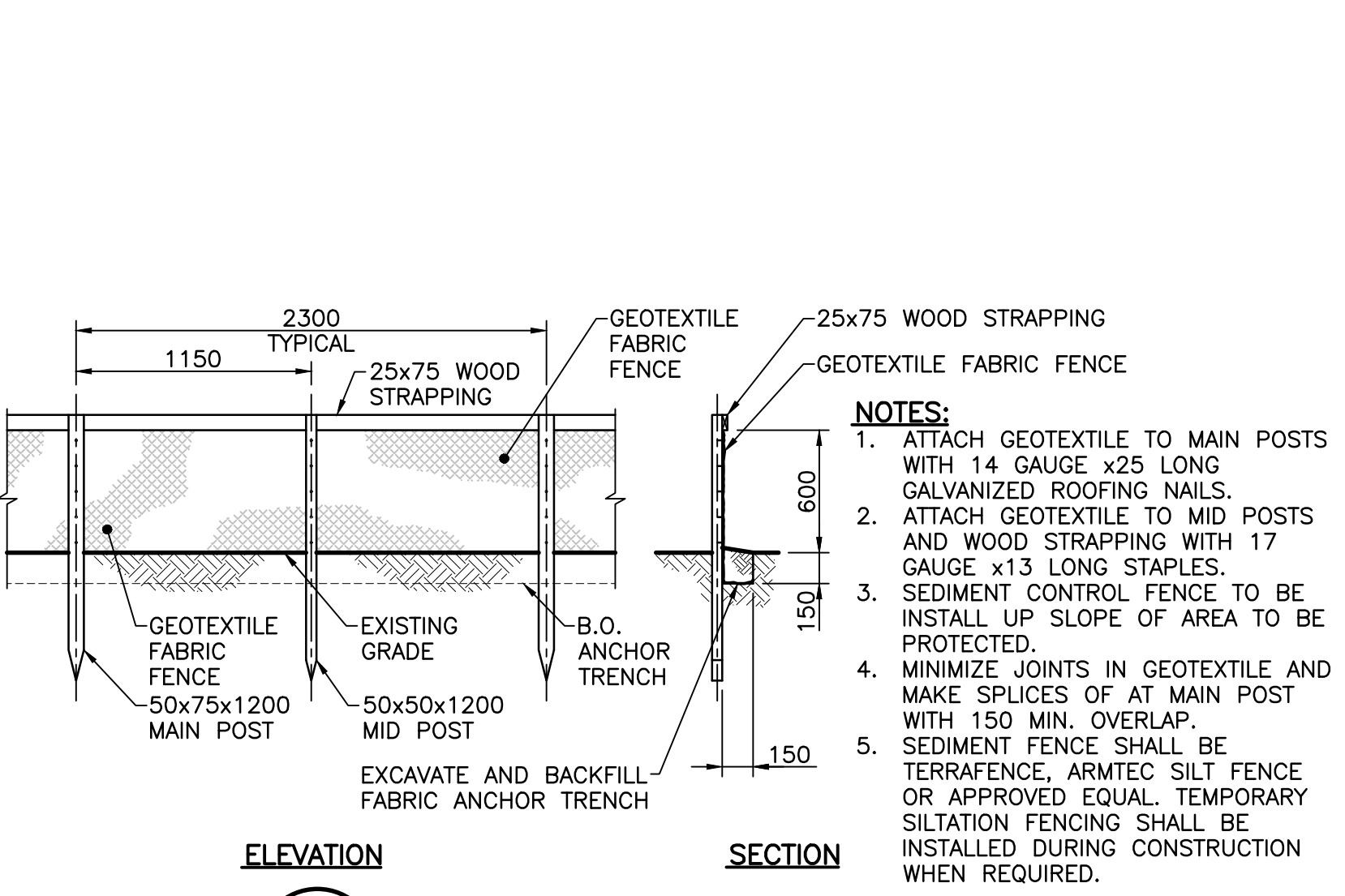
B SECTION— RECIRCULATING SAND FILTER
P03 1:50 VIEW LOOKING NORTH



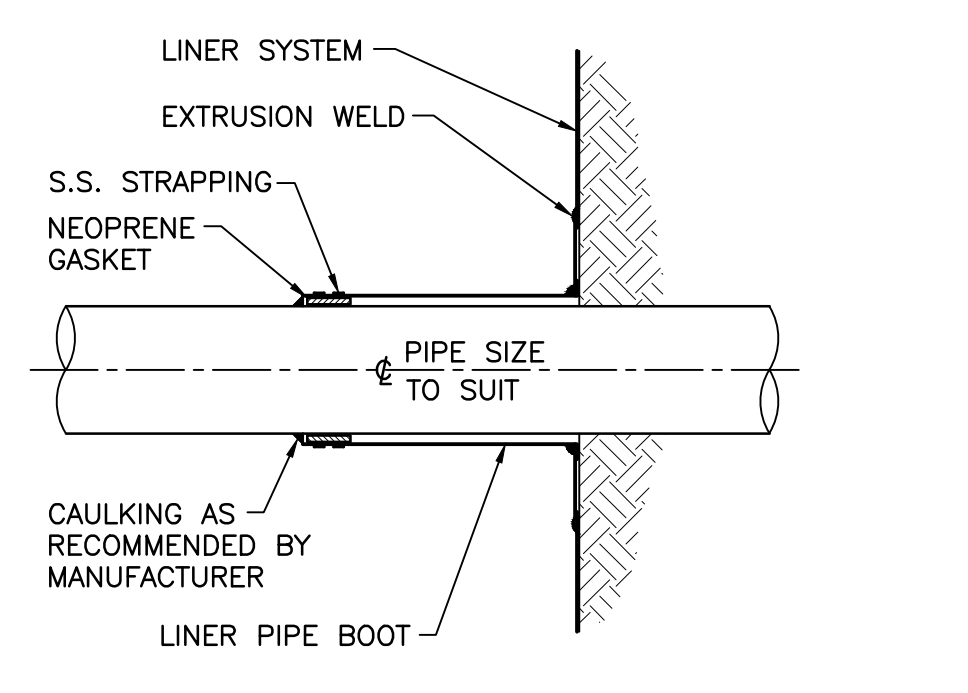
1 DETAIL— TYPICAL CHAIN LINK FENCE
P01 1:30 ELEVATION OF 2400 HIGH FENCE C/W 3600 WIDE DOUBLE GATE



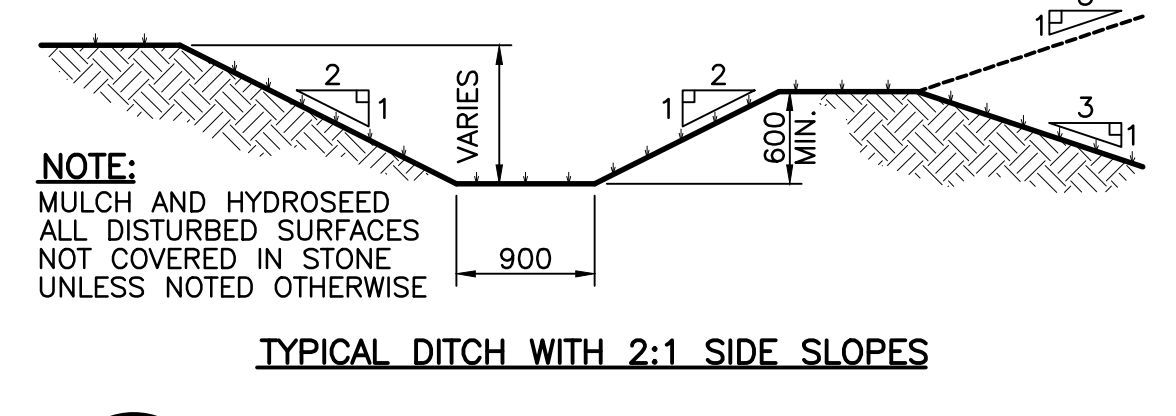
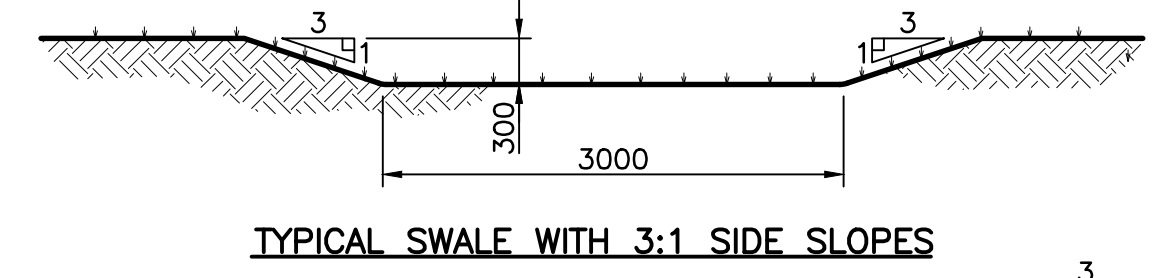
2 DETAIL— TYPICAL BURIED PIPE TRENCH
P01 N.T.S.



3 DETAIL— SEDIMENT CONTROL FENCE
P01 1:30 SEE CIVIL NOTES 10, 11 AND 12 ON CIVIL DRAWING C01



4 DETAIL— LINER PIPE BOOT
N.T.S.



5 DETAIL— DRAINAGE DITCH AND SWALE
N.T.S.

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 - SEE PROCESS DRAWING P01 FOR WWTP PLAN AND PROCESS NOTES.
 - SEE PROCESS DRAWING P02 FOR DRAFTING LEGEND AND ABBREVIATIONS.
 - SEE PROCESS DRAWING P03 RECIRCULATING SAND FILTER PLAN.
 - SEE CIVIL DRAWING C01 FOR EXISTING SITE PLAN AND CIVIL NOTES.

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	MAA
B	ISSUED FOR APPROVAL	FEB 01/17	SHE
A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT PROCESS

RSF SECTIONS AND MISCELLANEOUS DETAILS



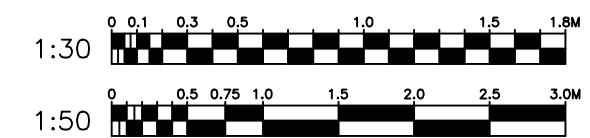
Contract No	Date	Scale
160817.02	NOV. 2016	AS NOTED

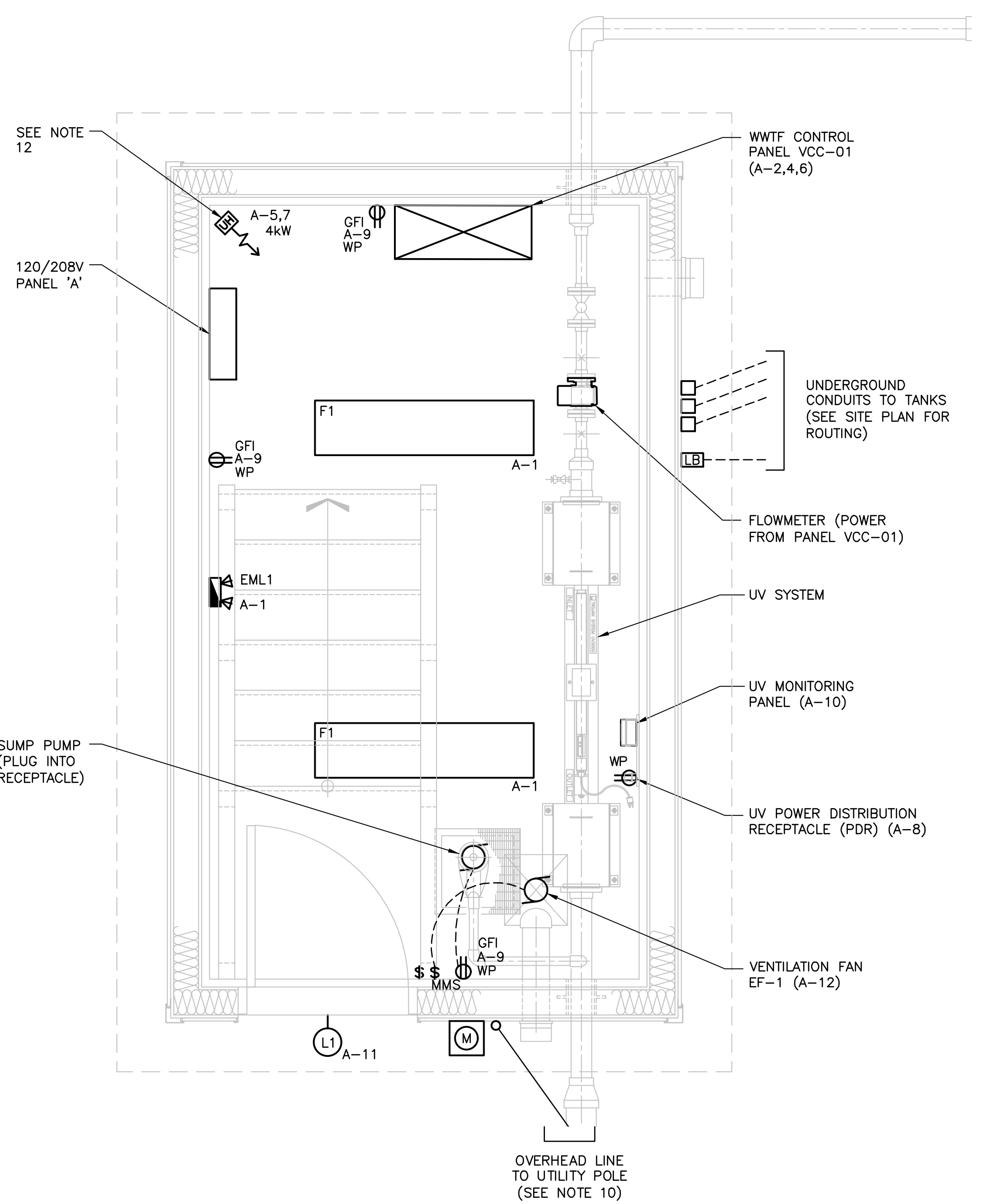
Designed	Drawn
SHE	MAA

Checked	Approved
WJD	—

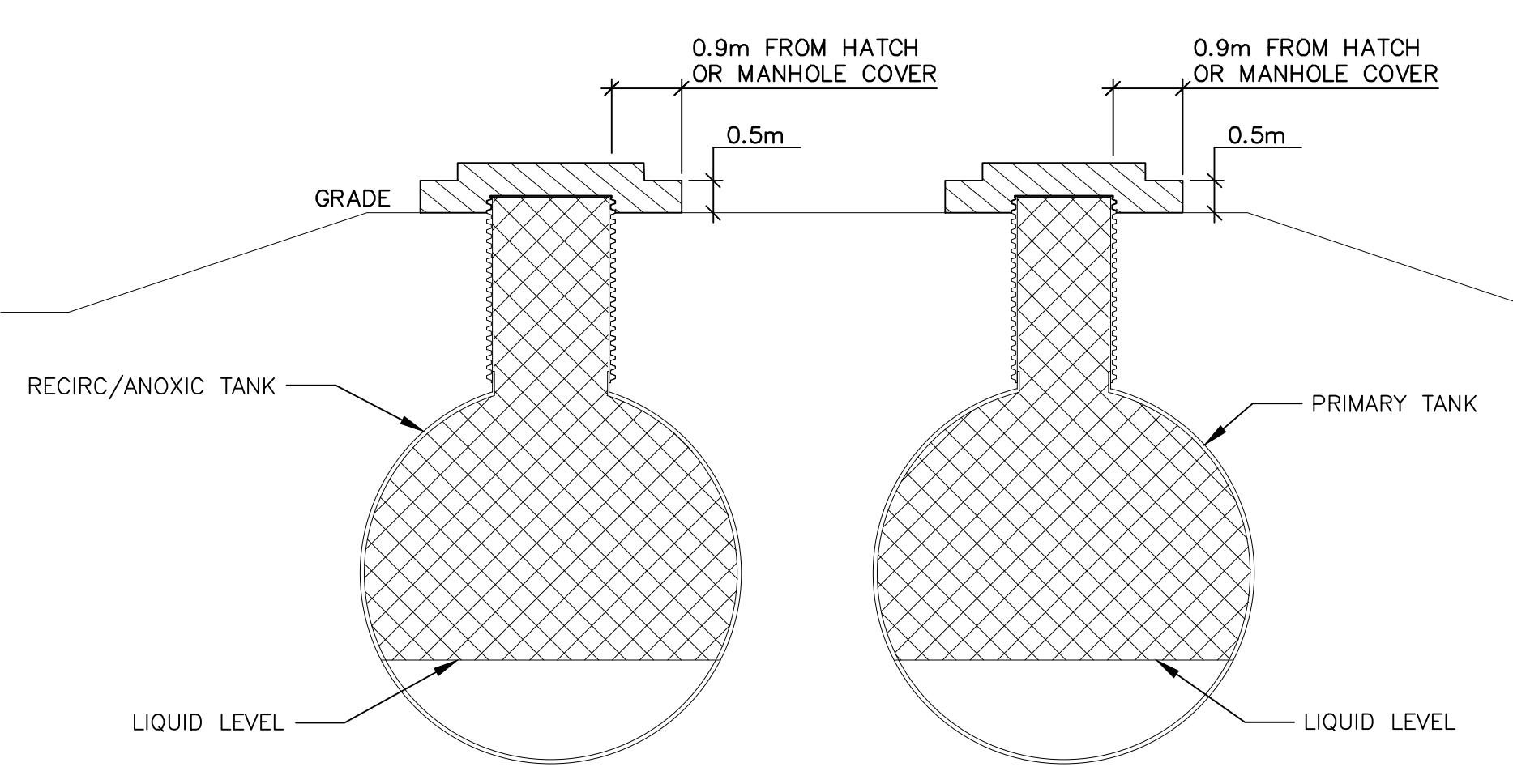
Sheet No 4 of 4

Drawing No **P04**





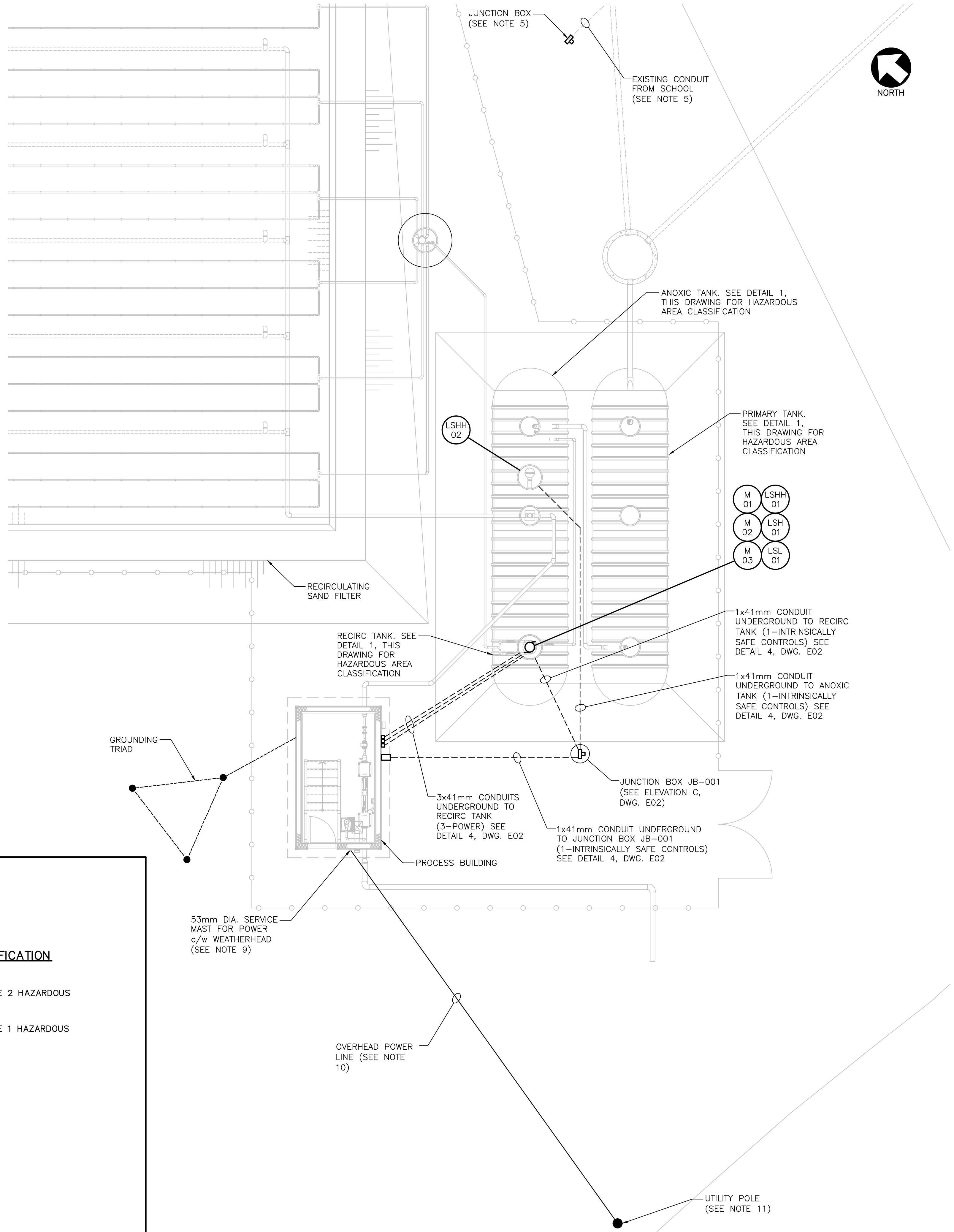
PLAN-PROCESS BUILDING
1:20



1 DETAIL-TANK HAZARDOUS AREA CLASSIFICATION
1:30

HAZARDOUS CLASSIFICATION LEGEND:

- INDICATES ZONE 2 HAZARDOUS CLASSIFICATION
- INDICATES ZONE 1 HAZARDOUS CLASSIFICATION
- UNCLASSIFIED



SITE PLAN-TREATMENT FACILITY LAYOUT
1:50

- NOTES:**
- LOCATIONS OF BURIED SERVICES ARE APPROXIMATE. VERIFY LOCATIONS OF BURIED SERVICES PRIOR TO INSTALLATION OF THE NEW UNDERGROUND ELECTRICAL SERVICES.
 - DURING EXCAVATION, ADEQUATELY SUPPORT ANY EXISTING UNDERGROUND SERVICES.
 - IF SITE CONDITIONS PROHIBIT TRENCH DEPTH AS PER THE INSTALLATION DETAILS, ADVISE THE OWNER AND ENGINEER PRIOR TO PROCEEDING.
 - REMOVE AND DISPOSE OF ALL EXISTING ELECTRICAL EQUIPMENT IN EXISTING TREATMENT PLANT INCLUDING, BUT NOT LIMITED TO: MOTORS, BLOWERS, SWITCHES, RECEPTACLES, AND LUMINAIRES. REMOVE AND DISPOSE OF ALL CABLING AND CONDUIT FOR THESE DEVICES, EXCEPT AS PER NOTE 5.
 - PULL BACK AND REMOVE EXISTING CABLES FROM EXISTING TREATMENT PLANT TO ELECTRICAL ROOM IN SCHOOL. REMOVE EXISTING CONDUIT BETWEEN EXISTING TREATMENT PLANT AND NOTED LOCATION. SUPPLY AND INSTALL NEW NEMA 4X JUNCTION BOX AT NOTED LOCATION AS PER ELEVATION A, DRAWING E02. SUPPLY AND INSTALL NEW RIGID PVC CONDUIT TO MATCH EXISTING BETWEEN EXISTING CONDUIT FROM SCHOOL AND NEW JUNCTION BOX. NOTED LOCATION OF JUNCTION BOX IS APPROXIMATE. COORDINATE LOCATION OF JUNCTION BOX WITH OTHER TRADES, SITE CONDITIONS, AND ACTUAL LOCATION OF EXISTING CONDUIT.
 - UNLESS NOTED OTHERWISE, ELECTRICAL, CONTROLS, AND INSTRUMENTATION EQUIPMENT IS NEW.
 - RECIRCULATION AND ANOXIC PUMPS MUST BE FULLY SUBMERGED AT ALL TIMES.
 - RIGID PVC CONDUIT SHALL NOT BE RUN ABOVE GROUND OUTSIDE OF THE PROCESS BUILDING. ALL RIGID PVC CONDUIT MUST TRANSITION TO RIGID ALUMINUM UNDERGROUND.
 - LOCATE THE NEW SERVICE MAST AND WEATHERHEAD TO SUIT FIELD CONDITIONS AND TO THE SATISFACTION OF THE POWER UTILITY AND THE ENGINEER.
 - COORDINATE WITH OWNER AND POWER UTILITY TO PROVIDE A NEW 120/208V THREE PHASE OVERHEAD ELECTRICAL SERVICE TO THE PROCESS BUILDING. OBTAIN ALL PERMITS AND PAY ALL FEES REQUIRED.
 - ACTUAL LOCATION OF NEW UTILITY POLE TO BE DETERMINED BY POWER UTILITY.
 - ELECTRIC UNIT HEATER IS SPECIFIED IN DIVISION 23.

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	JMB
B	ISSUED FOR APPROVAL	FEB 01/17	SHE
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Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWTP REPLACEMENT

ELECTRICAL

SITE LAYOUTS



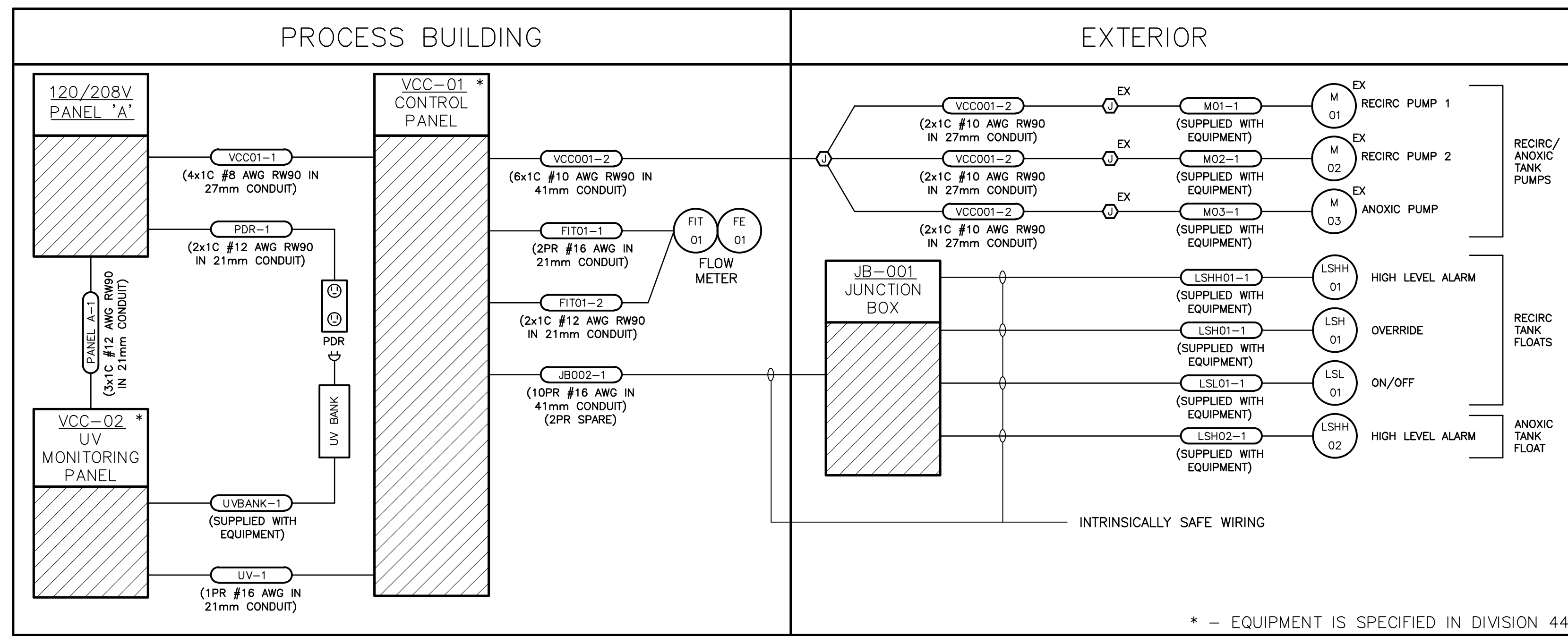
Contract No	Date	Scale
160817.02	NOV. 2016	AS NOTED

Designed	Drawn
JMJ	JMJ

Checked	Approved
IR	-

Sheet No 1 of 2
Drawing No **E01**

DRAWING NAME: C:\USERS\MALCOLM\DESIGN\160817.02-E01.DWG LAYOUT NAME: E01 PLOT DATE: May-16-17 10:24:19 AM CAD OPERATOR: MALCOLM



POWER: 120/208V, 3PH, 4W
No. OF CCTS.: 18

PANEL: A
LOCATION: PROCESS BUILDING
FED FROM: UTILITY

SYM. I.C.: 18,000 AMPS
MAINS: 100A AMPS
ENTER AT: BOTTOM MTG. 60"

DESIGNATION	LOAD	CIR. No.	BKR	PH A	PH B	PH C	DESIGNATION
INTERIOR LIGHTING	64	1	15A				
SUMP PUMP	492	3	15A				
UNIT HEATER	2000	5	30A				
RECEPTACLES-UTILITY	540	7	2P				
EXTERIOR LIGHTING		9	15A				
SPARE		11	15A				
SPARE		13	15A				
SPARE		15	15A				
SPACE		17					

PHASE A - TOTAL 5,844
PHASE B - TOTAL 4,807
PHASE C - TOTAL 5,673

TOTAL LOAD: 16,324 KW, 53.31 AMP.

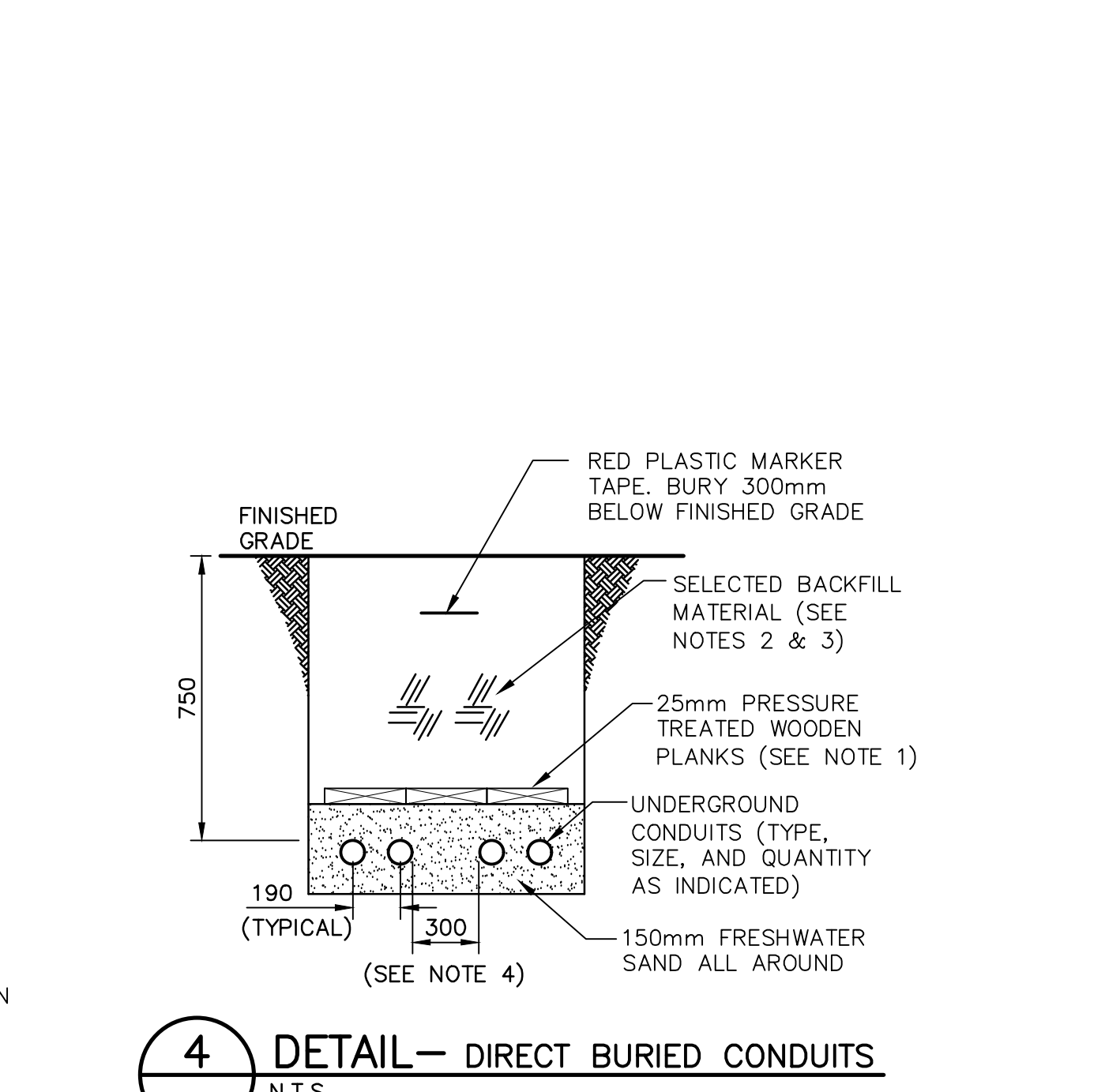
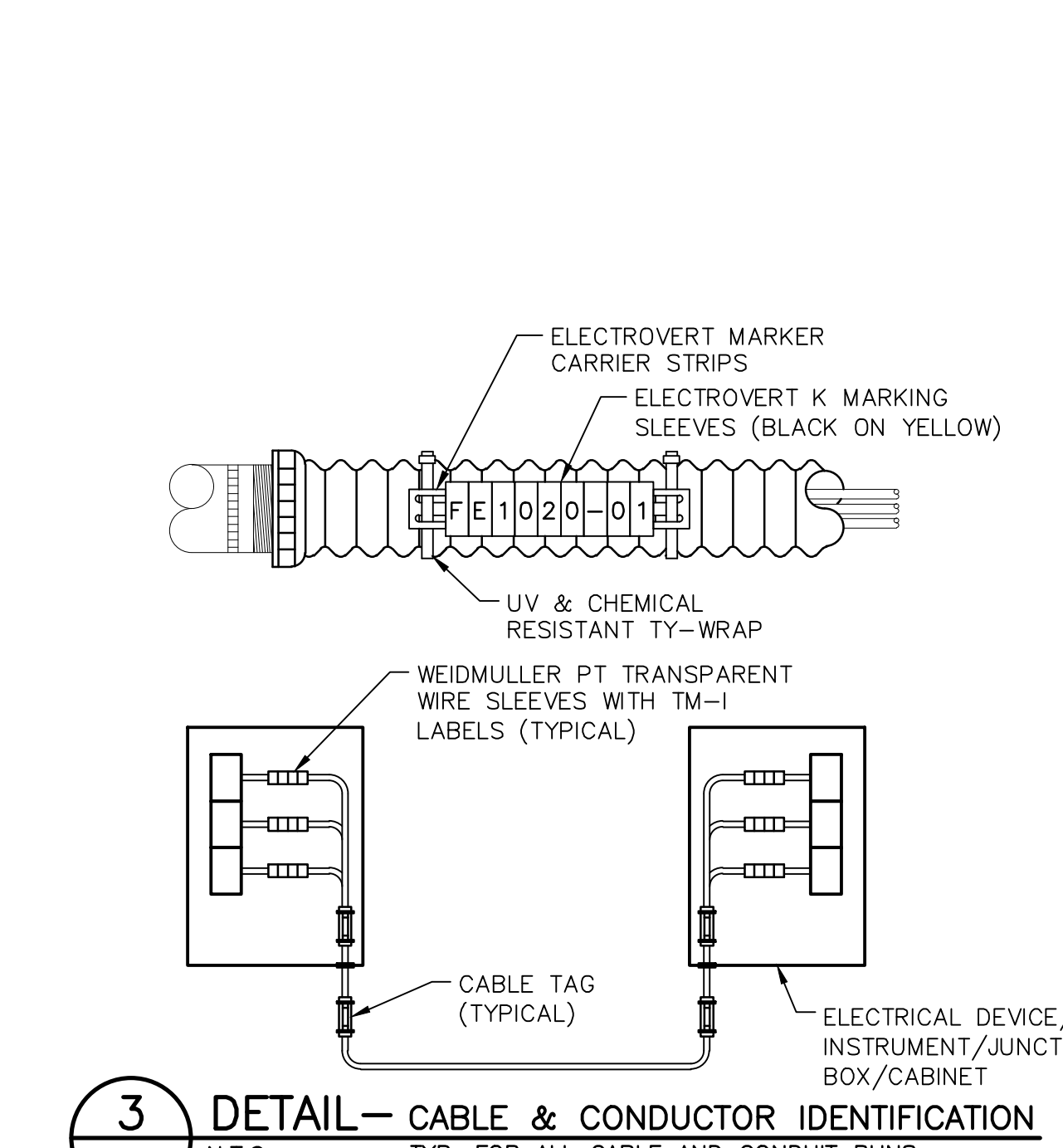
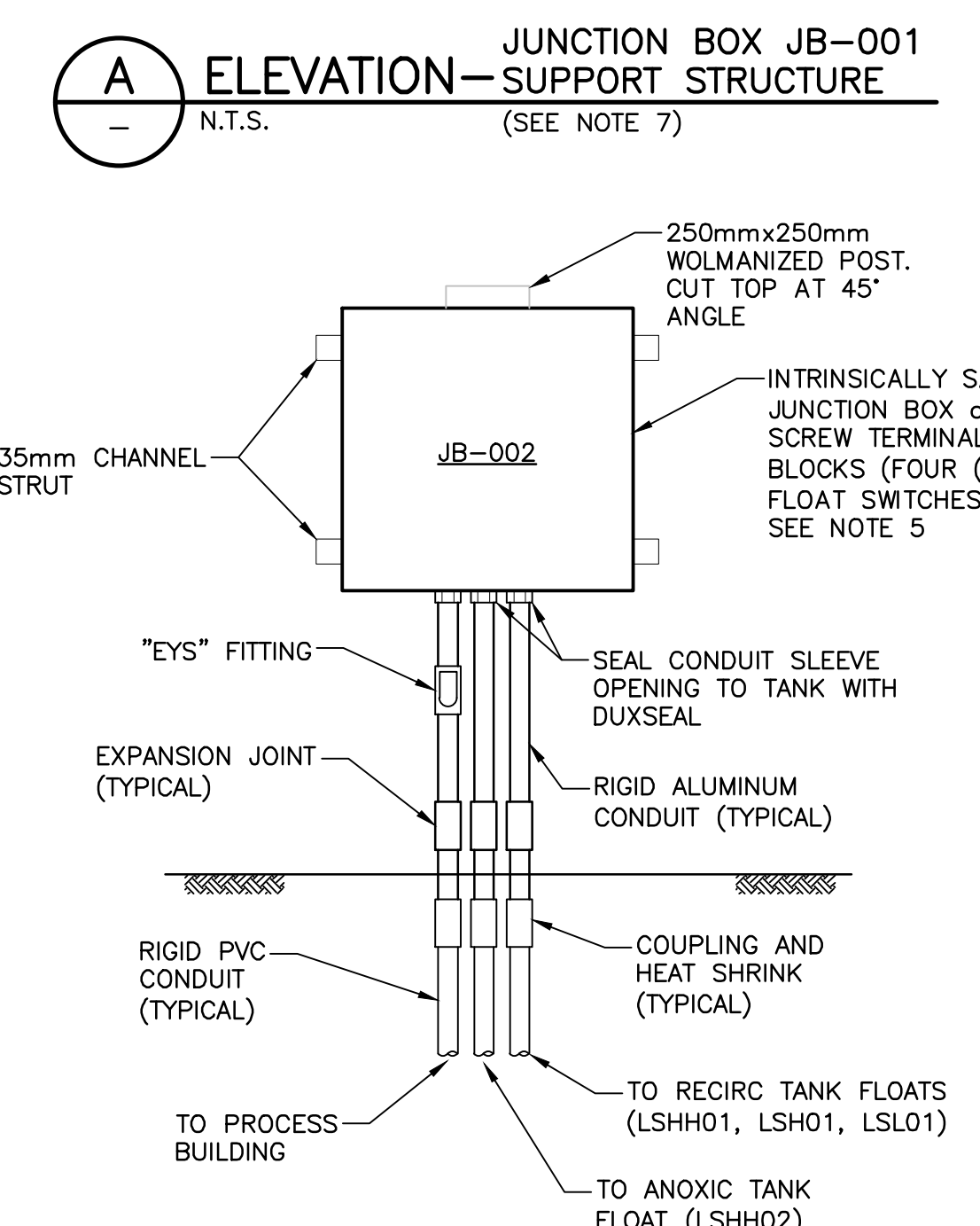
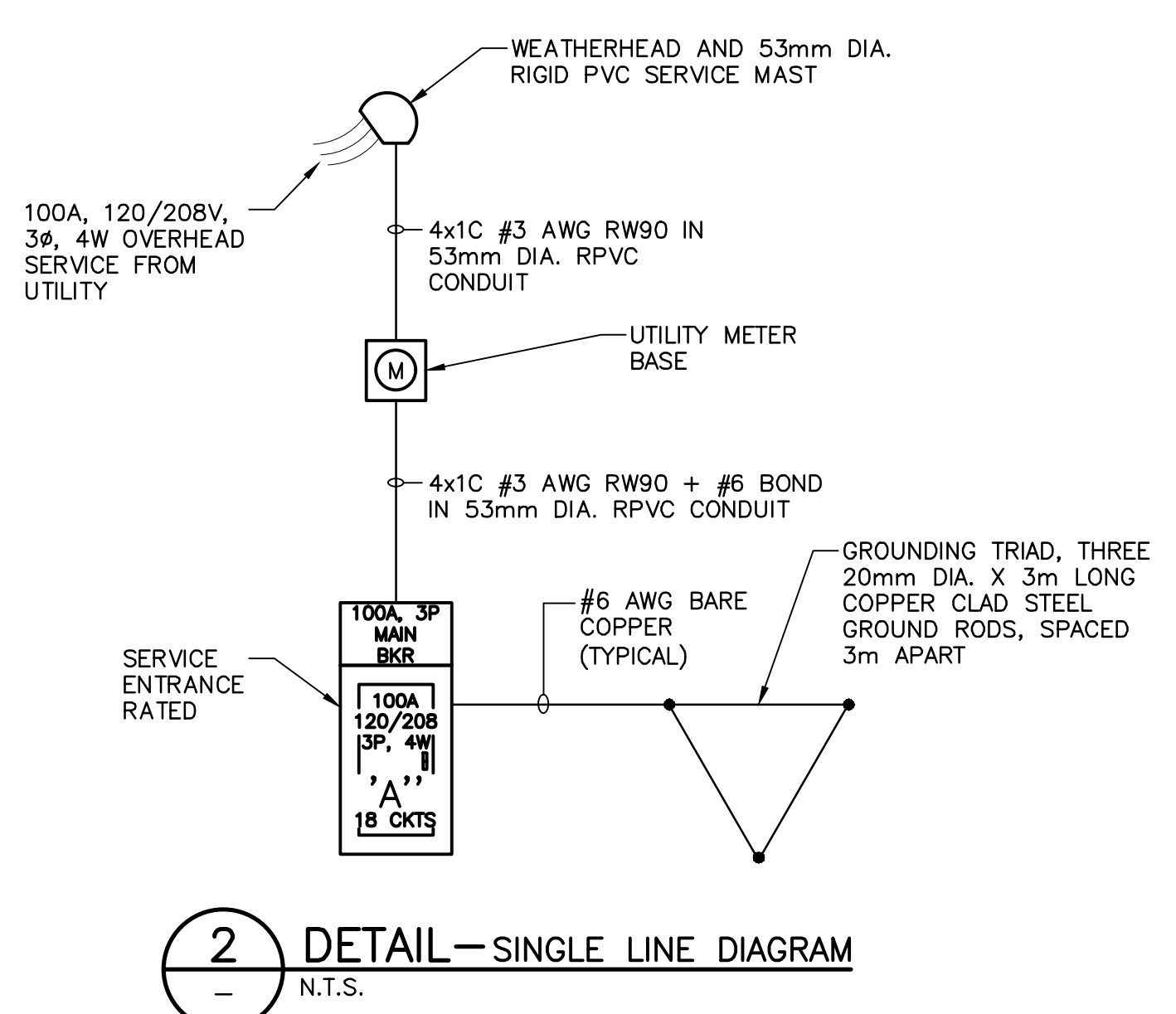
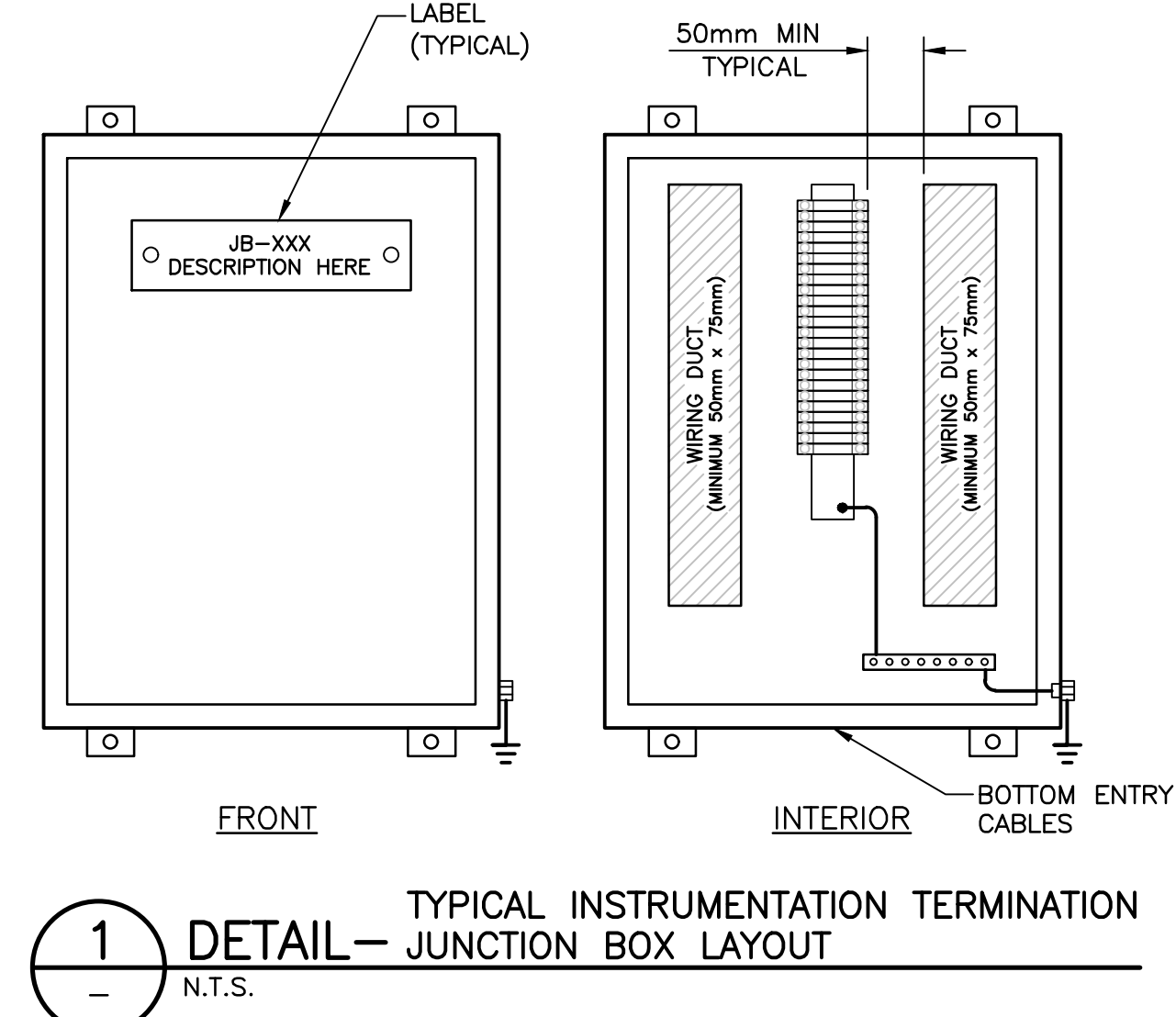
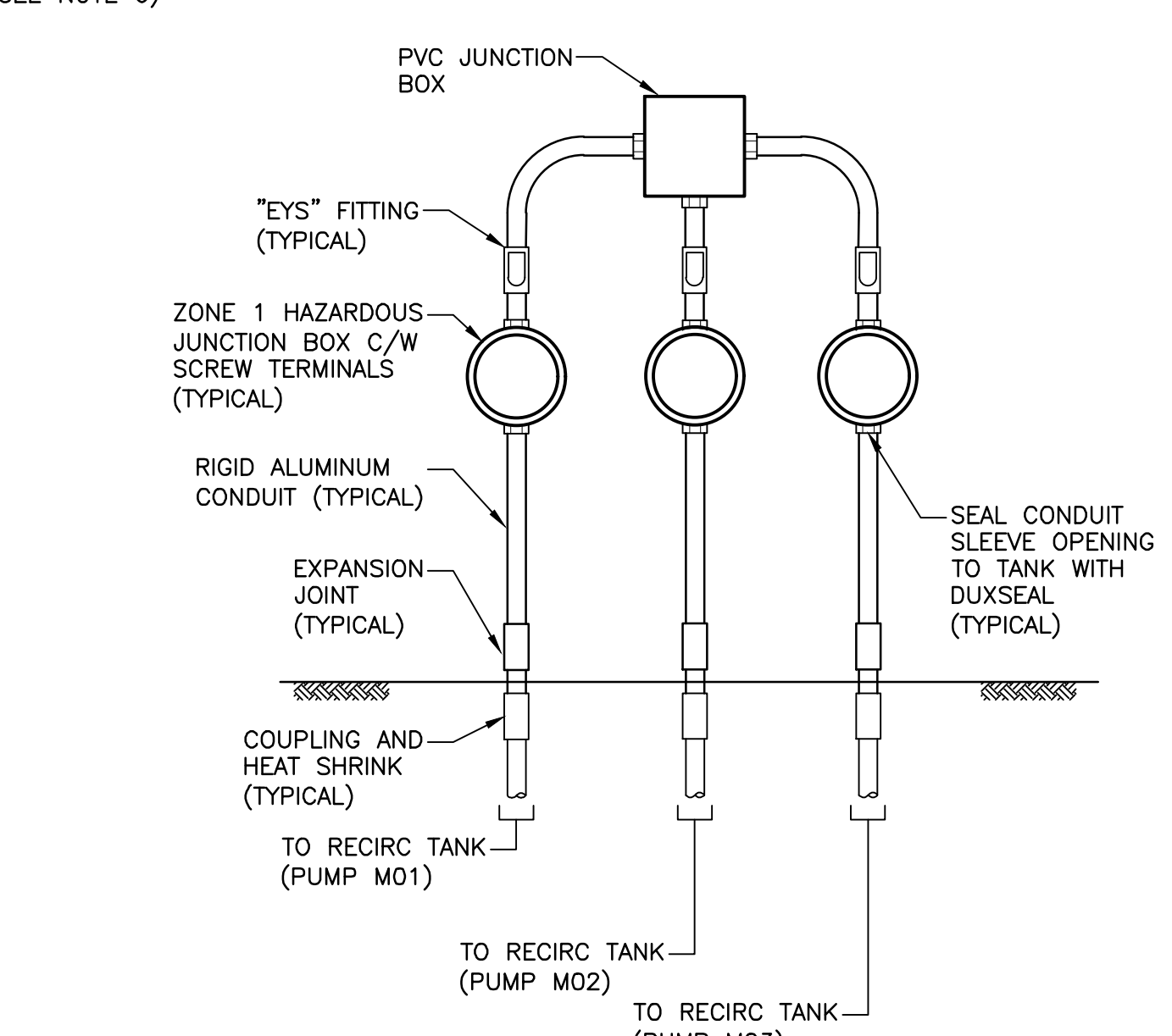
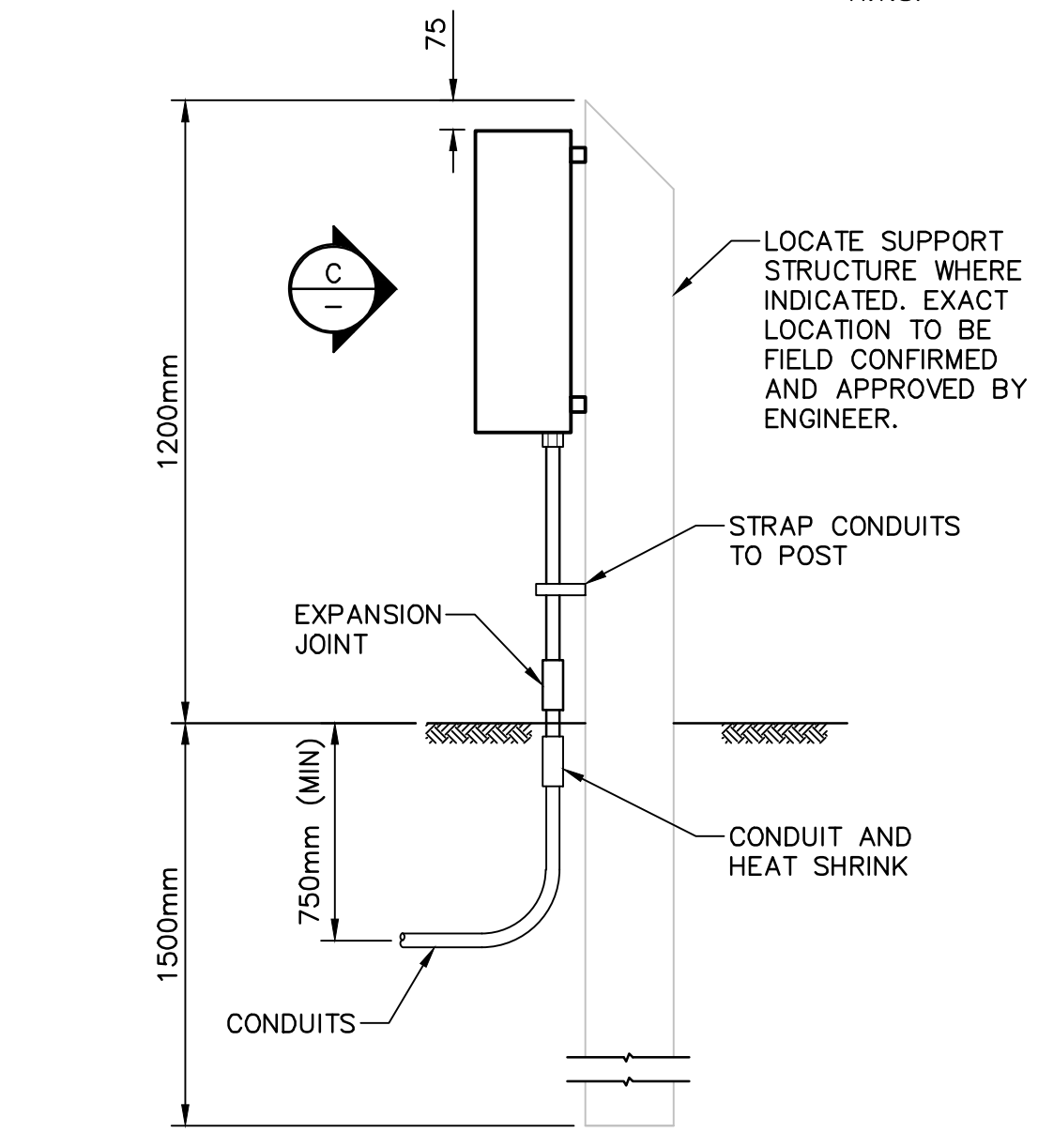
REMARKS: ① SERVICE ENTRANCE RATED
② INCLUDE 100A, 3P BOTTOM-MOUNTED MAIN BREAKER

LIGHTING SCHEDULE

LUMINAIRE TYPE	SUPPLY VOLTAGE	LAMP SOURCE	NUMBER OF LAMPS	LAMP WATTAGE	GENERAL DESCRIPTION
F1	120VAC	T8 FLUORESCENT	2	32	1200mm CLOSED INDUSTRIAL LUMINAIRE
L1	120VAC	LED	N/A	35W	WALL MOUNTED AREA LIGHT (FULL CUT-OFF), C/W INTEGRAL PHOTOCELL AND MOTION DETECTOR
EML1	120VAC	LED	2	4	EMERGENCY LIGHT, NON-METALLIC NEMA 4 ENCLOSURE, C/W BATTERY BACKUP

TYPE EML - EMERGENCY LIGHT TYPE F - FLUORESCENT TYPE L - LED

INSTRUMENTATION AND CONTROL CABLING DIAGRAM
N.T.S. (SEE NOTE 6)



- NOTES:**
- PLANKS SHALL EXTEND A MINIMUM OF 50mm ON EITHER SIDE OF CONDUITS.
 - BACKFILLING OF TRENCH TO BE IN LAYERS NOT EXCEEDING 300mm (MECHANICALLY TAMPED).
 - BACKFILL TRENCH WITH SELECTED BACKFILL SOIL IN ACCORDANCE WITH SPECIFICATIONS AND FREE FROM LARGE ROCKS OR DEBRIS.
 - MAINTAIN A MINIMUM 300mm SEPARATION BETWEEN POWER AND CONTROL CONDUITS, AND A MINIMUM 1m LATERAL SEPARATION BETWEEN CONDUITS AND ALL OTHER PIPING.
 - PROVIDE ADEQUATE TERMINALS IN EACH BOX FOR CONDUCTOR TERMINATION, PLUS 20% SPARE TERMINALS.
 - ALL CONDUITS ARE TO BE COMPLETE WITH A GREEN INSULATED BOND CONDUCTOR, SIZED IN ACCORDANCE WITH CEC REQUIREMENTS, MINIMUM #12 AWG.
 - JUNCTION BOXES ARE TO BE INSTALLED A MINIMUM OF 0.9m AWAY FROM MANHOLES OR TANK HATCHES.
 - INSTRUMENTATION TERMINATION JUNCTION BOX LAYOUT IS TO BE USED AS A GUIDE ONLY. REFER TO THE CABLING DIAGRAMS TO DETERMINE THE REQUIRED NUMBER OF TERMINAL BLOCKS IN EACH FIELD JUNCTION BOX. REFER TO SPECIFICATIONS FOR MATERIAL REQUIREMENTS.

- LEGEND:**
- (XX) WALL-MOUNTED FIXTURE (XX=TYPE AS INDICATED)
 - XX CEILING-MOUNTED FIXTURE (XX=TYPE AS INDICATED)
 - XX EMERGENCY LIGHT FIXTURE (XX=TYPE AS INDICATED)
 - ⚡ LIGHT SWITCH
 - ⚡ MMS TOGGLE-TYPE MANUAL MOTOR STARTER
 - ⚡ RECEPTACLE
 - ⚡ UNIT HEATER
 - ⊙ SINGLE-PHASE MOTOR
 - ⊠ CONTROL PANEL
 - ⊠ MISCELLANEOUS ELECTRICAL EQUIPMENT
 - LB 'L' TYPE CONDUIT FITTING
 - ⊙ JUNCTION BOX
 - GFI GROUND FAULT INTERRUPTING
 - EX EXPLOSION-PROOF
 - WP WEATHERPROOF

No.	Description	Date	By
0	ISSUED FOR TENDER	MAY 17/17	JM
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A	ISSUED FOR REVIEW	JAN 11/17	SHE

Revision or Issue

HALIFAX REGIONAL SCHOOL BOARD

TANTALLON ELEMENTARY SCHOOLS WWPT REPLACEMENT

ELECTRICAL

DIAGRAMS, DETAILS AND SCHEDULES



CBCL No. 160817.02	Contract No. -	Date NOV. 2016	Scale AS NOTED
Designed JM	Checked IR	Drawn JM	Approved -
Sheet No. 2 of 2		Drawing No. E02	

DRAWING NAME: C:\DESIGN\WALTON\DESIGN\160817.02-02.DWG. LAYOUT NAME: E02. DATE: May-16-17. 10:04:12 AM. CAD OPERATOR: MURKINSON