



**Invitation to Tender No. 21-073
Jack Bagley Community Park Redevelopment**

Information for Tenderers

The Regional District of Nanaimo, hereinafter referred to as the "Regional District", invites Tenders for the Jack Bagley Park Redevelopment.

SCOPE: Brief description of the project:

- a) Demolition of existing site works
- b) Installation of utilities, including water line to project site
- c) Installation of washroom/ change room building
- d) Installation of landscape stairs, ramp, walls, and site furnishings
- e) Installation of sports courts and other paved surfacing
- f) Installation of irrigation system and planting

The work is requested to be completed by May 30, 2022.

Tender documents may be downloaded directly from the Regional District of Nanaimo website at www.rdn.bc.ca or the BC Bid website at www.bcbid.gov.bc.ca

Tenders are to be submitted **via email** in PDF format with "21-073 Jack Bagley Park Redevelopment" as the subject line to Andrew Robertson at arobertson@islengineering.com bearing the name of the firm bidding on or before on or before **3:00:00 p.m. local time on the 29 day of October, 2021** (the "Tender Closing"). The Owner and the Consultant will not be responsible for any technological delays. It is the Tenderer's sole responsibility to ensure their Tender is received when, where and how it is specified in this document.

Physical tender submissions will not be accepted.

There will be a non-mandatory site visit on **October 13, 2021, at 9 a.m., meeting at Jack Bagley Community Park, 2535 Powder Point Road, Nanoose Bay, BC**. All persons in attendance must bring their own personal protection equipment (i.e., steel toe footwear, high visibility vest, etc.).

All enquiries related to this Tender are to be directed in writing to, **Peter Williams, Parks Planner, Regional District of Nanaimo** at pwilliams@rdn.bc.ca

Tenders will not be opened in public. The Regional District will endeavor to post unverified bid results by 10:00 a.m. the business day following the Tender Closing.

Each Tender Form received from a Bidder must be accompanied by a **verifiable digital E-Bid Bond** in the amount equal to TEN PERCENT (10%) of the TOTAL AMOUNT OF TENDER and a **verifiable digital Consent of Surety** per the Surety Association of Canada. The successful Bidder will be required to submit a 50% Labour & Materials Bond and a 50% Performance Bond.

Tenders must remain valid for sixty (60) days following the closing time and date.

The Owner reserves the right to reject any or all tenders, to accept the tender deemed most favourable in the interests of the Owner. The lowest or any tender may not necessarily be accepted.

This procurement is subject to Chapter 5 of the Canadian Free Trade Agreement. The Regional District's language in its procurement documents shall be English.

This project is contingent on required Building Permits and MOTI permits to be obtained by RDN. The MOTI permit attached to this document.



Regional District of Nanaimo

Invitation to Tender No. 21-073

Jack Bagley Community Park Redevelopment

Issue Date: October 5, 2021

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PART 1 INVITATION**1.1 INVITATION TO TENDER**

The Regional District of Nanaimo (the “Regional District”) invites tenders for the Jack Bagley Community Park Redevelopment.

1.2 DESCRIPTION OF WORK

- Demolition of existing site works
- Installation of utilities, including water line to project site
- Installation of washroom/ change room building
- Installation of landscape stairs, ramp, walls, and site furnishings
- Installation of sports courts and other paved surfacing
- installation of irrigation system and planting

1.3 TENDER SUBMISSION

1.3.1 Tenders will be submitted **via email** in PDF format with “21-073 Jack Bagley Park Redevelopment” as the subject line to Andrew Robertson at arobertson@islengineering.com bearing the name of the firm bidding on or before on or before **3:00 p.m. local time on the 29 day of October, 2021** (the “Tender Closing”). The Owner and the Consultant will not be responsible for any technological delays. It is the Tenderer’s sole responsibility to ensure their Tender is received when, where and how it is specified in this document.

1.3.2 Electronically submitted Tenders will be deemed to be successfully received at the time as posted on the incoming email.

1.3.3 Tenders received after the Tender Closing date and time will not be considered by the Regional District.

1.3.4 The submission of a Tender constitutes the agreement of the Tenderer to be solely responsible for all costs and expenses incurred by it in preparing and submitting its Tender, including any costs incurred by the Tenderer after the Tender Closing.

PART 2 TENDER DOCUMENTS

2.1 Documents may be viewed and obtained directly from the Regional District of Nanaimo website at www.rdn.bc.ca or the BC Bid website at www.bcbid.gov.bc.ca

PART 3 PRE-TENDER ENQUIRIES AND ADDENDA

3.1 Enquiries should be addressed to:

Peter Williams, Parks Planner, Regional District of Nanaimo
Email: pwilliams@rdn.bc.ca

Please Note: The Project Manager named above is the only valid contact for enquiries. No explanation, interpretation, or clarification of the Tender Documents by any other person whatsoever shall bind the Regional District in the interpretation of the Tender Documents.

- 3.2 Any requests for explanations, interpretations or clarifications made by Tenderers should be submitted in writing to the Regional District at least seven (7) calendar Days before Tender Closing to allow enough time for a response.
- 3.3 If the Regional District, in the Regional District's sole discretion, determines that a clarification, addition, deletion or revision of the Tender Documents is required then the Regional District will issue a written addendum. Notice of the issuance of a written addendum, and the issued written addendum, will be posted on the Regional District of Nanaimo website www.rdn.bc.ca and the BC Bid website www.bcbid.gov.bc.ca. It is the sole responsibility of all prospective Tenderers to check for any addenda prior to submitting their Tender.
- 3.4 All Addenda issued by the Regional District shall be incorporated into and become part of the Tender Documents.
- 3.5 If a Tenderer finds any errors, omissions, or discrepancies in the Tender Documents, it shall immediately notify the Regional District in writing.
- 3.6 No oral explanation, interpretation, or clarification of the Tender Documents by any person whatsoever shall bind the Regional District in the interpretation of the Tender Documents.
- 3.7 There will be a non-mandatory site meeting on **October 13 at 9:00 a.m.** at Jack Bagley Community Park, 2535 Powder Point Road, Nanoose Bay, BC. All persons in attendance must bring their own person protection equipment (i.e., steel toe footwear, high visibility vest, etc.).

PART 4 INSPECTION OF SITE

- 4.1 It is the responsibility of the Tenderer to examine the Work Site before submitting a Tender. It is the Tenderer's responsibility to be familiar with and allow for all site conditions which might affect the Work and the Tender. The Regional District will not grant, and the Tenderer will not be entitled to any additional payments or extensions of

time due to site conditions which were or would have been reasonably foreseeable upon a proper inspection of the Work Site by the Tenderer.

- 4.2 The submission of a Tender by the Tenderer shall be deemed to be an acknowledgement that the Tenderer has relied and is relying on its own examination of the Work Site, and all other matters related to the completion of Work.
- 4.3 The Tenderer shall comply with all applicable regulations of the Workers' Compensation Board of British Columbia and the Regional District's corporate safety policies and regulations while attending the Work Site.

PART 5 COMPLETION OF TENDER DOCUMENTS

- 5.1 The Tenderer should complete the Tender Form in ink or in type.
- 5.2 All prices are to be in Canadian currency. Prices shall include all necessary costs including but not limited to supply, fabrication and finishing, conveyance and delivery to the Work Site, packing, crating, freight, cartage, shipping charges, unloading, installation, overhead, profit and all tariffs, duties, and taxes (excluding GST) unless otherwise indicated, including British Columbia Provincial Sales Tax. The applicable Federal Goods and Services Tax shall be shown as a separate item in the Tender Price.

PART 6 BID SECURITY

- 1.1 The Tenderer shall submit, with its Tender, a deposit in the form of a **verifiable digital bid bond** (the "Bid Bond") in favour of the Regional District of Nanaimo signed and sealed by the Tenderer and the Tenderer's Surety. The form of Bid Bond shall be in the form acceptable to the Regional District. The Bid Bond shall equal ten percent (10%) of the Tender Price. A **verifiable digital Consent of Surety** shall also be submitted with the Tender.
- 6.1 The Regional District will retain the Bid Bond of the successful Tenderer until:
- (1) the successful Tenderer has executed the Agreement;
 - (2) the successful Tenderer has provided all bonding and documentation in accordance with Section 00100, Clauses 15.2 and 15.3.
- 1.2 All bonds and documentation required by Section 00100, Part 6 shall be issued by a company licensed to transact business in the Province of British Columbia. **All required bonds and documentation should be verifiable and in a digital format as per the Surety Association of Canada. Scanned photocopies and facsimiles, including those under seal, may result in the rejection of the Tender.**

PART 7 BID RIGGING

- 7.1 The Tenderer's attention is directed to the Competition Act which provides that bid-rigging as defined in the Act is an indictable offence punishable upon conviction by a fine or imprisonment or both.
- 7.2 The Tenderer shall not engage in collusion of any sort and shall ensure that no person or other legal entity, other than the bidder has an interest in the bidder's tender and prepare the tender without any knowledge of, comparison of figures with, or arrangement with any other person or firm preparing a Tender for the same work.

PART 8 SOLICITATION

- 8.1 The Tenderer may not make any representations or solicitations to any director, officer, or employee of the Regional District with respect to the Tender either before or after submission of the Tender except as provided herein. If any director, officer, employee, agent sub-contractor, supplier or other representative of the Tenderer communicates with any director, officer or employee of the Regional District or any consultant engaged by the Regional District in connection with this Invitation to Tender about this Invitation to Tender, other than the person named under Part 3 – Pre-Tender Enquiries and Addenda, the Regional District shall have the unfettered right, regardless of the nature of the communication, to reject the Tender submitted by the Tenderer.

PART 9 CONDITIONS OF TENDER

- 9.1 Tenders which contain qualifying conditions or otherwise fail to conform to the requirements of the Tender Documents may be disqualified or rejected. The Regional District may, however, in its sole discretion, reject or retain for its consideration Tenders which are non-conforming because they do not contain the content or form required by the Tender Documents or for failure to comply with the process for submission set out in this Section 00100.

PART 10 SUBMISSION OF TENDER

- 10.1 Tenders will be submitted **via email** in PDF format with "21-073 Jack Bagley Park Redevelopment" as the subject line to Andrew Robertson at arobertson@islengineering.com bearing the name of the firm bidding on or before on or before **3:00 p.m. local time on the 29 day of October, 2021** (the "Tender Closing").
- 10.2 All Tenders shall be signed by authorized officers in the case of the Corporate Firm and in the case of an individual partnership or non-incorporated organization, shall be signed and witnessed.
- 10.3 It is solely the responsibility of the Tenderer to ensure that it has obtained, prior to the Tender Closing, all Addenda issued by the Regional District.
- 10.4 The Regional District may not accept an amendment to a previously submitted Tender unless:

- (1) it is in writing;
 - (2) it is electronically received via email prior to the Tender Closing with the email entitled: "21-073 Jack Bagley Park Redevelopment—Tenderer's Name".
 - (3) it indicates a change to a Tender already submitted; and
 - (4) it is signed by the person or persons who signed the original Tender.
- 10.5 Tenderers shall be solely responsible for the completion and delivery of Tenders and any amendments in the manner and time specified by Section 00100, Part 10. No extension of the Tender Closing will be given to accommodate Tenderers or amendments to Tenders that do not comply with the requirements of Section 00100, Part 10.

PART 11 VARIATION TO TENDER DOCUMENT

- 11.1 If the Tenderer wishes to propose any variations to the specifications and/or terms and conditions, it should submit the proposed variations to the contact person for enquiries as identified in Section 00100, Clause 3.1 at least seven (7) calendar Days before the Tender Closing, otherwise the variations may not be considered by the Regional District. The acceptability of any such variations will be at the Regional District's sole and unfettered discretion.
- 11.2 Requested variations should be submitted in sufficient detail to facilitate evaluation by the Regional District.
- 11.3 Approved variations will be incorporated in the specifications and/or terms and conditions by the issuance of Addenda posted on the RDN website and BC Bid website.
- 11.4 Unless otherwise expressly stated in the Tender, the Tenderer agrees to accept without reservation or amendment, the whole of the specifications and Tender Documents.
- 11.5 Variations to the specifications not submitted in accordance with 11.1 above will only be considered if they are: (a) submitted by the otherwise wholly compliant and lowest bidder; (b) in sufficient detail and in the same format as the original specification, including cost implications, to facilitate evaluation by the Regional District; and (c) acceptable to the Regional District. Variations to the specifications not submitted in accordance with 11.1 and not in accordance with (a), (b) and (c) above will not be considered.
- 11.6 If the Regional District stipulates a completion date herein, and the Tenderer is unable to commit to this date, the Tenderer may submit a Tender stating the Tenderer's best possible completion date (Section 00200 Schedule 3 - Tenderer's Proposed Construction Schedule). The acceptability of such completion date will be at the Regional District's sole and unfettered discretion and may be justification for rejecting the Tender.

PART 12 IRREVOCABILITY OF OFFER

- 12.1 The Tender submitted by the Tenderer shall be irrevocable and remain open for acceptance by the Regional District for a period of 60 Days from the Tender Closing, whether another Tender has been accepted or not. If at any time after 60 Days from the Tender Closing, the Tenderer has not revoked its Tender in writing, the Regional District may accept the Tender.
- 12.2 If a Tenderer, for any reason whatsoever, purports to revoke its Tender within 60 Days from the Tender Closing, or if for any reason whatsoever a successful Tenderer does not execute and deliver the Agreement in accordance with Section 00100, Clause 15.1, the Regional District, without limiting any other remedy it may have under the Tender Documents or otherwise, shall be entitled to:
- (1) exercise its rights under any Bid Bond and retain the amount payable to the Regional District under the Bid Bond as liquidated damages; or
 - (2) require the Tenderer to pay to the Regional District an amount equal to the difference between the Tender price of its Tender and any other Tender which is accepted by the Regional District, if such other Tender is for a greater price, plus the total of all costs, expenses, and damages, including legal fees on a solicitor and own client basis, incurred by the Regional District because of or related to such revocation or failure by the Tenderer.

PART 13 TENDER OPENING

- 13.1 **Tenders will not be opened in public.** The Regional District of Nanaimo will endeavour to make available the unevaluated results of the Tender to Bidders by 10:00 a.m. the business day following the Tender Closing. The Regional District of Nanaimo wishes to thank all Tenderers for their effort in responding to this bidding opportunity.

PART 14 ACCEPTANCE AND REJECTION OF TENDERS

- 14.1 Notwithstanding any other provision in the Tender Documents, any practice or custom in the construction industry, or the procedures and guidelines recommended for use on publicly funded construction projects, the Regional District, in its sole discretion, shall have the unfettered right to:
- (1) accept any Tender;
 - (2) reject any Tender;
 - (3) reject all Tenders;
 - (4) accept a Tender which is not the lowest Tender;
 - (5) reject a Tender even if it is the only Tender received by the Regional District;

- (6) accept all or any part of a Tender; and
 - (7) award all or a portion of the Work to any Tenderer.
- 14.2 If a Tender contains a defect or fails in some way to comply with the requirements of the Tender Documents, which in the sole and unfettered discretion of the Regional District is not material, the Regional District may waive the defect and accept the Tender.
- 14.3 Awards shall be made on Tenders that will, in the opinion of the Regional District, give the greatest value based on quality, service and price. In determining what constitutes greatest value, the Regional District may consider its previous experience with the Tenderer. Without limiting the generality of the foregoing, the Regional District may consider: the quality of work; the timeliness of completion; the number, scope, and reasonableness of requested change orders; public impact; compliance with applicable health, safety, labour, and environmental laws; environmental and social practices; and the number and reasonableness of any claims. The Regional District's previous experience with the Tenderer regarding its competence and cooperation may also be taken into consideration in determining greatest value. The Regional District reserves the right to rely upon its records, references, and recollections in this regard. The Regional District may also obtain references other than those provided by the Tenderer and may use these references in determining greatest value.
- 14.4 The Regional District, in its sole discretion, reserves the right to reject the Tender in the event the Regional District determines, acting reasonably on the information available to it, that the Tenderer is in material non-compliance with, or has been convicted of a material offence or violation of, health, safety, labour or environmental laws. The Regional District's judgment in this regard will be final.
- 14.5 The Regional District will notify the successful Tenderer in writing that its Tender has been accepted (the "Notice of Intent to Award").
- 14.6 No information about an award of a contract will be given out between the time of opening and the time an award has been made.

PART 15 SUCCESSFUL TENDERER REQUIREMENTS:

- 15.1 The successful Tenderer should execute and deliver the Agreement to the Regional District within ten (10) business days after it has received the Agreement from the Regional District such time limit being extended only with the written approval of the Owner.
- 15.2 The successful Tenderer should submit to the Regional District of Nanaimo the following original documentation (facsimile or photocopy copies not acceptable) within seven (7)

business days of the notification of the successful Tender under Section 00100, Clause 14.5:

- (1) Original Performance Bond and Labour and Material Payment Bond (the “Bonds”) each of which shall equal fifty percent (50%) of the Contract Price, issued by a Surety licensed to transact the business of suretyship in the Province of British Columbia, in favour of the Regional District, signed and sealed by the successful Tenderer and the Tenderer’s Surety. The form of Performance Bond and Labour and Material Payment Bond shall be in a form acceptable to the Regional District. The Performance Bond shall encompass the Warranty and Guarantee period and shall, in any event, be in effect for no less than two (2) years from the date of issuance of the Notice of Acceptance.
- (2) A certificate of General Liability insurance pursuant to “CCDC 41 – CCDC Insurance Requirements” with the Regional District of Nanaimo named as additionally insured.
- (3) A Workers’ Compensation Board Clearance Letter of Clearance indicating good standing and remittance up to date.

15.3 The successful Tenderer shall not commence the Work until it has received a Notice to Proceed issued by the Regional District.

PART 16 AWARD OF CONTRACT

16.1 All contracts require the approval of the appropriate Regional District authority prior to award. Where a contract requires the approval of the Regional District’s Board prior to award, the total price of any Tender and the reason for selecting the successful Tenderer may be released at a regular meeting of the Regional District’s Board or a Committee of the Board.

16.2 Notwithstanding Clause 18.1(4) below, the Regional District reserves the right to release to the public the total price of any Tender, regardless of whether it was identified by the Tenderer as confidential. By submitting a Tender, each Tenderer consents to the release of the total price and, where applicable, information disclosable under the Act that is relevant to the selection of the successful Tenderer, to provide transparency in relation to expenditures of this type.

PART 17 FORM OF CONTRACT

17.1 The successful contractor will be expected to enter a CCDC4-2011 Unit Price Contract as amended herein in the “Supplementary General Conditions” section 00500.

PART 18 CONFIDENTIALITY AND SECURITY

18.1 The following conditions apply:

- (1) The Tender Documents, or any portion thereof, may not be used for any purpose other than submission of Tenders; and
- (2) The successful Tenderer must agree not to divulge or release any information that has been given to it or acquired by it on a confidential basis during the course of carrying out the Work or performing its services.
- (3) It is the Regional District's policy to maintain confidentiality with respect to all confidential information related to the Tender, but the Tenderer acknowledges and agrees that the Tender becomes the property of the Regional District and any confidential information disclosed by it to the Regional District may be subject to a request for public disclosure under *the Freedom of Information and Protection of Privacy Act, R.S.B.C. 1996, c.165*, as amended from time to time (in this Clause and Clause 17.2, the "Act").
- (4) The Tenderer acknowledges that the Act provides an exemption from disclosure for information as specified in Section 21 of the Act. Accordingly, if any information supplied to the Regional District fits within Section 21 of the Act, the Tenderer must specifically advise the Regional District and request the Regional District not to disclose that information, however confidentiality cannot be guaranteed.

PART 19 DISCLAIMERS/LIMITATIONS OF LIABILITY

- 19.1 Neither acceptance of a Tender nor execution of an Agreement shall constitute approval of any activity or development contemplated in any Tender that requires any approval, permit, or license pursuant to any federal, provincial, regional district or municipal statute, regulation, or bylaw. It is the responsibility of the Contractor to obtain such prior commencement of the Work.
- 19.2 The Regional District, its directors, officers, servants, employees, agents, and consultants expressly disclaim all liability for representations, warranties, express or implied or contained in, or for omissions from this Tender or any written or oral information transmitted or made available at any time to a Tenderer by or on behalf of the Regional District. Nothing in this Tender is intended to relieve a Tenderer from forming its own opinions and conclusions in respect of this Tender.
- 19.3 Except as expressly and specifically permitted in these Instructions to Tenderers, no Tenderer shall have any claim for any compensation of any kind whatsoever, because of participating in this Invitation to Tender, and by submitting a Tender each Tenderer shall be deemed to have agreed that it has no claim.

PART 20 SUSTAINABLE PURCHASING PRACTICE

20.1 It is the Regional District's policy to ensure that procurement decisions for the supply of goods, services and construction consider economic considerations, as well as the Tenderer's environmental and social practices. The Regional District expects that each Tenderer has and will comply with internationally recognized labour conventions and recommendations of the International Labour Organization (ILO), of which Canada is a member, and any applicable legislation pertaining to workplace safety, health, labour and employment, human rights, and the environment. In Canada this includes but is not limited to the latest editions of the following: *Corruption of Foreign Public Officials Act* (Canada), *Human Rights Code* (BC), *Employment Standards Act*, *Workers Compensation Act* (BC), *Canadian Environmental Protection Act*, *Fisheries Act* (Canada), *Transportation of Dangerous Goods Act* (BC), *Transportation of Dangerous Goods Act*, (Canada), *Environmental Management Act* (BC).

PART 21 PRIME CONTRACTOR

21.1 The successful Contractor shall be deemed to be the Prime Contractor within the meaning of Part 3, Division 3, Section 118(1) of the Workers Compensation Act. The successful Contractor must be qualified and willing to assume this responsibility.

PART 22 HOURS OF WORK

22.1 No work shall be performed under the Contract between the hours of 6:00 p.m. and 7:00 a.m. of the following day or on Saturdays, Sundays, or statutory holidays except as authorized in writing by the Regional District at the Regional District's sole discretion.

PART 23 CONFLICT OF INTEREST

23.1 The Tenderer declares that it has no financial interest, directly or indirectly in the business of any third party that would be or be seen to be a conflict of interest in carrying out the services. It warrants that neither it nor any of its officers or directors, or any employee with authority to bind the Bidder, has any financial or personal relationship or affiliation with any elected official or employee of the Regional District or their immediate families which might in any way be seen by the Regional District to create a conflict.

PART 24 LITIGATION CLAUSE

24.1 The RDN may, in its absolute discretion, reject a Tender, if the Tenderer, or any officer or director of the Tenderer is or has been engaged either directly or indirectly through another corporation in legal action against the RDN, its elected or appointed officers and employees in relation to:

- (a) any other contract for works or services; or
- (b) any matter arising from the RDN's exercise of its powers, duties, or functions under the Local Government Act, Community Charter, or another enactment within five years of the date of this Bid Call.

In determining whether to reject a Tender under this clause, the RDN will consider whether the litigation is likely to affect the Tenderer's ability to work with the RDN, its consultants and representatives and whether the RDN's experience with the Tenderer indicates that the RDN is likely to incur increased staff and legal costs in the administration of this Contract if it is awarded to the Tenderer.

PART 25 TENDER IRREGULARITIES

- 25.1 The Regional District may accept or waive a minor and inconsequential irregularity, or where practicable to do so, the Regional District may, as a condition of bid acceptance, request a Tenderer to correct a minor and inconsequential irregularity with no change in bid price. The determination of what is, or is not, a minor and inconsequential irregularity, the determination of whether to accept, waive, or require correction of an irregularity, and the final determination of the validity of a bid, shall be at the Regional District's sole discretion.

PART 26 COVID-19

- 26.1 Tenderers are advised that the Regional District of Nanaimo acknowledges both the challenges and uncertainty in managing the Coronavirus (COVID-19) in BC's construction industry going forward. Portions of this tender may contain specific starting and completion dates that may or may not be achievable, depending on future restrictions and the duration of these restrictions. Additional risk may be realized from supply chain issues and potential construction site slowdowns, resulting in a delay in delivery of the project. The successful Tenderer will be required to provide the Owner and Consultant with a COVID-19 management plan including safe work plans that meet current Federal and Provincial Government and WorksafeBC requirements.

END OF SECTION



Section 200

Invitation to Tender No. 21-073
Jack Bagley Park Redevelopment

FORM OF TENDER

JACK BAGLEY PARK REDEVELOPMENT

FORM OF TENDER

Section 200

The undersigned who is skilled in the work described in the Tender Documents and having carefully read the Tender Documents, consisting of:

The Instructions to Tenderers;
Form of Tender;
Contract Agreement and General Conditions (CCDC #4 - Unit Price Contract);
Supplementary Conditions;
Construction Specifications prepared by ISL Engineering and Land Services Ltd. and Haeccity Architecture Studio;
Drawing Sheets L01 to IR-02 prepared by ISL Engineering and Land Services Ltd., Haeccity Architecture Studio, AME and Ion Irrigation;
Geotechnical Desktop Study dated May 24, 2019 prepared by Tetra Tech;
Addenda Numbers: _____

and who has inspected the site, hereby agrees to enter into a Contract to perform the work required by the Tender Documents and repair any defects for a period of one year from the date of substantial completion of the work, as determined by the Regional District of Nanaimo, at the prices stipulated herein.

It is understood that:

1. The Tender shall be irrevocable for **60** days after the closing date for receipt of Tenders and the Owner may at any time within such period accept this Tender whether any other Tender has previously been awarded or not.
2. The Tenderer shall execute the Agreement between the Owner and Contractor within **10** calendar days of receiving the Agreement from the Regional District, such time limit being extended only with the written approval of the Owner.
3. The Tenderer shall commence the Contract within **10** calendar days of receipt of the Notice to Proceed and shall complete the Work by May 30, 2022.
4. The Tenderer, should he fail to complete the work in the time specified above, shall compensate the Owner for the actual cost to the Owner of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract past the completion date.
5. If the Owner fails to make payments to the Contractor as they become due under the terms of the Contract, interest at ten percent (10%) per annum on such unpaid amounts shall also become due and payable until payment has been made.



**Tender No. 21-073
Jack Bagley Park Redevelopment SCHEDULES**

Date: _____

Company: _____

Address: _____

Telephone: _____ Email: _____

To: Regional District of Nanaimo
Via email to arobertson@islengineering.com

SCHEDULE 1 – SCHEDULE OF PRICES

Having examined the Project site and having carefully examined all of the tender documents including all Addenda issued as supplements thereto, and having examined and complied with Instructions to Bidders, we hereby offer to perform the Work set forth in the aforesaid documents for the Pricing in Canadian Dollars. Prices include the Contractor’s labour, material, equipment, material costs, overhead and profit, all taxes and duties, and shall represent the cost to the RDN of such charges excluding GST which shall be shown separately.

Schedule of Prices

A – Site Works

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
A1	Mobilization and Demobilization	Lump sum	1		
A2	Demolition	Lump sum	1		
A3	Excavation and Grading	Lump sum	1		
A4	Water service	Lump sum	1		
A5	Drainage Improvements	Lump sum	1		
Subtotal:					

B-Building

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
B1	Washroom and change room building (complete)	Lump sum	1		
Subtotal:					



C-Hardscaping

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
C1	Lock Block wall relocation	Lineal meter	58.5		
C2	Concrete stairs c/w handrails	Lump sum	1		
C3	Furniture concrete footings and pads	Lump sum	1		
C4	Boulders at ramp	Lump sum	1		
C5	Chainlink fences and gates	Lump sum	1		
C6	Asphalt paving	Sq. meter	1423		
C7	Sports courts asphalt coatings	Lump sum	1		
C8	Gravel surfacing	Sq. meter	150		
Subtotal:					

D –Site Furniture

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
D1	Picnic tables	Each	3		
D2	Benches	Each	5		
D3	Waste receptacles	Each	2		
D4	Drinking fountain	Each	1		
D5	Tennis court posts and net c/w footings	Each	1		
D6	Pickleball court posts and net c/w footings	Each	1		
Subtotal:					

E – Softscape

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
E1	Irrigation system (complete) minus to trees	Lump sum	1		
E2	Growing medium	Cu. meter	186		
E3	Shrubs	Each	137		
E4	Hydroseeding	Sq. meter	1174		
Subtotal:					

UNIT PRICE PRICING (Sections A – E):

Unit Price Total: \$ _____

GST (5%): \$ _____

Total Contract Price: \$ _____



Total Contract Price will be used to establish low bidder

Provisional Items (At the sole discretion of the Regional District to accept all, some, or none)

F – Provisional Items

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Amount
F1	Timber stairs c/w handrail	Lump sum	1		
F2	Coloured asphalt at entry plaza	Lump sum	1		
F3	Growing medium for trees	Cu. meter	54		
F4	Irrigation for trees	Lump sum	1		
F5	Trees	Each	6		
Subtotal:					

SCHEDULE 2 – TENDERER’S EXPERIENCE

The successful contractor or team must be regularly engaged in the Work described in the Tender Documents. The team must have completed three similar projects in the last 5 years. The following is a list of references that demonstrate the Tenderer’s successful performance in comparable work. References should be similar in size, type and scope to the Work described in the Tender Documents.

1. Project Name: _____

Project Location: _____

Contract Sum: _____

Date Start: _____ Date Complete: _____

Owner Name: _____ Contact Ph. No.: _____

Project Engineer: _____ Contact Ph. No.: _____

Key Subcontractors Used: _____



2. Project Name: _____
Project Location: _____
Contract Sum: _____
Date Start: _____ Date Complete: _____
Owner Name: _____ Contact Ph. No.: _____
Project Engineer: _____ Contact Ph. No.: _____
Key Subcontractors Used: _____

3. Project Name: _____
Project Location: _____
Contract Sum: _____
Date Start: _____ Date Complete: _____
Owner Name: _____ Contact Ph. No.: _____
Project Engineer: _____ Contact Ph. No.: _____
Key Subcontractors Used: _____

SCHEDULE 3 - TENDERER'S PROPOSED CONSTRUCTION SCHEDULE

The following is the schedule of the major phases of Work which the Tenderer intends to follow if awarded the Contract. The Tenderer shall complete the following proposed construction schedule. (Please indicate time proposed to be taken in form of bars). Assume date of Notice of Intent to Award of November 15, 2021.



Key Tasks	December	January	February	March	April	May
Mobilization						
Site removals						
Stormwater drainage system installation						
Site preparation / rough grading						
Building concrete slab & footings						
Building exterior construction						
Building electrical						
Building HVAC						
Water line trenching & pipe installation						
Building water connection & plumbing						
Sport court fencing						
Asphalt paving						
Entry stairs and ramp						
Timber stairs (Provisional item)						
Sports court and plaza line painting						
Site furnishings						
Irrigation installation						
Planting						
Substantial completion						
Total completion						
Demolition						
(Other)						
(Other)						
(Other)						

ACCEPTANCE

- .1 This Bid is open to acceptance for a period of sixty (60) days from the date of bid closing.
- .2 Submission of this Bid implies acceptance of the existing conditions at the site.
- .3 We understand that the lowest or any Bid will not necessarily be accepted. The RDN may also elect not to proceed with the Project.
- .4 The RDN reserves the right to waive minor defects or irregularities in the bid.
- .5 The Tenderer agrees to be designated as the Prime Contractor for this project per WorkSafe BC OH&S Regulations Sections 20.2 Notice of Project and 20.3 Coordination of Multiple Employer Workplaces and Workers’ Compensation Act, Section 118 Coordination of Multiple-Employer Workplaces (1) and (2). We are qualified and are willing to accept the responsibilities as Prime Contractor for the project.
- .6 We can complete the work by May 30, 2022.

Company: _____

Signature: _____
(Authorized Officer)

Printed: _____
(Authorized Officer)

JACK BAGLEY PARK REDEVELOPMENT

SCHEDULE 4 FORCE ACCOUNT

Section 200

The following is a list of personnel and associated rates which we may use for force account work:

OCCUPATION	HOURLY RATE	OVERTIME HOURLY RATE

The following is a list of equipment which we may use for force account work:

EQUIPMENT	MAKE AND MODEL	HOURLY RATE

The following are the Supplementary General Conditions referred to in Part 17 of the Instructions to Tenderers.

These amendments shall be read in conjunction with the Agreement, Definitions and General Conditions of the Unit Price Contract (CCDC4-2011) of the Contract Documents. Where reference is made in the Contract Documents to the General Conditions of Contract (GC), such reference includes these amendments.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

Article A-2 Agreements and Amendments

SGC 1 Add paragraph 2.3:

Counterpart. The Agreement may be executed in any number of counterparts, each of which will be deemed to be an original and all of which taken together will be deemed to constitute one and the same instrument. Delivery by electronic transmission in portable document format (PDF) of an executed counterpart of this Agreement is as effective as delivery of an originally executed counterpart of this Agreement.

DEFINITIONS

SGC 2 Delete the definition for Value Added Taxes, and replace it with the following:

Value Added Taxes

Value Added Taxes means the Good & Services Taxes under the Excise Tax Act (Canada).

Add the definitions:

Milestone Dates

Milestone Dates means any date specified in the Contract Documents for completion of the Work, or portion of the Work, including the date for Substantial Performance of the Work.

Abnormally Adverse Weather

Abnormally Adverse Weather means temperature, precipitation, wind or other weather condition which, in a two-week period, differs from the statistical average for that condition in that period by more than one standard deviation, calculated based on relevant data available from Environment Canada.

Construction Schedule

Construction Schedule means a schedule of the Work prepared by the Contractor setting out the start and completion dates of the major elements of the Work including, but not limited to, mobilization, shop drawings, construction, installation, testing, commissioning, Substantial Performance of the Work, Owner occupancy and any other Milestone Dates, and may be amended from time to time in accordance with the Contract Documents.

GENERAL CONDITIONS OF CONTRACT

GC 1.1 CONTRACT DOCUMENTS

SGC 3 Replace GC1.1.7.1 with the following:

.1 the order of priority of documents, from highest to lowest, shall be:

- Duly executed Agreement
- Supplementary General Conditions
- Duly executed Tender Form
- The most recent Addendum followed by other Addenda, the more recent taking precedence over earlier Addenda.
- The Specifications, Drawings, Appendices and General Conditions
- The Tender Documents
- Other relevant documents such as but not limited to executed bonds, insurance certificate and any reports, standards or the like included by reference.

GC 1.5 FORCE MAJEURE

SGC 4 Add new paragraph 1.5 as follows:

GC 1.5 A party is not liable for failure to perform the party's obligations if such failure is as a result of Acts of God (including fire, flood, earthquake, storm, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (regardless of whether war is declared), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, labour dispute, strike, lockout, pandemic, epidemic or interruption or failure of electricity.

In the event force majeure occurs, the party who is delayed or fails to perform shall give prompt notice to the other party and shall take all reasonable steps to eliminate the cause. Should the force majeure event last for longer than 30 calendar days, the Regional District, at its sole discretion, may terminate this Agreement by written notice to the Vendor without further liability, expense, or cost of any kind.

GC 2.1 AUTHORITY OF THE CONSULTANT

SGC 5 In paragraph 2.1.3 delete the phrase "against whom the Contractor makes no reasonable objection".

GC 2.2 ROLE OF THE CONSULTANT

SGC 6 Add new paragraph 2.2.19 as follows:

2.2.19 All decisions, determinations, findings, interpretations instructions, consents and approvals of the Consultant must be in writing. Neither the Owner nor the Consultant will be bound by any oral decisions, determinations, findings, interpretations, instructions, consents, or approvals of the Consultant.

GC 2.3 REVIEW AND INSPECTION OF THE WORK

SGC 7 Add new paragraph 2.3.8 as follows:

2.3.8. If the Contractor is not prepared for a review or inspection after the Contractor has notified the Consultant of readiness for a proposed review or inspection, and as a result the Consultant is required to make second or subsequent visits, the contractor shall reimburse the Owner for any additional charges rendered by the Consultant to the Owner for the second visit or subsequent visits, and the Owner may deduct the amount of any such charges from any monies otherwise owing to the Contractor on account of the Contract Amount.

GC 3.1 CONTROL OF THE WORK

SGC 8 Add the following paragraph to 3.1.1 after “Contract Documents”:

“including the Construction Schedule.”

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

SGC 9 Delete GC 3.2.2.2 and replace with following:

3.2.2.2. Use reasonable efforts to ensure that the Owner’s other contractors or own forces are made aware of, and comply with, the safety precautions and programs of the Contractor provided pursuant to GC 9.4 – CONSTRUCTION SAFETY.

GC 3.5 CONSTRUCTION SCHEDULE

SGC 10 In paragraph 3.5.1 sub-paragraph .1, delete “. . . prior to the first application for payment. . .” and replace with the following:

“within ten (10) working days after Notice of Intent to Award”;

SGC 11 Add paragraph:

3.5.1.4 If the Contractor submits a Construction Schedule or a revision to the Construction Schedule indicating that any Milestone Dates will not be met then receipt of such schedule by the Consultant will not relieve the Contractor of the obligation to meet the Milestone Dates as set out in the Contract Documents.

SGC 12 Add paragraph:

3.5.1.5 The Contractor shall immediately notify the Consultant in writing of any occurrence which, in the opinion of the Contractor has caused or which the Contractor anticipates may cause a delay to, or which will affect, the performance of the Work in accordance with the Construction Schedule. Such notice shall include complete details of the reason for the delay, the anticipated length of the delay and a revision to the Construction Schedule in accordance with the anticipated delay.

SGC 13 Add the following paragraphs 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.5.7, and 3.5.8:

3.5.2 The Contractor shall perform the Work in compliance with the Milestone Dates and the Construction Schedule. Any such failure to comply shall be deemed to be a default to which the provisions of GC 7.1.2 to GC 7.1.6 (inclusive) apply.

3.5.3 If the Consultant determines that, because of the Contractor’s own acts or omissions, the progress of the Work is behind the Construction Schedule, or the Contractor will not meet any particular Milestone Date then the Contractor shall, upon written notice from the Consultant

and at the Contractor's own cost, take all reasonable measures to accelerate the Work so as to conform to the Construction Schedule or meet the Milestone Date.

- 3.5.4 If the Consultant determines that, because of reasons other than the Contractor's own acts or omissions, the progress of the Work is behind the Construction Schedule, or will not meet any particular Milestone Date, or if the Owner desires to accelerate the Work to achieve early completion of the Work, then on written notice from the Consultant the Contractor shall accelerate the Work as directed by the Consultant at the Owner's cost, such acceleration to be a change to the Work to which the provisions of Part 6 shall apply.
- 3.5.5 If the Consultant has not directed the Contractor to accelerate the Work at the Owner's cost, the Contractor shall not be entitled to claim any payment on account of acceleration costs unless the Contractor has given prior written notice within 5 working days to the Consultant setting out that the Contractor intends to claim such costs and the reasons for such claim, provided however that the giving of such notice shall not entitle the Contractor to payment of such costs
- 3.5.6 If the Contractor accelerates the performance of the Work because of a notice given pursuant to GC 3.5.3, or for the Contractor's own benefit, then the Owner may claim all reasonable additional costs incurred as a result of such acceleration.
- 3.5.7 If, for any reason, the Contractor deems it necessary to accelerate the Work then the Contractor shall provide written notice of its intention to accelerate the Work 5 Working Days prior to doing so and shall accelerate the Work at its own expense.
- 3.5.8 The Tenderer, should he fail to complete the work in the time specified above, shall compensate the Owner for the actual cost to the Owner of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract past the completion date.

GC 3.6 SUPERVISION

SGC14 Delete paragraphs 3.6.1 and 3.6.2 and replace with the following:

- 3.6.1 The Contractor shall employ a competent senior representative at the Place of the Work (the "Supervisor") who shall have the responsibility to ensure that the Work is performed in compliance with the Contract Documents.
- 3.6.2 The Supervisor shall represent the Contractor at the Place of the Work and instructions given to the Supervisor by the Consultant shall be deemed to have been given to the Contractor.
- 3.6.3 The Contractor shall not change the Supervisor without consent of the Consultant, such consent not to be unreasonably withheld.

GC 3.7 SUBCONTRACTORS AND SUPPLIERS

SGC 15 Delete paragraphs 3.7.3 and 3.7.4

SGC 16 Add the following paragraph:

- 3.7.7 The Contractor shall, in respect of his Subcontractors, be held responsible for and shall ensure that said Subcontractors obtain and pay for all necessary permits, fees, licenses and certificates of inspection and insurance in connection with the Work as may be required by applicable statutes, regulations, by-laws and ordinances.

GC 3.10 SHOP DRAWINGS

SGC 17 Add the following new subsection

3.10.13 The Contractor shall submit all Shop Drawings, record drawing drawings and any other drawings concerning the Work in triplicate and in reproducible, suitable, and usable electronic form.

GC 3.11 USE OF THE WORK

SGC 18 Add the following paragraphs 3.11.3 and 3.11.4 as follows:

3.11.3 The Owner will obtain any Road Usage Permits required for Work within Ministry of Transportation and Infrastructure Roadways.

3.11.4 The Contractor will submit a traffic management plan in accordance with Ministry of Transportation and Infrastructure requirements for Traffic Management for Work on Roadways:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/traffic-engineering-safety/trafficmanagementmanual>

for approval by Ministry of Transportation and Infrastructure showing how the Contractor will provide for safe and efficient access and exit of construction vehicles from Place of Work and the Contractor will ensure all work is conducted in accordance with the plan.

GC 3.13 CLEANUP

SGC 19. Add the following paragraphs 3.13.4 as follows:

3.13.4 The Contractor is responsible for dust control within the Place of the Work and roadways beyond the limits of the Place of the Work that have been affected during construction. While performing the Work the Contractor shall control dust originating from the Work and shall take immediate corrective action if directed by the Consultant. The Contractor will clean the Place of the Work and employ a street sweeper to clean affected roadways as directed by the Consultant. Dusty or loose materials shall be transported in covered haulage vehicles. Wet materials shall be transported in suitable watertight haulage vehicles.

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

SGC 20 Delete GC 5.1 - "Financing Information Required of the Owner" in its entirety.

GC 5.2 APPLICATION FOR PROGRESS PAYMENT

SGC 21 Delete entirely paragraph 5.2.4

SGC 22 Add the following paragraphs 5.2.8 and 5.2.9 as follows:

5.2.8 As a condition to all payments, the Contractor shall submit to the Consultant a Statutory Declaration on the standard Canadian Construction Association (CCA) 9A 2001 declared before a notary public or commissioner for oaths for the Province of British Columbia stating that:

- .1 all wages for the various classes of labour, and all accounts for purchase of materials, equipment, or for the rental of equipment employed in or about the Work, and amounts due to Subcontractors have been paid;

- .2 there are no outstanding claims or liens relating to labour or services provided in connection with the Work; and
- .3 all levies, assessments and sums due under any applicable Workers' Compensation laws or similar laws in force at the place of the Work have been fully paid.

As a further condition of payment, there shall be no liens registered against the Place of the Work, arising from or connected with the Work. In the event that a claim of builders lien relating to the Work has been registered against title to the Place of the Work, the Contractor shall be obligated, at its expense, to take all steps necessary, including making court application, to have the claim of lien immediately discharged from title to the Place of the Work and to indemnify the Owner for all costs, including court costs on a solicitor and own client basis, incurred as a result.

5.2.9 As a condition to all payments after the first progress payment, the Contractor shall also submit to the Consultant a Statutory Declaration for "Statement of Claims" on a form approved by the Owner, also declared before a notary public or a Commissioner for Taking Oaths for the Province of British Columbia stating:

- .1 there are no outstanding claims for payment for Work, or changes to the Construction Schedule in respect of Work, performed beyond the scope of the Contract, or
- .2 there are outstanding claims for payment for Work, or changes to the Construction Schedule in respect of Work, performed beyond the scope of the Contract which have been communicated to the Consultant in writing, but for which a Change Order or Change Directive has not yet been received; or
- .3 there are outstanding claims for payment for Work, or changes to the Construction Schedule in respect of Work, performed beyond the scope of the Contract, including adjustments to the Construction Schedule, for which Change Orders or Change Directives have not been issued and which have not yet been communicated to the Consultant in writing.

GC 5.3 PROGRESS PAYMENT

SGC 23 In paragraph 5.3.1 sub-paragraph .3, delete ". . . 20 calendar days. . ." and replace with ". . . 30 calendar days. . ."; and

Add the following new subsection

5.3.3 The payment by the Owner of any monthly or other payment shall not bind the Owner with respect to any subsequent payment or the final progress payment, but shall be taken as approximate only, and shall not mean, or be construed to mean, that the Owner has accepted Work that is not in accordance with the requirements of the Contract, or that the Contractor is in any manner released from its obligation to comply with the Contract.

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

SGC 24 Add new paragraphs 5.4.4; 5.4.5 and 5.4.6 as follows:

5.4.4 Prior to or at the time of applying for a review under paragraph 5.4.1 to establish Substantial Performance of Work, the Contractor shall submit to the Consultant the following items:

- .1 Letters of Assurance for professional design and review from those professionals engaged by the Contractor under the provisions of the Contract, including all applicable sealed shop drawings.

-
- .2 All required manufacturer's inspections, certifications, guarantees, warranties as specified in the Contract Documents.
 - .3 All maintenance manuals, operating instructions, maintenance and operating tools, replacement parts or materials as specified in the Contract Documents.
 - .4 Certificates issued by all permit issuing authorities indicating approval of all installations requiring permits.
 - .5 Certificates issued by all testing, commissioning, cleaning, inspection authorities and associations as specified in the Contract Documents.
 - .6 All Drawings and as-installed documents in the form specified in the Contract Documents.
 - .7 A certificate issued by Workers Compensation Board confirming that the Contractor has paid all assessments.
- 5.4.5 Prior to Substantial Performance of the Work and in addition to the lien holdback, a deficiency holdback shall be established for Work determined by the Consultant to be defective or incomplete (the "Deficiency Holdback"). The Consultant shall establish the amount of the Deficiency Holdback as twice the estimated cost to rectify defective work and finish incomplete Work using the services of another contractor or the Owner's own forces. No part of the Deficiency Holdback shall become payable until all of the defective Work is corrected and all of the Work is complete. If the defective or incomplete Work is not corrected or completed within a reasonable time as determined by the Consultant, then all or a portion of the Deficiency Holdback as determined by the Consultant may be retained by the Owner to be applied against the loss and damage suffered by the Owner to correct or complete the Work.
- 5.4.6 The Contractor's application for the Certificate of Substantial Performance shall constitute a waiver and release by the Contractor of any and all claims arising out of or relating to the Contract up to the date of Substantial Performance of the Work. This waiver and release shall apply without limitation to claims that arise due to the negligence or breach of contract by the Owner, the Consultant, and their respective employees, agents, officers and consultants, but does not include claims made by the Contractor in writing prior to application for a certificate of Substantial Performance of the Work and delivered to the Consultant prior to the date of Substantial Performance of the Work and still unsettled.
- GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK**
- SGC 25 Delete entirely paragraph 5.5.3
- GC 5.7 FINAL PAYMENT**
- SGC 26 In paragraph 5.7.4, revise "5 calendar days" to read "15 working days"
- GC 5.9 NON-CONFORMING WORK**
- SGC 27 In paragraph 5.9.1 replace "No payment by the Owner" with the words "No payment by the Owner or certification by the Consultant"
- GC 6.1 CHANGES IN THE WORK**
- SGC 28 Add the following paragraphs 6.1.3 and 6.1.4 as follows:
- 6.1.3 The Contractor shall not be entitled to rely on any oral representation (except in an emergency in which GC 6.1.4 will apply), site meeting discussion, site meeting minutes or other communication as approval that any Work is a Change. The Contractor must receive a Change

Order or Change Directive before proceeding with a Change and the Contractor shall strictly comply with the requirements of this GC

- 6.1.4 In an emergency, when it is impractical to delay a Change Directive, the Consultant may issue an oral direction which the Contractor shall follow. In such event the Consultant shall issue a written Change Directive at the first opportunity.

GC 6.2 CHANGE ORDER

- SGC. 29 Change the first part of paragraph 6.2.3 to read "When the Owner and the Contractor agree in writing..."

Add:

- 6.2.4. When the valuation of a change in the Work is to be determined either by estimate and acceptance in a lump sum, or by cost and fixed or percentage fee, the valuation shall be in accordance with the following:
- .1 Work performed by the Contractor – Contractors direct field costs plus 10% mark-up for overhead and profit.
 - .2 Work performed by the Sub-Contractor – Sub-contractors will receive direct field costs plus 10% mark-up for overhead and profit. The General Contractor will receive an additional 5% markup on the actual cost evidenced by invoice to cover all overhead and profit.

GC 6.3 CHANGE DIRECTIVE

- SGC 30 Delete and replace GC 6.3.6.3 with:

"The Contractor's fee will cover all overhead and profit and will be calculated as follows:

- .1 Work performed by the Contractor – Contractor's direct field costs plus 10% mark-up for overhead and profit.
- .2 Work performed by the Sub-Contractor – Sub-contractors will receive direct field costs plus 10% mark-up for overhead and profit. The Contractor will receive a 5% markup on the Sub-contractor's actual cost evidenced by invoice to cover all of the Contractor's overhead and profit.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

- SGC 31 Add the following paragraphs 6.4.5 and 6.4.6:

- 6.4.5 Despite the rest of this GC, Contract Time will not be extended and the Contractor will not be entitled to any increase in the Contract Price due to conditions of the Place of the Work which the Consultant determines would have been reasonably foreseeable by the Contractor had the Contractor conducted a reasonable inspection of the Place of the Work, including the subsurface soil conditions of the Place of the Work."
- 6.4.6 Before commencing any Work at the Place of the Work, the Contractor shall be responsible to locate in three dimensions all underground utilities and structures indicated on the Contract Documents as being at the Place of Work. The Contractor shall also be responsible to consult with all utility providers that provide electricity, communication, gas or other utility services in the area of the Place of Work, to locate in three dimensions all underground utilities for which they have records. The Contractor shall also locate in three dimensions any other utilities or

underground structures that are reasonably apparent in an inspection of the Place of the Work.

GC 6.5 DELAYS

SGC 32 GC 6.5.4 Change “10” to “5” in the second line of paragraph 6.5.4. At the end of paragraph 6.5.4 add the following sentences:

“A Notice in Writing shall be delivered to the Consultant for each and every delay and shall indicate the reasons for such delay and the best estimate of the Contractor as to its estimated duration and likely effect upon the Contract Time. No oral communication, site meeting discussion or meeting minutes shall be sufficient notification of delay“

SGC 33 Add paragraphs 6.5.6, 6.5.7 and 6.5.8 as follows:

6.5.6 If the Consultant determines that the Contractor is delayed in the performance of the Work, for reasons other than those under GC6.5.1, GC6.5.2 or GC6.5.3, such that in the Consultant’s opinion the Work is more than 20 percent behind the Construction Schedule, then upon notice from the Owner, the Contractor will increase the hours of work, the days of work, and the number of workers as required to bring the Work back into line with the Construction Schedule and any costs associated with such measures shall be borne by the Contractor.

6.5.7 In the event of any delay the Contractor shall take all reasonable measures to minimize the effects and costs of the delay and (except where the delay is caused by the Owner or the Consultant or other cause reasonably outside of the control of the Contractor) the Contractor will be responsible for all costs relating to the delay.

6.5.8 The Contractor shall maintain and protect the Work during the period of delay in the performance of the Work.

GC 7.2 CONTRACTOR’S RIGHT TO STOP THE WORK OR TERMINATE THE CONTRACT

SGC 34 Delete entirely paragraph 7.2.3.1

SGC 35 Replace paragraph 7.2.5 with the following:

7.2.5 If the Contractor terminates the Contract under the conditions set out above, the Contractor shall be entitled to be paid for all work performed under the Contract including reasonable profit and will be entitled to no further compensation from the Owner.”

GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

SGC 36 Delete paragraph 8.2.1 and substitute the following:

8.2.1 In accordance with the latest edition of the Rules for Mediation of CCDC 40 – [2018 Rules for Mediation and Arbitration of Construction Disputes](#), the parties shall appoint a Project Mediator within 15 working days after both parties agree in writing that a Project Mediator be appointed.

SGC 37 Delete the paragraphs 8.2.6, 8.2.7 and 8.2.8 and replace with the following:

8.2.6 Upon termination of mediated negotiations, either party may refer the unresolved dispute to the courts or to any other form of dispute resolution, including arbitration, which the parties have agreed to use.

GC 9.1 PROTECTION OF WORK AND PROPERTY

SGC 38 Add the following paragraph 9.1.5 as follows:

9.1.5 When carrying out excavation work, the Contractor may encounter underground utilities such as sewers, gas mains, telephone cables, power cables, and water mains. The Contractor shall be fully responsible for any breakage or damage to such utilities, and the Contractor shall pay the full cost of repairing such damage and making good any losses or damage suffered by the Owner or others.

GC 9.4 CONSTRUCTION SAFETY

SGC 39 Delete paragraph 9.4.1 and replace with the following:

9.4.1 The Contractor shall be solely responsible for construction safety at the Place of the Work as and to the extent required by applicable legislation, regulations and codes, including the Workers Compensation Act, applicable regulations and good construction practice, and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work.

GC 10.1 TAXES AND DUTIES

SGC 40 Add paragraph 10.1.3 as follows:

10.1.3 Any tax including, without limiting the generality of the foregoing, the Value-Added Tax or any government sales tax, customs, duty or excise tax, whether paid or not, which is found to be inapplicable or for which exemption may be obtained is, the sole and exclusive property of the Owner. The Contractor agrees to cooperate with the Owner or his agent in the application for any refund of any such taxes, which cooperation shall include without limitation making or concurring in the making of application for any such refund or exemption and providing to the Owner or his agent copies, or where required, originals, or records, invoices, purchase orders and other documentation necessary to support such application for exemption or refund.

SGC 41 Add paragraph 10.1.4 as follows:

10.1.4 Where any invoices or other documents are required for tax and duty refund purposes, the Contractor shall provide the Owner with such invoices and other documents as may be necessary to substantiate the amount of taxes or duties paid during the performance of the Contract for which the Owner may rightfully claim redemption.

SGC 42 Add paragraph 10.1.5 as follows:

10.1.5 The Contractor agrees to provide the Owner with a signed statement, if requested by the Owner, in which is the Contractor confirms that the Contractor and all Subcontractors relinquish all claims to any refunds or reimbursements of any Federal or Provincial taxes paid by the Contractor relating to performance of the Contract for which the Owner may rightfully claim redemption and the Contractor hereby relinquishes all such claims.

GC 10.2 LAWS, NOTICES, PERMITS AND FEES

SGC 43 GC 10.2.6 Delete the words “knowing it to be” in the second line of paragraph 10.2.5 and replace them with “that is”.

SGC 44 Add the following paragraph:

10.2.8 The Contractor will notify and deal with organizations involved with or affected by the Work, such as telephone, electricity, gas and other utility providers, railway companies and government agencies.

GC 10.4 WORKERS' COMPENSATION

SGC 45 Add the following sentence to paragraph 10.4.1:

“The Contractor agrees that the Owner has the unfettered right to set off the amount of any unpaid premiums and assessments for WorkSafe BC coverage against any monies owing by the Owner to the Contractor.”

SGC 46 Add paragraph 10.4.3 as follows:

10.4.3 The Contractor shall indemnify and hold harmless the Owner from all manner of claims, demands, damages, costs, losses, penalties, actions, causes of action and proceedings arising out of or in any way related to unpaid WorkSafe BC assessments owed by any person working on the Project or relating to the Work or arising out of or in any way related to the failure to observe safety rules, regulations and practices of WorkSafe BC.

SGC 47 Add paragraph 10.4.4 as follows:

10.4.4 The Contractor will be the “Prime Contractor” within the meaning of Part 3, Division 3, Section 118(1) for the Project under the *Workers Compensation Act* (British Columbia) and will fulfill all obligations of the “Prime Contractor” under that Act, including by ensuring that the activities of any employees, workers and other persons at the Place of the Work relating to occupational health and safety are coordinated and by doing everything that is reasonably practicable to establish and maintain a system or process that will ensure compliance with the *Workers Compensation Act* and the regulations under that Act applicable to the Place of the Work”.

GC 12.1 INDEMNIFICATION

SGC 48 Delete GC 12.1.1 and 12.1.2 and replace with the following:

12.1.1 Without restricting the parties' obligation to indemnify as described in paragraphs 12.1.4 and 12.1.5, the Owner and the Contractor shall each indemnify and hold harmless the other from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings whether in respect to losses suffered by them or in respect to claims by third parties that arise out of, or are attributable in any respect to their involvement as parties to this Contract, provided such claims are:

- .1 caused by:
the negligent acts or omissions of the party from whom indemnification is sought or anyone for whose acts or omissions that party is liable, or a failure of the party to the Contract from whom indemnification is sought to fulfill its terms or conditions; and
- .2 made by Notice in Writing within a period of 10 years from the date of Substantial Performance of the Work as set out in the certificate of Substantial Performance of the Work issued pursuant to paragraph 5.4.2.2 of GC 5.4 – SUBSTANTIAL PERFORMANCE OF THE WORK or within such territory of the Place of the Work.

12.1.2 The obligation of either party to indemnify as set forth in paragraph 12.1.1 shall be limited as follows:

- .1 In respect to losses suffered by the Owner and the Contractor for which insurance is, or for which insurance is not, required to be provided by either party shall in no event be greater than \$5,000,000.

- .2 In respect to claims by third parties for direct loss resulting from bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, the obligation to indemnify is without limit. In respect to all other claims for indemnity as a destruction of tangible property, the obligation to indemnify is without limit. In respect to all other claims for indemnity as a destruction of tangible property, the obligation to indemnify is without limit. In respect to all other claims for indemnity as a result of claims advanced by third parties, the limits of indemnity set forth in paragraphs 12.1.2.1 shall apply.

GC 12.3 WARRANTY

SGC 49 Add the following sentence to paragraph 12.3.4:

In effecting a correction of defects or deficiencies, the Contractor shall also bear all costs involved in removing, replacing, repairing or restoring aspects of the Work that may be affected in the process of making the correction.

SGC 50 Add paragraph 12.3.7 as follows:

12.3.7 Where a material, product or installation covered by warranty fails, the stipulated warranty and warranty period shall be renewed for the specific work being replaced or repaired, with the exception of warranties referred to in GC 12.3.6

END OF SECTION 00500

May 24, 2019

ISL Engineering and Land Services Ltd.
Suite 5013 - 4190 Lougheed Highway
Burnaby, BC V5C 6A8

ISSUED FOR REVIEW
FILE: 704-ENG.VGEO03594-01
Via Email: arobertson@islengineering.com

Attention: Andrew Robertson, MBCSLA, LEED AP

Subject: Jack Bagley Community Park – Geotechnical Desktop Study

This 'Issued for Review' document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an 'Issued for Use' document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the 'Issued for Review' document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by the Regional District of Nanaimo (RDN), care of ISL Engineering and Land Services Ltd. (ISL), to conduct a geotechnical desktop study of the Jack Bagley Community Park in Nanoose Bay, BC (the Park). Tetra Tech understands the RDN is planning to construct a racquetball court at the park and is seeking preliminary input to determine the feasibility of the project.

2.0 PROJECT DESCRIPTION

The Park is located adjacent to Powder Point Road and behind Nanoose Bay Elementary School, as shown in Figure 1. Land at the Park is currently constructed entirely as a turf playing field. Three sides of the Park are cut into the slope, with the fourth side sloped down to the adjacent Powder Point Road. At the base of the downslope to the road, a lock-block wall of approximately 0.75 m (one block) in height exists.

Tetra Tech understands the RDN is undertaking preliminary site planning to determine the feasibility of constructing racquetball courts at the Park.

3.0 SITE RECONNAISSANCE

A site visit was conducted by Eli Riedl, EIT, of Tetra Tech, on May 17, 2019. During the site visit the following observations were made:

- Cut slopes surrounding the park were generally composed of till-like SAND, with varying amounts of gravel and silt components. Occasional boulders were observed in the exposed soils;
- The turf sports field appeared to have adequate drainage, with no swampy areas evident. The site visit followed a period of drier weather, but there was evidence of regular irrigation;
- Probes of the sports field soils indicated compact soils likely underly loose surficial organics at a depth of approximately 0.15 m;

- Several shallow depressions were noted in the sports field, indicating that some differential settlement has occurred; and,
- Probes of the downslope from the edge of the fields to Powder Point Road indicated looser soils.

Selected photos from the site reconnaissance are included in Appendix B.

4.0 BACKGROUND INFORMATION REVIEW

4.1 Air Photos

Air photos from 1978 and 1992 were reviewed for this desktop review. The air photo from 1978 shows the site of the Park in use as a borrow pit (Figure 2). In the 1992 air photo, the site has been developed into a sports field with baseball diamonds similar to the current configuration (Figure 3).

4.2 Surficial and Bedrock Geology

Review of the map “Soils of South Vancouver Island, British Columbia, Soil Survey Report No. 44, Sheet 3”, indicates soils in the area of the Park are composed of approximately 80% Kye deposits and 20% Dashwood deposits. “Soils of Southern Vancouver Island, MOE Technical Report 17” describes Kye deposits as loamy sand, generally developed from “fluvial, fluvio-glacial and/or marine” parent material. Kye deposits are described as rapidly drained and strongly acidic. The Soils of Southern Vancouver Island Report describes Dashwood soils as very gravelly, loamy sand, to gravelly, sandy loam, normally less than 1 m thick and underlain by morainal deposits. Dashwood soils are further described as well drained and moderately to strongly acidic.

The British Columbia Ministry of Environment Map “Vancouver Island Bedrock Geology” indicates the bedrock geology in the area of the Park consists of undivided sedimentary rocks belonging to the Nanaimo Group.

4.3 Geotechnical Reports

No technical reports relevant to the proposed development at the park were readily available for Tetra Tech to review. It should be noted that the review of air photos indicates the Nanoose Bay Elementary School, located north of the project site, was constructed after 1992. There is most likely a geotechnical report associated with the construction of the school, however, it could not be located for this report.

5.0 DISCUSSION

Based on the results of Tetra Tech’s review, no conditions were found which would preclude the proposed development at the Park. In general, regarding the proposed racquetball courts at the park, Tetra Tech can make the following comments.

- Granular soils probably underly the site. Granular soils are generally considered advantageous in foundation design;
- There appears to be adequate drainage at the site. The site is positioned mid-slope and the underlying soils appear to be well drained; and,

- Depressions in the field were noted during site reconnaissance, indicating some differential settlement has occurred in the subsurface. Over-excavation of soils may be necessary during construction to achieve desired foundation performance.

While conditions were generally inferred to be agreeable to the proposed development, the ability of this desktop study to assess geotechnical conditions is limited. If the proposed development at the Park is to go to construction, an intrusive geotechnical exploration and assessment should be undertaken.

6.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Regional District of Nanaimo and their agents. Tetra Tech Canada Inc. (operating as Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Regional District of Nanaimo, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

7.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully Submitted,
Tetra Tech Canada Inc.

ISSUED FOR REVIEW

ISSUED FOR REVIEW

Prepared by:
Eli Riedl, EIT.
Junior Engineer
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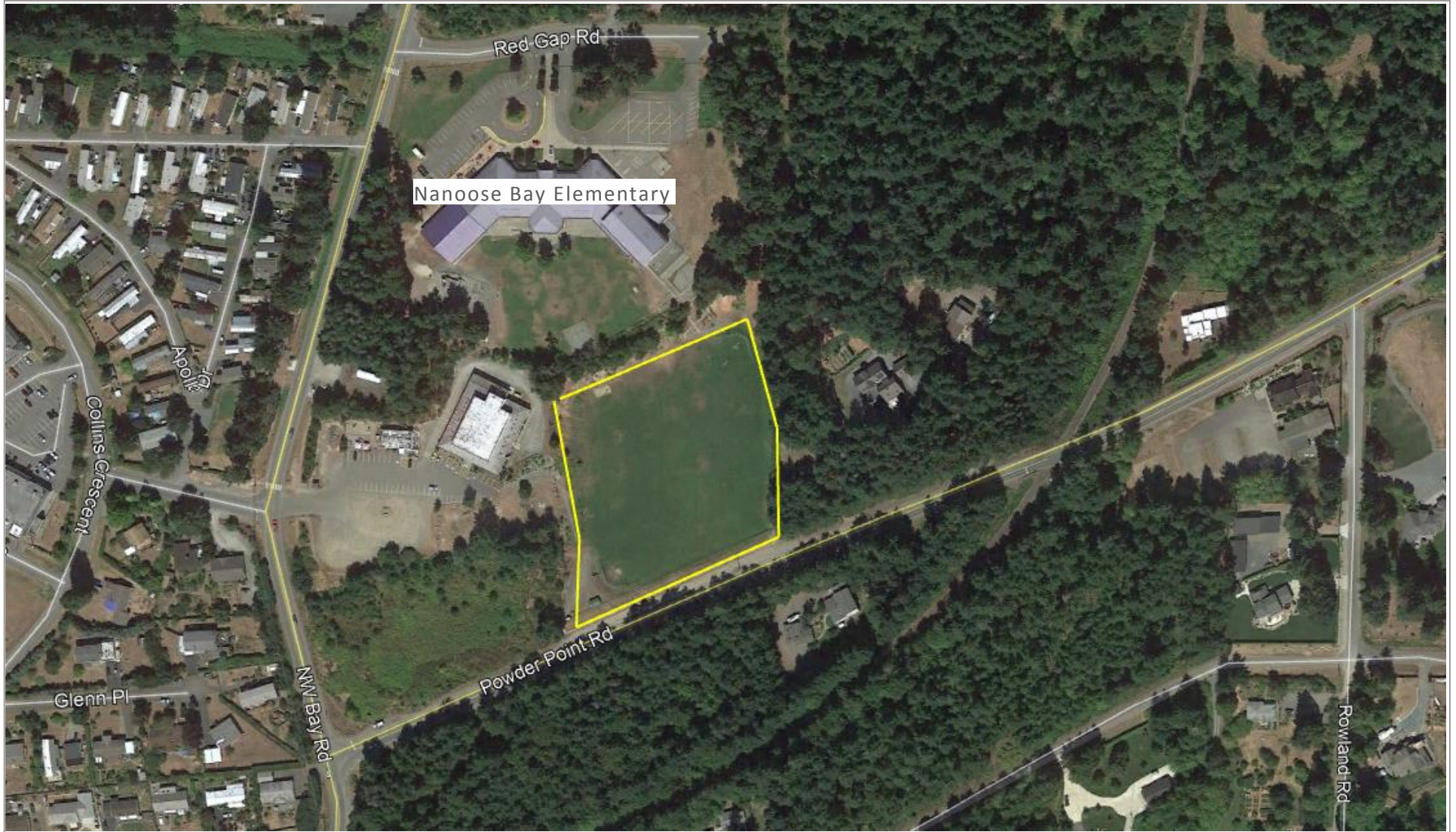
Reviewed by:
Andrew Walker
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/dr

Attachments: Figures 1 – 3
Appendix A - Tetra Tech's Limitations of the Use of this Document
Appendix B – Site Photos

FIGURES

- Figure 1 Location Plan
- Figure 2 1978 Airphoto
- Figure 3 1992 Airphoto



LEGEND

 Subject Site Outline

NOTES
Imagery from Google Earth

STATUS
ISSUED FOR REVIEW

CLIENT
Regional District
of Nanaimo



**Jack Bagley Community Park
Geotechnical Desktop Study**

Site Location

PROJECT NO. 704-ENG.VGEO03594-01	DWN ER	CKD AW	APVD	REV 0
OFFICE NANAIMO	DATE May 24, 2019			

Figure 1



LEGEND

NOTES

STATUS
FISSUED FOR REVIEW

CLIENT

Regional District
of Nanaimo



**Jack Bagley Community Park
Geotechnical Desktop Study**

Site Detail from 1978 Air Photo

PROJECT NO. 704-ENG.VGEO03594-01	DWN ER	CKD AW	APVD	REV 0
OFFICE NANAIMO	DATE May 24, 2019			

Figure 2



LEGEND

NOTES

CLIENT

Regional District
of Nanaimo

**Jack Bagley Community Park
Geotechnical Desktop Study**

Site Detail from 1992 Air Photo

STATUS
ISSUED FOR REVIEW



PROJECT NO.
704-ENG.VGEO03594-01

DWN	CKD	APVD	REV
ER	AW		0

OFFICE
NANAIMO

DATE
May 24, 2019

Figure 3

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

1.9 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

1.10 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historical environment. TETRA TECH does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional exploration and review may be necessary.

1.11 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

1.12 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

1.15 DRAINAGE SYSTEMS

Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

SITE PHOTOS



Photo 1: Soil Outcrop On Site Slope



Photo 2: Lock Block Wall at Base of Site

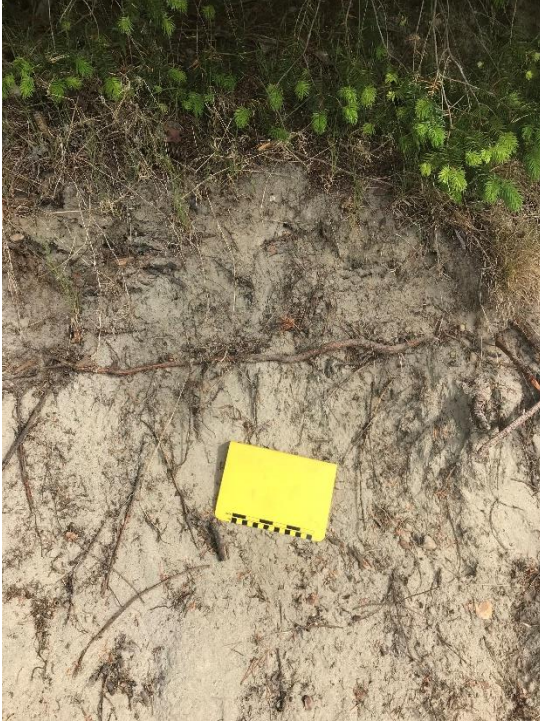


Photo 3: Soil Outcrop On Site Slope



Photo 4: Site Viewed from Southeast Corner



Photo 5: Site Viewed from Southwest Corner



Photo 6: Depression in Field



PERMIT TO CONSTRUCT, USE, AND MAINTAIN WORKS WITHIN THE RIGHT-OF-WAY OF A PROVINCIAL PUBLIC HIGHWAY

PURSUANT TO TRANSPORTATION ACT AND/OR THE INDUSTRIAL ROADS ACT AND/OR THE MOTOR VEHICLE ACT AND/OR AS DEFINED IN THE NISGA'A FINAL AGREEMENT AND THE NISGA'A FINAL AGREEMENT ACT.

BETWEEN:

The Minister of Transportation and Infrastructure

Vancouver Island District
Third Floor
2100 Labieux Road
Nanaimo, BC V9T 6E9

("The Minister")

AND:

Regional District of Nanaimo
6300 Hammond Bay Road
Nanaimo, British Columbia V9T 6N2

("The Permittee")

WHEREAS:

- A. The Minister has the authority to grant permits for the auxiliary use of highway right of way...
B. The Permittee has requested the Minister to issue a permit pursuant to this authority for the following purpose:

The installation, operation, and maintenance of new 2" water service line within Northwest Bay Road, located at Apollo Drive, to serve Rem LOT A, DISTRICT LOT 6, NANOOSE DISTRICT, PLAN VIP13317 in accordance with ISL drawing 32345 C-01 Rev C.

- C. The Minister is prepared to issue a permit on certain terms and conditions;

ACCORDINGLY, the Minister hereby grants to the Permittee a permit for the Use (as hereinafter defined) of highway right of way on the following terms and conditions:

- 1. That the construction and maintenance of the said works is carried out to the satisfaction of the Regional Executive Director.
2. That, before opening up any highway or interfering with any public work, intimation in writing of the intention to do so must be given to the District Official at least seven days before the work is begun.
3. That any person appointed by the Regional Executive Director for the purpose shall have free access to all parts of the works for the purpose of inspecting the same.
4. That the construction of the said works shall be commenced on or before the 1st February 2022 and shall be prosecuted with due diligence and to the satisfaction of the Regional Executive Director and shall be completed on or before the 1st May 2022
5. (a) The highway must at all times be kept open to traffic. The roadway must be completely restored for traffic as soon as possible. At all times the permittee must safeguard the traveling public.
(b) That, unless with the consent of the Regional Executive Director no more than forty-five (45) metres of pipe-track or other excavation in any public highway is to be kept open at one time.
(c) All excavation work must be carried out in accordance with the BC Occupational Health and Safety Regulation. Care shall be



taken to protect adjacent property.

(d) That all excavations shall be carefully back-filled with suitable material, which is to be tamped into place, and that the permittee shall restore the surface of the road and shoulders and ditches at their own expense. All surplus material is to be removed from the Provincial Crown lands, or deposited where and as required by the District Official of the Ministry of Transportation and Infrastructure. The permittee is financially responsible for any maintenance works required on said ditch for a period of one year. The Ministry will carry out the necessary remedial work and invoice the permittee monthly.

(e) The pipeline crossing installation is to be placed by drilling and (or) jacking in such a manner as to afford minimum grade settlement. No water jetting will be permitted. That where, in the opinion of the District Official, an excavation or opening for a pipeline crossing installation could be made which would not be detrimental to the highway or its users, permission will be granted for said works. On throughways, freeways, and main highways no open cuts will be allowed.

(f) That all pipelines in excess of a nominal diameter of 5 cm., whether gas, oil, water, pressure sewers, conduits, etc., shall be installed where indicated by the District Official, encased in a steel casing-pipe or conduit-pipe of sufficient strength to withstand all stresses and strains resulting from the location, such casing to extend the full width of the highway right-of-way if deemed necessary to the District Official. The ends of the casing-pipe shall be suitably sealed and, if required, properly vented above the ground with vent-pipes not less than 5 cm. in diameter, and extending not less than 1.2 metres above ground surface. Vent-pipes shall be connected 30 cm. from the ends of the casing-pipe, and the top of each vent shall be fitted with a turn-down elbow, properly screened and equipped with identification markers.

All pipelines of non-rigid material, i.e., plastic or copper, of any diameter, shall be cased, or embedded in sand.

The inside diameter of the casing-pipe shall be at least 25 percent larger than the outside diameter of the pipeline. The casing-pipe shall be installed with an even bearing throughout its length, and in such a manner so as to prevent leakage, except through the vents.

The top of the casing-pipe, or the pipeline where casing is not required, shall be located as directed by the District Official, and shall in no case be less than 1.2 metres below the surface of the highway and not less than 1.0 metres below the highway ditches. Pipelines must not obstruct drainage structures or ditches or interfere with traffic on the highway or with highway maintenance.

6. That where the work for which permission is hereby granted comes in contact with any bridge, culvert, ditch, or other existing work, such existing work must be properly maintained and supported in such manner as not to interfere with its proper function during the construction of the new work, and on the completion of the new work the bridge, culvert, ditch, or other existing work interfered with shall be completely restored to its original good condition.
7. That when necessary all excavations, materials, or other obstructions are to be efficiently fenced, lit, and watched, and at all times every possible precaution is to be taken to ensure the safety of the public.
8. The Permittee shall indemnify and save harmless the Ministry, its agents and employees, from and against all claims, liabilities, demands, losses, damages, costs and expenses, fines, penalties, assessments and levies made against or incurred, suffered or sustained by the Ministry, its agents and employees, or any of them at any time or times, whether before or after the expiration or termination of this permit, where the same or any of them are based upon or arise out of or from anything done or omitted to be done by the Permittee, its employees, agents or Subcontractors, in connection with the permit.
9. That the permission herein granted to use and maintain the works is only granted for such times as the land or public work in, upon, or over which the said works are constructed is under the jurisdiction of the Minister of Transportation and Infrastructure. This permission is not to be construed as being granted for all time, and shall not be deemed to vest in the permittee any right, title or interest whatsoever in or to the lands upon which the works are constructed. Should the lands affected at any time be included within that of an incorporated municipality or city, this permission shall become void, unless the works are on a highway duly classified as an arterial highway pursuant to Section 45 of the Transportation Act.
10. That after receiving notice in writing of the intention on the part of the Provincial Government to construct, extend, alter, or improve any public work, the person or persons responsible for the maintenance of the works for which permission is hereby granted shall within six weeks move or alter such work at their own expense to such new positions or in such manner as may be necessitated by the construction, extension, alteration, or improvement proposed to be carried out by the Provincial Government.
11. That while reasonable care will be taken on the part of the Provincial Government to do as little damage as possible to any private work in the carrying-out of the construction, extension, alterations, improvement, repair, or maintenance of any public work adjacent thereto, the Provincial Government can accept no responsibility for any kind of such damage.
12. That the permission hereby granted to construct, use, and maintain work is granted without prejudice to the provisions of the Transportation Act, or other Acts governing Crown lands and public works or their use by the public.
13. That this permission shall be in force only during such time as the said works are operated and maintained by the applicants, to the entire satisfaction of the Regional Executive Director.
14. That the Ministry will not be responsible for grade changes on accesses caused by reconstruction of any Provincial highway.



15. This permit is valid only for the specific works stated herein. Any alterations or additions must be covered by a separate permit.
16. This permit may be canceled, at the discretion of the Minister, without recourse, should the permittee fail to comply with all the terms of the permit. Thirty days' notice will be given before cancellation.
17. When the requirements of the Ministry necessitate use of the said lands for Provincial purposes, at the discretion of the Minister, this permit may be canceled.
18. That these works shall be identified with this permit number in a manner satisfactory to the District Official of the Ministry of Transportation and Infrastructure.
19. As a condition of this permit, the permittee unconditionally agrees with the Ministry of Transportation and Infrastructure that the permittee is the prime contractor or will appoint a qualified prime contractor, as described in Section 118 of the Workers Compensation Act, for the purposes of the work described by this permit, at the work location described in this permit, and that the permittee or designated prime contractor will observe and perform all of the duties and obligations which fall to be discharged by the prime contractor pursuant to the Workers Compensation Act and the Occupational Health and Safety Regulation.
20. The permittee is advised and acknowledges that the following hazards may be present at the work location and need to be considered in co-ordinating site safety: overhead hazards, particularly electrical or telecommunications lines; buried utilities, particularly electrical, telecommunication, and gas lines; traffic, danger trees, falling rocks, and sharp or infectious litter.
21. Any works within the Ministry right-of-way that fall within the scope of "engineering" under the Engineers and Geoscientists Act will be performed by a Professional Engineer, and shall comply with this Ministry's "Engineer of Record and Field Review Guidelines". The Guidelines can be viewed on the Ministry's website at <http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/technical-circulars/2009/t06-09.pdf>
22. The permittee is responsible for preventing the introduction and spread of noxious weeds on the highway right-of-way as defined by the British Columbia Weed Control Act and Weed Control Regulation.
23. In accordance with Sections 000.03 Non-Ministry Developments on Ministry Land or That are Intended to Become Ministry Assets and 165.20 Archaeological and Paleontological Discoveries of the Design Build Standard Specification for Highway Construction - In the event that any item of archaeological, heritage, historical, cultural or scientific interest is found on the project site, the following Chance Find Procedure shall apply:

Such item(s) shall remain the property of the Province and the Permittee shall, on making or being advised of such a find, immediately cease operations in the affected area, minimize activities which create ground disturbance in and adjacent to the affected area, and notify the District Official and the Archaeology Branch of the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development. Work shall not resume within 30 m of the discovery site until an appropriate directive has been received from that agency.

To protect archaeological and paleontological sites that are situated within or adjacent to a project site, the Permittee may be required to use a variety of mitigative measures, including but not limited to drainage or erosion control, slope stabilization measures, or erecting fences or other suitable barriers to protect archaeological or paleontological sites that are situated within or adjacent to a project site. These measures, with any negotiated extensions of time for completion of the Works they require, will be determined and adopted at the discretion of the District Official. The costs associated with such mitigative measures will be borne by the Permittee.

A buffer zone, in which no land alteration or other activity is permitted, may be required to ensure adequate site protection. The width of this buffer zone shall be determined by the District Official in consultation with a representative of the Archaeology Branch of the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The Permittee shall be responsible for the actions of employees and subcontractors with respect to site vandalism and the unlicensed collection of artifacts from Designated archaeological sites in and around the work location.

The Permittee shall ensure that all workers and Subcontractors are fully aware of these requirements and processes.
24. The Permittee shall be responsible for the preservation during construction of all geodetic benchmarks, survey monuments and property markers on the right-of-way. The Permittee shall use, at no expense to the Ministry, a British Columbia Land Surveyor to replace any survey monuments destroyed or damaged as a result of the Permittee's negligence. At locations where construction work will cover or destroy such markers, the Permittee shall not move or remove them until written direction is received from the Ministry Representative.
25. The Permittee shall ensure all equipment working on or hauling material on to and from the Site does not damage or deposit material onto any part of an existing roadway. Materials spilled onto the public roadways or driveways opened to public traffic shall be cleaned up immediately. The Permittee has the full responsibility to repair any damage to existing highways, local roads and driveways caused by its construction equipment and/or operations.
26. The Permittee shall take all reasonable precautions to attempt to ensure the safety of the public in connection with the Use. In particular, but not so as to limit this obligation, the Permittee shall, if so required by the Designated Ministry Official on reasonable grounds, prepare and implement a traffic control plan. The contents of the plan and the manner in which it is



implemented must meet the reasonable satisfaction of the Designated Ministry Official.

27. The Permittee shall, at his cost, supply, erect, and maintain standard traffic control devices in accordance with the Ministry of Transportation and Infrastructure Traffic Control Manual for Works on Roadways and Occupational Health and Safety Regulation.
28. Pavement must be cut by hand or approved mechanical means in straight lines parallel to the trench centreline.
Distance from a pavement cut to the edge of the trench must be at least 150 mm or sufficient to ensure the pavement will not be undermined by sloughing.
Except where trenching is well clear of the road shoulder, all excavated material must be removed from the site immediately.
Stockpiling of native material adjacent to the trench is not permitted.
Trenches must be backfilled or adequately covered at the end of the work day
Trench shoring must conform to WorkSafe BC standards and is to be used where soil conditions warrant. Extreme care must be taken to avoid sloughing of the trench sides to minimize damage to the subgrade beyond the limits of excavation.
29. Pipe bedding must conform to industry standards.
Where sloughing of trench sides has undermined the pavement, the pavement must be marked with a painted line showing the extent of the damaged area. Pavement must be removed from this area and the voids filled and compacted in accordance with backfill requirements.
Trenches must be backfilled with granular material that meets Ministry standards as set out in Section 202.02 (Table 202-C), 2016 Standard Specifications for Highway Construction and all subsequent interim revisions and updates, in accordance with the following minimum requirements:
 - (a) Sub-base material must meet or exceed specified requirements for Select Granular Sub Base aggregates.
 - (b) Crushed Base Course depth is to match existing depth, but must not be less than 300 mm compacted thickness and consist of "25 mm minus" WGB (or IGB) crushed aggregate.Backfill must be placed in layers not exceeding 150 mm compacted thickness and shall be compacted with approved tamping equipment to a minimum of 95 percent Proctor density to within 300 mm of the surface and 100 percent for the final 300 mm.
30. As soon as any portion of the highway can be re-opened to traffic, a temporary asphalt patch must be applied.
31. Pavement edges must be cut, made true and straight, cleaned, and primed before installing a final patch.
Asphalt concrete must be restored to the same thickness as the existing surface or to a minimum of 75 mm thickness, whichever is greater. Asphaltic concrete must meet Ministry standards as set out in Section 502, Standard Specifications for Highway Construction.
Asphalt concrete is to be laid in two or more lifts or layers. Each lift is to be thoroughly compacted before successive lifts are applied.
The Permittee will ensure that the permanent pavement patch is to Ministry standards for one year from the date that the patch is installed.
32. Where the Ministry and a regulator both set a standard or requirement in a particular area, the highest or most stringent of the two will apply to any installation on highway right-of-way.
33. All unsuitable material and inorganic debris shall be removed from the project area. All surplus or unsuitable organic waste and debris shall be removed from the site unless its complete burning is approved by the Designated Ministry Official in compliance with the B.C. Open Burning Smoke Control regulation.
34. Sites are to be reseeded to standards set out in Section 757, Standard Specifications for Highway Construction.
35. Excavations across entrances, whether private or commercial, must be backfilled and thoroughly compacted by the end of the current working day. The surface must be restored, whether paved or gravel, to its original condition within 48 hours.
Affected property owners must be notified at least 48 hours in advance before excavating a driveway.
36. The Minister may order the removal or alteration of utility installations, if necessary, for the protection of the highway or highway users.
If the utility owner does not respond to an order to remove or alter a utility installation, the Minister may carry out that work and recover costs from the utility.
37. Permittee is responsible for ensuring that all works are contained to the highway right of way. Any works located within private property must have the owner's permission.



- 38. A copy of the permit is to be kept by the field supervisor, in order that he is aware of all permit conditions.
- 39. Three reasonable attempts to bore or jack the pipeline, under paved road crossings, shall be expected prior to consideration of open cut crossings. Should open cutting be subsequently permitted, compaction, material, concrete capping and patching specifications shall be provided. If open cutting is permitted the crossing shall be perpendicular to centre line in order to minimize disturbance to the road structure, unless otherwise approved. Any open cut trench is to be saw cut to a width of one metre additional width beyond the edge of the trench excavation unless such width reaches the curb or edge of pavement. After three (3) months or when the hot patch has settled, the trench plus an additional three (3) meters on either side is to be scarified to a 50mm depth and re-paved to create a smooth seam and surface. The permittee shall be responsible for the repair of any failure and/or settlement of the excavation area for a period of three (3) years.
- 40. The permittee is responsible for obtaining the necessary approval from all other agencies affected.
- 41. Traffic Control Plan

The Permittee shall take all reasonable precautions to attempt to ensure the safety of the public in connection with the Use. In particular, but not so as to limit this obligation, the Permittee shall prepare and implement a traffic control plan. The contents of the plan and the manner in which it is implemented must meet the reasonable satisfaction of the Designated Ministry Official and be submitted to this office a minimum of 14 days prior to the commencement of any works at the location.

The rights granted to the Permittee in this permit are to be exercised only for the purpose as defined in Recital B on page 1.

Dated at Nanaimo, British Columbia, this 29th day of September, 2021

On Behalf of the Minister

REGIONAL DISTRICT OF NANAIMO
JACK BAGLEY PARK REDEVELOPMENT

NANAIMO, BC

Construction Specifications



Issued for Tender

2021.10.05

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1.0 GENERAL

1.1 General Requirements

- .1 The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
- .2 This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts
- .3 Submit to Owner and 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 and no claim for extension by reason of such default will be allowed.
- .4 Do not proceed with Work affected by submittal until review is complete.
- .5 Present shop drawings and product data, in SI Metric units. Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 Review submittals prior to submission to Owner. 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.
- .7 Notify Owner, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by the Owner's review of submittals.
- .10 Keep one reviewed copy of each submission on site.

1.2 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified Professional Engineer.
- .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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow 10 working days for review of each submission.
- .5 Adjustments made on shop drawings by Owner/Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Owner prior to proceeding with Work
- .6 Make changes in shop drawings as Owner/Consultant may require, consistent with Contract Documents. When resubmitting, notify Owner/Consultant in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.

- .5 Performance characteristics.
- .6 Standards.
- .7 Operating weight.
- .8 Wiring diagrams.
- .9 Single line and schematic diagrams.
- .10 Relationship to adjacent work.

- .9 Supplement standard information to provide details applicable to project.

The review of shop drawings by the Owner/Consultant is for sole purpose of ascertaining conformance with general concept.

- .1 This review shall not mean that Owner/Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- .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 co-ordination of Work of sub-trades.

- | | | | |
|------------|-------------------------------------|----|--|
| 1.3 | Certificates and Transcripts | .1 | Immediately after award of Contract, submit WorkSafe BC status. |
| 1.4 | Acceptability of Materials | .1 | Whenever materials are specified by trade name or by manufacturer's name, the tender must be based on the use of the stated specified materials. |

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts
		.3	The Contractor has primary responsibility for producing quality results through compliance with plans, specifications, and accepted standards of the industry. .1 All Sub-Contractors are required to abide by the Contractor's Work and Quality Management Plans.
		.4	The Contractor is responsible for the delivery of a facility that meets the standards of quality demanded by the specification as it applies to the workmanship and completed results.
1.2	Reference Standards	.1	Canadian Construction Documents Committee (CCDC) .1 CCDC 2-2020, Stipulated Price Contract.
1.3	Quality Management Plan	.1	Submit to Owner/Consultant for review and acceptance the Contractor Quality Management Plan (QMP) prior to start of construction activities. .1 Construction design and construction will be permitted to begin only after acceptance of the QMP or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a QMP or another interim plan containing the additional work.
		.2	QMP to cover all construction design and operations, both on and offsite and is to be tailored to the proposed construction design and construction sequence.
1.4	Inspection	.1	Contractor will carry out Quality Control activities including but not limited to inspection, testing, and review of test results and reports during the construction period of the project.
		.2	Allow Owner/Consultant unfettered access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
		.3	Give timely notice to Owner/Consultant requesting inspection if Work is designated for special tests, inspections or approvals.
		.4	If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work at no additional cost.

- .5 Owner will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, Contractor to correct such Work and pay cost of re-examination and correction.
- 1.5 Independent Inspection Agencies**
- .1 Separate Independent Inspection/Testing Agencies may be engaged by Owner/Consultant for purpose of inspecting and/or testing portions of Work required for Owner/Consultant's Quality Assurance activities. Cost of such services will be borne by Owner/Consultant.
- .2 When independent inspection/testing agencies are engaged by Owner/Consultant the Contractor is to provide unfettered access to work for any inspections/tests.
- .3 Contractors shall be responsible for the appointment and payment of independent testing laboratory services for all the testing and inspection required as per Contractor's Construction Quality Plan and as stated in specifications.
- .4 Contractor to provide equipment required for executing inspection and testing by appointed agencies
- .5 Owner/Consultant's employment of inspection/testing agencies does not relax responsibility of Contractor to perform Work in accordance with Contract Documents and perform their own testing.
- .6 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Contractor to correct defects and irregularities as advised by Owner/Consultant at no additional cost to the contract. Contractor to pay costs for retesting and re-inspection.
- 1.6 Access to Work**
- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.
- 1.7 Procedures**
- .1 Notify appropriate agency and Owner/Consultant 5 working days in advance of requirement for tests, in order that attendance arrangements can be made.
- .1 Provide confirmation again 2 working day prior to scheduled inspection/test.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
- 1.8 Rejected Work**
- .1 Remove defective Work, whether result of poor workmanship,

- use of defective products or damage and whether incorporated in Work or not, which has been rejected by Owner/Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Owner/Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner/Consultant will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Owner/Consultant.
- .1 All changes from Contract Documents are to be recorded in red line markups by Contractor and progress reports with proper dimensioning/measurements.
- 1.9 Reports**
- .1 Submit copies of inspection and test reports in PDF format to Owner/Consultant.
- .2 Provide copies to Sub-Contractors of work being inspected or tested and/or manufacturer or fabricator of material being inspected or tested.
- 1.10 Tests and Mix Designs**
- .1 Furnish test results and mix designs as requested by Owner/Consultant and/or required by Contract Documents.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents and beyond those required by law of Place of Work will be appraised by Owner/Consultant and may be authorized as recoverable.
- .3 Except as stated otherwise in the specifications Sections, the Contractor shall provide all sampling and testing under this Contract
- .4 Materials testing laboratories must be accredited by a laboratory accreditation and will be required to submit to the Owner/Consultant a copy of the Certification of Accreditation and Scope of Accreditation. The policy applies to the specific laboratory performing the actual testing, not just the Corporate office.
- .1 The Owner/Consultant retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in the contract.
- .5 The Contractor shall cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the DCC Representative immediately. Test results must be signed by a testing laboratory representative

authorized to sign certified test reports.

END OF SECTION

SELECTIVE DEMOLITION

1 – GENERAL

1.1 SECTION INCLUDES

1. Required demolition of designated existing elements
2. Salvage of designated items

1.2 RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this section.

1.3 REFERENCES

1. BC Building Code: Part 8 Safety Measures at Construction and Demolition Sites, Provincial Requirements.

1.4 NOTIFICATION OF OWNERS OF UTILITY LINES AND EQUIPMENT

1. Notify the Owner or local authority owning any conduits, wires, pipes, or equipment affected by demolition work.
2. Arrange for removal or relocation of affected items and pay fees or costs in conjunction with removal or relocation, except as otherwise noted.

1.5 PROTECTION

1. Prior to starting any work on site, provide a safety plan as per BC Building Code Requirements
2. Coordinate the implementation of the safety plan with the owner
3. Prior to starting demolition operations, provide necessary protection of existing spaces and items to remain
4. ACI Publications: Comply with ACI 301, "Specifications for Structural Concrete," unless modified by the requirements of the Contract Documents.
 1. Conduct demolition work in a manner that will minimize need for disruption of the Owners normal operations.
 2. Provide protective measures as required to provide free and safe passage of Owner's personnel and public to and from occupied portions of the facilities.
 3. Provide minimum of 72 hours advance notice to Owner of demolition activities that will impact Owners normal operations.
 1. Obtain specific approval from Owner for impact.
5. Owner assumes no responsibility for actual condition of items to be demolished.
 1. Owner will maintain conditions at time of commencement of contract insofar as practical.
6. Protect any exposed existing finish work that is to remain during demolition operations.

SELECTIVE DEMOLITION

7. Erect and maintain dust proof partitions, closures, and ventilator system as required preventing the spread of dust or fumes to occupied portions of the building.

1. Take whatever precautions necessary to minimize impact on occupied areas.

1.6 JOB CONDITIONS

1. Conform to applicable codes for demolition of structures, safety of adjacent structures, dust control, runoff, and erosion control, and disposal of demolished materials.
2. Obtain required permits from authorities having jurisdiction.
3. Notify affected utility companies before starting work and comply with their requirements.
4. Do not close or obstruct roadways, sidewalks, and hydrants, without permits.
5. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.
 1. Contact the Consultant and Owner immediately.
6. Test soils around buried tanks for contamination.
7. No demolition will occur during school hours without the written permission of the Owner.

1.7 EXPLOSIVES

1. The use of explosives is strictly prohibited.

2 – PRODUCTS

1. Not applicable.

3 – EXECUTION

3.1 PREPARATION

1. Verify the proper disconnection and capping of all abandoned utilities.
2. Verify that required barricades and other protective measures are in place.
3. Provide necessary shoring, bracing, and other precautions required for proper support of existing structure during cutting and demolition operations.
4. Photograph existing conditions of structure, surfaces, equipment and surrounding spaces that could be misconstrued as damage resulting from selective demolition work; submit photographs and written report of existing damage to Consultant prior to starting work.
5. Contractor shall repair damage caused to existing facilities at no cost to Owner unless they can provide documentation is indicating pre-existing damage

3.2 DEMOLITION OPERATIONS

1. Comply with alteration precautions and procedures specified in Section 01 35 16.
2. Cut and remove elements and equipment as designated on Drawings.

SELECTIVE DEMOLITION

1. Remove elements in their entirety unless otherwise indicated.
3. Execute demolition in a careful and orderly manner with least possible disturbance or damage to adjoining surfaces and structure.
4. Exercise extreme caution in cutting and demolition of portions of existing structure.
 1. Obtain approval of Consultant prior to cutting or removing structural members for any reason.
5. Avoid excessive vibrations in demolition procedures that may transmit through existing structure and finish materials.
6. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning assessment, removal, handling, and protection against exposure or environmental pollution and immediately contact the owner.

3.3 DISPOSAL

1. Materials, equipment, and debris resulting from demolition operations shall become property of Contractor.
 1. Remove demolition debris at least once each day in accordance with applicable bylaws
2. Cover debris in trucks with approved netting to prevent spillage during transportation.
3. Do not store except in approved containers or burn materials on site.
 1. Remove combustible waste materials in a manner approved by local Fire Department.
 2. Remove, handle, and dispose of any hazardous waste and debris in accordance with applicable bylaws
4. Transport demolition debris to off-site disposal area and legally dispose of debris.
5. Use street routes specifically designated by the Owner for hauling debris.
6. When possible dispose of material to recycling centers.

3.4 CLEANING AND REPAIR

1. Leave building broom clean and free of debris, ready to receive new work.
2. Repair demolition performed in excess of that required.
 1. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts
		.3	Cooperate and coordinate with the requirements of other units of work specified in other Sections.
1.2	Section Includes	.1	Section includes, but is not limited to: .1 Provision for concrete forming and accessories
1.3	Related Sections	.1	03 20 00 Concrete Reinforcing
		.2	03 30 00 Cast-in-Place Concrete
1.4	Reference Standards	.1	General .1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. .3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements. .4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	Canadian Standards Association (CSA International) .1 CSA A23.1-19/A23.2-19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete. .2 CSA O86-19, Engineering Design in Wood. .3 CSA O121-17, Douglas Fir Plywood. .4 CSA O151-17, Canadian Softwood Plywood. .5 CSA O153-19, Poplar Plywood. .6 CSA O325-21, Construction Sheathing. .7 CSA O437 Series-93(R2011), Standards for OSB and Waferboard. .8 CSA S269.1-16(R2021), Falsework and Formwork.
		.3	Underwriters' Laboratories of Canada (ULC)

- .1 CAN/ULC-S701-17, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- 1.5 Submittals**
 - .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Submit shop drawings for formwork and falsework.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.
 - .3 Co-ordinate submittal requirements and provide submittals required by Contract Documents.
 - .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.
 - .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
 - .6 Indicate sequence of erection and removal of formwork/falsework as directed by Engineer.
- 1.6 Delivery, Storage and Handling**
 - .1 Store and manage hazardous materials in accordance with Contract Documents and Standards.
- 2.0 PRODUCTS**
- 2.1 Materials**
 - .1 Materials and resources in accordance with Contract Documents and Standards.
 - .2 Do verification requirements in accordance with Contract Documents and Standards.

- .3 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CAN/CSA-O86.
 - .2 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
 - .3 Rigid insulation board: to CAN/ULC-S701.
- .4 Pan forms: removable and steel as indicated.
- .5 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .6 Form liner:
 - .1 Plywood: Douglas Fir to CSA O121, 19 mm thick minimum.
- .7 Form release agent: non-toxic, biodegradable.
- .8 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, 15 to 25 mm²/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .9 Falsework materials: to CSA-S269.1
- .10 Sealant: to Section 07 92 00 - Joint Sealing.

3.0 EXECUTION

3.1 Fabrication and Erection

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Obtain Consultant's approval for use of earth forms framing openings not indicated on drawings.
- .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 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .9 Align form joints and make watertight.
 - .1 Keep form joints to minimum.
- .10 Locate horizontal form joints for exposed columns 2400mm above finished floor elevation.
- .11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .13 Construct forms for architectural concrete, and place ties as directed.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .14 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .15 Line forms for following surfaces:
 - .1 Outer face of beams.
 - .2 Soffit of girders and underside of bridge decks if exposed.
 - .3 Exposed faces of abutments, wingwalls, piers and pylons: do not stagger joints of form lining material and align joints to obtain uniform pattern.
 - .4 Secure lining taut to formwork to prevent folds.
 - .5 Pull down lining over edges of formwork panels.
 - .6 Ensure lining is new and not reused material.
 - .7 Ensure lining is dry and free of oil when concrete is poured.
 - .8 Application of form release agents on formwork surface is prohibited where drainage lining is used.

- .9 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
 - .10 Cost of textile lining is included in price of concrete for corresponding portion of Work.
 - .16 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.
 - .17 When slip forming and flying forms are used, submit details as indicated in PART 1 - SUBMITTALS.
- 3.2 Removal and Re Shoring**
- .1 Leave formwork in place for following minimum periods of 5 days time after placing concrete.
 - .2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
 - .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
 - .4 Space reshoring in each principal direction at not more than 3000mm apart.
 - .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

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|------------|----------------------------|----|--|
| 1.0 | GENERAL | .1 | The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section. |
| | | .2 | This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts |
| | | .3 | Cooperate and coordinate with the requirements of other units of work specified in other Sections. |
| | | .4 | Concrete reinforcing shall conform to the requirements of the reference Standards unless otherwise noted. |
| 1.1 | Section Includes | | Section includes, but is not limited to:
.1 The provision of steel reinforcing for concrete reinforcing as shown on drawings. |
| 1.2 | Related Sections | .1 | 03 10 00 Concrete Forming and Accessories |
| | | .2 | 03 30 00 Cast-in-place Concrete |
| | | .3 | 05 12 23 Structural Steel for Buildings |
| 1.3 | Reference Standards | .1 | General
.1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
.2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
.3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements.
.4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions. |
| | | .2 | ASTM International
.1 ASTM A143/A143M-07(R2020), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
.2 ASTM A775/A775M-19, Standard Specification for Epoxy Coated Reinforcing Steel Bars. |
| | | .3 | CSA International
.1 CSA A23.1-19/A23.2-19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete. |

- .2 CAN/CSA A23.3-19, Design of Concrete Structures.
 - .3 CSA G30.18-09(R2019), Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA G40.20/G40.2-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CAN/CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .6 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- 1.4 Submittals**
- .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
 - .3 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia of Canada for concrete reinforcement, bar support and accessories for review by the Consultant and Structural Engineer at least 14 days prior to the placement of rebar.
 - .4 Clearly indicate placing of reinforcement, including bar sizes, grades, spacing, bar bending details, location and quantities of reinforcing mesh and mechanical splices if approved by Consultant, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Detail lap lengths and bar development lengths to CAN/CSA A23.3, unless otherwise indicated.
 - .6 Placing drawings and bar lists will be reviewed for number and size of bars only and this review shall in no way relieve the Contractor of his responsibility for carrying out the Work in accordance with the drawings.
 - .7 Substitution of imperial reinforcing sizes and grades will only be accepted if placing drawings showing imperial sizes are submitted to the Structural Engineer for review. Approval must be obtained before any work is commenced.
- 1.5 Quality Assurance**
- .1 Submit in accordance with Section 01 45 00 Quality Control.
 - .1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Upon request submit in writing to Consultant proposed source of reinforcement material to be supplied
- 1.6 Delivery, Storage and Handling**
- .1 Deliver, store and handle materials in accordance with Contract Documents and 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 accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- 2.0 PRODUCTS**
- 2.1 Materials**
- .1 Substitute different size bars only if permitted in writing by Consultant.
 - .2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA G30.18, unless indicated otherwise.
 - .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA G30.18.
 - .4 Cold drawn annealed steel wire ties to ASTM A82/A82M.
 - .5 Deformed steel wire for concrete reinforcement to ASTM A82/A82M.
 - .6 Welded steel wire fabric to ASTM A185/A185M.
 - .1 Provide in flat sheets only.
 - .7 Welded deformed steel wire fabric to ASTM A82/A82M.
 - .1 Provide in flat sheets only.
 - .8 Epoxy Coating of non-prestressed reinforcement to ASTM A775/A775M. The bar shall be coated with a primer or a conversion coating to improve adhesion of the epoxy to the bar.
 - .9 Plastic ties or plastic coated wires shall be used for tying epoxy-coated reinforcement
 - .10 Galvanizing of non-prestressed reinforcement to CAN/CSA-G164, ASTM A767M Class I, minimum zinc coating 610 g/m². 10M and smaller reinforcing bars shall have a minimum zinc coating of 915 grams per square meter. 15M and larger reinforcing bars shall have a minimum zinc coating of 1070 grams per square meter.
 - .1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
 - .2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

- .1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
 - .3 If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.
 - .1 In this case, no restriction applies to temperature of solution.
 - .11 Hot dip galvanized wire with a minimum core diameter of 1.44 mm (16.5 ga.) shall be used for tying galvanized reinforcement.
 - .12 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2
 - .13 Mechanical splices: subject to approval of Consultant.
 - .14 Plain round bars to CSA G40.20/G40.21.
- 2.2 Fabrication**
 - .1 Fabricate reinforcing steel in accordance with reviewed shop drawings and Standards.
 - .2 Reinforcing bars shall be cold bent. Bars shall not be straightened or re-bent.
 - .3 Obtain Consultant's written approval for locations of reinforcement splices other than those shown on placing drawings.
 - .4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
 - .5 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
 - .1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.
- 2.3 Source Quality Control**
 - .1 Upon request, provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Upon request, inform Consultant of proposed source of material to be supplied.
- 3.0 EXECUTION**
- 3.1 General**
 - .1 All phases of concrete reinforcement work shall be in accordance with the Standards unless otherwise specified herein or on the drawings. The Contractor shall ensure that only workers who are skilled and experienced in their trade do the work
 - .2 The Contractor shall notify the Engineer at least 72 hours

- before any concrete is placed in order that the Engineer may review the work.
- .3 No concrete shall be placed until the Structural Engineer has completed his/her review of reinforcing in place. The Contractor shall provide a minimum of 48 hours notice of the time when the reinforcement will be substantially in place and ready for the Structural Engineers review.
- .4 For galvanized and epoxy coated reinforcing bars, all systems for handling shall have padded contact areas. All bundling bands shall be padded or suitable banding shall be used to prevent damage to the coating. All bundles of coated bars shall be lifted with a strong back, spreader bar, multiple supports, or a platform bridge to prevent bar-to bar abrasion from sags in the bundles of coated bars. The bars or bundles shall not be dropped or dragged.
- 3.2 Preparation**
- .1 Galvanizing to include chromate treatment.
- .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.
- 3.3 Product Delivery, Storage and Handling**
- .1 Store reinforcement in a manner to prevent excessive rusting and fouling with dirt, grease, form-oil and other bond-breaking coatings
- .2 Reinforcement at the time concrete is placed shall be free from excessive rusting, mud, oil or other coatings that adversely affect its bonding capacity
- 3.4 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 slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.
- 3.5 Placing Reinforcement**
- .1 Place reinforcing steel as indicated on placing drawings and in accordance with Standard.
- .2 Use plain round bars as slip dowels in concrete.
- .1 Paint portion of dowel intended to move within hardened concrete with [one coat of asphalt paint].
- .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 Prior to placing concrete, obtain Consultant's approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.

3.6 Field Touch-Up

- .5 Reinforcement shall be secured against displacement within the tolerances permitted in the Standard with chairs, spacers, support bars, hangers or other accessories. Support devices contacting surfaces exposed to the exterior shall be noncorrosive.
- .6 All rebar shall be adequately tied and chaired to maintain it in the specified location during pouring. Lifting of reinforcing or welded wire mesh into specified position during the concrete pour will not be allowed.
- .7 Bars that are not part of the structural design or drawings, and whose only function is supporting other reinforcing in lieu of other support accessories, shall be considered as accessories.
- .8 Protect epoxy and paint coated portions of bars with covering during transportation and handling.
- .1 Repair coating damage with patching material approved by Structural Engineer and Testing Agency.
- .2 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.
- .3 Repair of coating damage to not exceed 5% of surface area of the bar
- .4 Coated bars which do not meet the requirements of this specification shall be rejected. Coated bars having defects shall be replaced or alternately stripped of coating, re-cleaned and recoated in accordance with the requirements of this specification.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.
		.3	Provide all labour, materials, equipment, and services necessary to supply and install cast in place concrete work shown or indicated in all the contract drawings and specifications including concrete toppings, bases, sumps, curbs, posts, manholes, pits, paving, sidewalks, equipment bases or curbs, grouting of baseplates, etc.
		.4	Coordinate concrete placement fully with other trades. Ensure other related work such as inserts, dowels, sleeves, reinforcement, etc. is complete before placing concrete.
1.2	Section Includes	.1	Section includes, but is not limited to: .1 The provision for cast-in-place concrete as shown on drawings.
1.3	Related Requirements	.1	03 10 00 Concrete Forming and Accessories
		.2	03 20 00 Concrete Reinforcing
		.3	05 12 23 Structural Steel for Buildings
		.4	05 50 00 Metal Fabrications
1.4	Reference Standards	.1	General .1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. .3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements. .4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	ASTM International .1 ASTM C260/260M-10a (2016), Standard Specification for Air-Entraining Admixtures for Concrete. .2 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

- .3 ASTM C494/C494M-19, Standard Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .5 ASTM D412-16 (2021), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - .6 ASTM D624-00 (2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .7 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .8 ASTM D1752-18, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3 Canada Green Building Council (CaGBC)
- .1 LEED v4 BD+C, LEED (Leadership in Energy and Environmental Design): Reference Guide for Building Design and Construction.
 - .2 LEED v4 ID+C, LEED (Leadership in Energy and Environmental Design): Reference Guide For Commercial Interiors.
- .4 CSA International
- .1 CSA A23.1/A23.2-19, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete.
 - .2 CSA A283-19, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-18, Cementitious Materials Compendium
- 1.5 Abbreviations and Acronyms**
- .1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).
 - .1 Type GU or GUb - General use cement.
 - .2 Type MS or MSb - Moderate sulphate-resistant cement.
 - .3 Type MH or MHb - Moderate heat of hydration cement.
 - .4 Type HE or Heb - High early-strength cement.
 - .5 Type LH or LHb - Low heat of hydration cement.
 - .6 Type HS or HSb - High sulphate-resistant cement.
 - .2 Fly ash:

- .1 Type F - with CaO content less than 8%.
 - .2 Type CI - with CaO content ranging from 8 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
- 1.6 Submittals**
- .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Keep an accurate record at the job site showing date, time, and place of each pour of concrete, together with a transit-mix delivery slip certifying contents of pour. Make the record available to the Owner for his inspection upon request. Upon completion of this portion of work, submit placing records and delivery slips to the Owner.
 - .3 Submit details of proposed methods of concrete curing and provisions for weather protection to the Structural Engineer for review
 - .4 Submit plan locations and details of construction joints for the Structural Engineer's review.
 - .5 Provide testing, inspection results and reports for review by the Structural Engineer and do not proceed without written approval when deviations from mix design or parameters are found.
 - .6 Provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in Section 01 45 00 - Quality Control.
 - .7 Provide concrete hauling time deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching.
- 1.7 Quality Assurance**
- .1 Provide Structural Engineer, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
 - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
 - .2 Quality Control Plan: provide written report to Structural Engineer verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
- 1.8 Delivery, Storage and Handling**
- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: deliver to site of Work and discharged within 90 minutes maximum after batching.

- .1 Do not modify maximum time limit without receipt of prior written agreement from Structural Engineer and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Structural Engineer.
 - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- 2.0 PRODUCTS**
- 2.1 General**
 - .1 Products shall satisfy the requirements of the Standard unless otherwise specified herein or on the drawings.
 - .2 Provide samples of materials on request
 - 2.2 Materials**
 - .1 Cement to CSA A3001, Type GU unless noted otherwise.
 - .2 Supplementary cementing materials: with minimum 20% Type F fly ash replacement by mass of total cementitious materials to CSA A3001.
 - .3 Mixing Water to CSA A23.1.
 - .4 Air entraining admixture to CAN3-A266.1.
 - .5 Aggregates to CSA A23.1/A23.2.
 - .6 Chemical admixtures may be used for specific purposes providing they conform to the Standard and only as approved by the Structural Engineer.
 - .7 Calcium chloride, either as a raw material or as a constituent in other admixtures, shall not be used.
 - .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
 - .1 Compressive strength: 35 MPa at 28 days.
 - .2 Net shrinkage at 28 days: maximum 0.1 %.
 - .9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.
 - .10 Curing compound: to CSA A23.1/A23.2.
 - .11 Weep hole tubes: plastic.
 - .12 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.
 - .13 Polyethylene film: 6 mil thickness to CAN/CGSB-51.34.

- .14 Bonding adhesive to the approval of the Structural Engineer.
- .15 Topping to the approval of the Structural Engineer.
- 2.3 Mix Design**
 - .1 Mix design to be completed by an approved materials testing agency and submitted to the Structural Engineer for approval two weeks prior to concrete being placed.
 - .2 Concrete mixes shall be proportioned by the supplier to meet the requirements for cement type, compressive strength, class of exposure, maximum aggregate size, slump, air content, and admixtures specified herein.
 - .3 All concrete shall be normal weight unless noted otherwise. Mix designs shall be as detailed in CSA-A23.1 Table 13, Alternate 1. The property requirements are shown on the structural drawings.
- 3.0 EXECUTION**
- 3.1 General**
 - .1 All phases of concrete work shall be in accordance with the Standard unless otherwise specified herein or on the drawings. Only workers who are skilled and experienced in their trade shall do the work.
 - .2 The Contractor shall notify the Structural Engineer at least 24 hours before any concrete is placed to allow the Structural Engineer to review the work.
 - .3 No concrete shall be placed until the Structural Engineer has completed his/her review of reinforcing in place. The Contractor shall provide a minimum of 24 hours notice of the time when the reinforcement will be substantially in place and ready for the Structural Engineers review.
- 3.2 Preparation**
 - .1 Obtain Structural Engineer's written approval before placing concrete.
 - .1 Provide 72 hours minimum notice prior to placing of concrete.
 - .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
 - .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
 - .4 Pumping of concrete is permitted only after approval of equipment and mix.
 - .5 Ensure reinforcement and inserts are not disturbed during concrete placement.

- .6 Prior to placing of concrete obtain Structural Engineer's approval of proposed method for protection of concrete during placing and curing in adverse weather.
 - .7 Protect previous Work from staining.
 - .8 Clean and remove stains prior to application for concrete finishes.
 - .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken
 - .10 In locations where new concrete is dowelled to existing Work, drill holes in existing concrete.
 - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
 - .11 Do not place load upon new concrete until authorized by Structural Engineer
- 3.3 Installation/Application**
- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
 - .2 Openings, sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by Structural Engineer.
 - .2 Where approved by Structural Engineer, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Structural Engineer.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Structural Engineer before placing of concrete.
 - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
 - .6 Openings and sleeves shown on the structural drawings must be confirmed with mechanical, electrical and architectural drawings.
 - .7 Openings and sleeves not shown on the structural drawings must be approved by the Structural Engineer.
 - .8 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
 - .3 Construction and Control joints:

- .1 Construction joints shall conform to the Standard except that for horizontal joints in walls it will be sufficient to place fresh concrete on a clean rough surface unless directed otherwise by the Structural Engineer or otherwise noted on the structural drawings.
 - .2 Joints in slabs on grade shall be located as indicated on the structural and/or architectural drawings. Unless noted otherwise on the drawings a joint in the slab on grade may be a pour joint, trowelled joint, zip strip, saw cut, or other pre-approved method. The depth of joints shall be a minimum of $\frac{1}{4}$ of the thickness of the slab. Saw cut joints are to be completed within 24 hr. of placing. Alternative joint details are to be submitted in writing to the Structural Engineer and Consultant.
 - .3 For vertical joints in walls below grade, see standard detail on structural drawings. For locations, see architectural and structural drawings.
 - .4 Horizontal construction joints in walls and columns shall occur at the top of slab and at the underside of slab/beam systems unless noted otherwise on the structural drawings.
 - .5 Construction joints not shown in the drawings or specifications shall be subject to the approval of the Structural Engineer. The Structural Engineer may require keys, or extra reinforcing to be provided at the Structural Engineer's discretion with associated costs borne by the Contractor.
 - .6 The existing concrete surface at construction joints shall be wetted thoroughly immediately prior to placement of concrete.
 - .7 All exposed concrete construction joints shall also be approved by the Consultant.
 - .8 Unless noted otherwise on the drawings, control joints in walls are to be located at a maximum spacing of 12m (40') on centre and detailed as indicated on the structural drawings.
 - .9 Supply and install premoulded waterstops in construction joints where indicated on the drawings. Weld joints to make watertight. Install waterstops in accordance with manufacturer's printed instructions and to Consultant's approval
- .4 Anchor bolts:
- .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
 - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Structural Engineer.

- .1 Formed holes: 100 mm minimum diameter.
- .2 Drilled holes: 25 mm minimum diameter larger than bolts used.
- .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
- .4 Set bolts and fill holes with epoxy grout.
- .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .5 Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated.
- .6 Dovetail anchor slots:
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
 - .2 Install continuous vertical anchor slots at 800 mm on centre where concrete walls are masonry faced.
- .7 Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.
- .8 Finishing and curing:
 - .1 Curing procedures shall be in accordance with the Standard. Alternate methods may be used providing they produce concrete that meets the contract document requirements.
 - .2 Cold and hot weather protection shall comply with the Standard or the requirements on the structural drawings, whichever are more rigorous.
 - .3 Finish concrete to CSA A23.1/A23.2.
 - .4 Use procedures as reviewed by Consultant or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .5 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
 - .6 Finish concrete floor to CSA A23.1/A23.2. Class.
 - .7 Provide scratch finish where floor tile is to be applied. Provide depression[s] to accommodate floor file.
 - .8 Provide float finish unless otherwise indicated.

- .9 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
- .9 Toppings:
 - .1 Topping mixture to meet minimum requirements as follows: Monolithic, Bonded overlay 50 mm thick.
 - .2 Make allowance for monolithic and bonded overlay topping thickness when pouring base course.
 - .3 Apply cement/sand grout to base course to CSA A23.1/A23.2.
 - .4 Place bonded topping to CSA A23.1/A23.2 and topping manufacturer's recommendations.
 - .5 Ensure that joints in topping are of same material as those in base course. Also ensure that their locations precisely match those in base course. Provide dividers as indicated.
- .10 PVC Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to field splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints in field.
 - .7 Use factory welded corners and intersections unless otherwise approved by Consultant.
 - .8 In place of a PVC waterstop system, an alternate crystalline and swelling waterstop system may be submitted to the Consultant for review and approval.
- .11 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction, and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of

- slab to within 12 mm of finished slab surface unless indicated otherwise.
- .12 Dampproof membrane:
- .1 Install dampproof membrane under concrete slabs-on-grade inside building.
 - .2 Lap dampproof membrane minimum 150 mm at joints and seal.
 - .3 Seal punctures in dampproof membrane before placing concrete.
 - .4 Use patching material at least 150 mm larger than puncture and seal
- 3.4 Tolerances**
- .1 Concrete tolerance to Standard or the requirements on the structural or architectural contract documents, whichever are more rigorous.
- 3.5 Field Quality Control**
- .1 Site tests: conduct tests as follows in accordance with Contract Documents and submit report.
- .1 Concrete pours.
 - .2 Slump.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
 - .5 Air and concrete temperature.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Consultant for review to CSA A23.1/A23.2.
- .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Consultant.
- .4 Testing laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.
- .6 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.
- 3.6 Rejection of Defective Work**
- .1 In the event that concrete tests do not conform to the requirements of this specification, or when conditions are such to cause doubt about the safety of the structure, testing of the structure will be undertaken at the direction of the Structural Engineer. This may entail further concrete tests, coring or load testing as per the Standard, or any other test the

Structural Engineer deems suitable. Such test shall be made at the expense of the Contractor and to the satisfaction of the Structural Engineer.

- .2 Where, in the opinion of the Structural Engineer, material or workmanship fails to meet the requirements of the specification, such work may be rejected. Work rejected shall be replaced or repaired to the approval of the Structural Engineer and at no additional cost to the Owner.

END OF SECTION

BOULDER PLACEMENT

1 GENERAL

1.1 SECTION INCLUDES

1. All materials, labour, equipment, and services to supply and install landscape boulders.

1.2 RELATED SECTIONS

1. Ornamental Stone Section 02380

1.3 DEFINITIONS

1. Boulder: Pre-approved imported or on-site rocks of specified size.

2 PRODUCTS

2.1 MATERIALS

1. On-site Boulders:
 1. May be used if they meet the size specified and are pre-approved by the Consultant.
2. Imported Boulders:
 1. Boulders to be sourced by the Contractor and approved by the Owner's Representative at the source prior to delivery or sample boulder approved by Owner's Representative prior to site delivery of remaining boulders.

3 EXECUTION

3.1 STOCKPILE

1. Boulders delivered to site shall be stockpiled and handled in a manner that prevents breakage and scarring.

3.2 PLACEMENT

1. Boulders shall be placed in horizontal orientation where possible, with 1/3 minimum of the height of the rock below finished grade.
2. Owner's Representative shall be notified by the Contractor at least 48 hours prior to boulder placement.
3. Owner's Representative is to direct on-site boulder placement.
4. Boulders shall be machine placed by use of belts or chains. Boulders shall not be dumped or pushed in place. Boulders heavily damaged by machined delivery and installation (e.g. deep or extensive scrape marks) may be rejected by the Consultant. Rejected boulders are to be replaced with similar sized boulders by the Contractor at no cost to the Owner.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.
1.2	Section Includes	.1	Section includes, but is not limited to: .1 The provision for Structural Steel as shown on drawings.
1.3	Related Requirements	.1	03 20 00 Concrete Reinforcing
		.2	03 30 00 Cast-In-Place Concrete
		.3	05 50 00 Metal Fabrications
1.4	Reference Standards	.1	General .1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. .3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements. .4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	ASTM International Inc. .1 ASTM A36/A36M-19, Standard Specification for Carbon Structural Steel. .2 ASTM A193/A193M-20, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications. .3 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60 000 psi Tensile Strength. .4 ASTM F3125/F3125M-19e2 Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 105 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
 - .1 Handbook of the Canadian Institute of Steel Construction.
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

- .4 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-19, Design of Steel Structures.
 - .4 CSAS136-16, North American Specifications for the Design of Cold Formed Steel Structural Members.
 - .5 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel.
 - .6 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CSA W55.3-08 (R2018), Certification of Companies for Resistance Welding of Steel and Aluminum
 - .8 CSA W59-18, Welded Steel Construction.
 - .9 CSA W178.1-18, Certification of Welding Inspection Organizations.

- .5 Master Painters Institute
 - .1 MPI-INT 5.1, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1, Structural Steel and Metal Fabrications.

- .6 AMPP (formerly NACE International and SSPC: The Society for Protective Coatings)
 - .1 NACE No. 3/SSPC SP-6, Commercial Blast Cleaning.

1.5 Submittals

- .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.

- .2 Provide shop drawings showing designed assemblies, components and connections prepared under direction of the Specialty Structural Engineer. The drawings shall be stamped and signed by this Specialty Structural Engineer registered or licensed in Province of British Columbia, Canada.

- .3 Shop drawings shall show complete shop and erection details necessary for fabrication and erection of the component parts of the structure, including cuts, copes, connections, holes, threaded fasteners, splices and location, type, size and extent of all welds. Splices not shown on the shop drawings will be rejected. All welds, both shop and field, shall be indicated by AWS Welding Symbols as specified in the CSA W59 Appendix

D and E.

- .4 Provide a shop drawing clearly locating all anchor bolts, embedded plates, baseplates, etc.
- .5 Provide setting drawings, templates and directions for the installation of anchor bolts, plates and other devices.
- .6 Review of the shop drawings by the Structural Engineer is intended as an assistance to the Contractor and does not relieve the Contractor of his responsibility for the completeness or accuracy of his work and its conformance with the contract documents.
- .7 Clearly identify on the shop drawing all revisions, changes, or modifications.
- .8 Resubmit reviewed shop drawings where noted in ISL Structural Engineering and Land Services review stamp, or when the Contractor makes revisions for his own purposes.
- .9 Allow at least two (2) weeks for shop drawing review by the Structural Engineer.
- .10 Provide a schedule of fabrication to the Consultant and Structural Engineer prior to the commencement of the fabrication.
- .11 Fabrication that commences prior to shop drawing review by the Structural Engineer is at the risk of the Contractor.
- .12 Should the sections shown on the drawings not be procurable, or should substitution for those sections be desired, sections of equivalent strength, may be substituted if approved by the Consultant. In such cases full particulars, thereof must be submitted prior to the closing of Bid.
- .13 Material substitutions after the closing of Bid, if accepted, will be at the Contractor's cost.

1.6 Quality Assurance

- .1 The Contractor shall submit, written evidence of qualification of the steel fabricators and erectors for welding under Canadian Welding Bureau requirements prior to starting work.
- .2 The Contractor shall submit written evidence of ability to weld reinforcing steel to structural steel in accordance with CSA W186 prior to starting work
- .3 The Specialty Structural Engineer responsible for shop drawings, or their representative, shall visit the site to review in place the connections and components designed by that Specialty Structural Engineer. The Specialty Structural Engineer shall be satisfied or take steps to ensure that these connections and components substantially comply with the Specialty Structural Engineer's design. The Specialty Structural Engineer shall then provide a sealed and signed letter to the Consultant and Structural Engineer to this effect.

- 1.7 **Delivery, Storage and Handling**
- .4 When requested, submit copies of mill test reports properly correlated to the materials used on the project.
- .1 Deliver, store and handle materials to keep them in good condition without defects.
- .2 The Contractor shall be responsible for the protection of all steelwork during fabrication, shipping, storage and construction. All damage shall be reported to the Structural Engineer for review. Steel work which is bent, broken or otherwise damaged, shall be repaired or replaced by the Contractor prior to erection to the satisfaction of the Structural Engineer at no cost to the Owner.
- .3 The Contractor shall be responsible for proper scheduling of delivery and erection for the structural steel in accordance with the construction schedule.
- .4 Store structural steel members at the site above ground on platforms, skids or other devices so that ground dampness will not affect the bottom members of the stacks.
- .5 Steel shall be protected from accumulations of standing water.
- .6 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.
- 2.0 **PRODUCTS**
- 2.1 **Design Requirements**
- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.
- .2 Unless otherwise noted connections shall be designed by the Contractor to the reference Standards by the Specialty Structural Engineer.
- .3 Use standard connection types where connections are not detailed on the structural drawings.
- .4 Where connections are detailed, use connection of the type and detail shown on the drawings. Modifications to the specified connection types and details will not be permitted without prior approval from the Structural Engineer.
- .6 Connections for wind or seismic lateral load-resisting elements, such as bracing and drag struts, and others so noted on the structural drawings may be designed as bearing connections but shall be pre-tensioned.
- .7 Other bolted connections may be snug tight.
- .8 Structural steel members spliced for ease of fabrication or transportation shall have splices designed to develop the full strength and stiffness of the member. Splices shall be subject to non-destructive testing as directed by the Structural Engineer. The Contractor shall bear the cost for such testing.

- .9 Submit sketches and design calculations stamped and signed by qualified Specialty Structural Engineer licensed in Province of British Columbia, Canada for non-standard connections.
- 2.2 Materials**
- .1 Structural steel to CSA G40.20/G40.21 Grade 350W.
- .2 Bolts: to ASTM F3125, type 1 medium carbon steel bolts, galvanized finish; ASTM A194/A194M, Grade 2H nuts, galvanized finish; ASTM F436, type 1 washers.
- .3 Welding materials to CSA W59 and certified by Canadian Welding Bureau.
- .4 Electrode strengths to be equal to E480XX (E70XX) or better.
- .5 Shop paint primer to ISC/CPMA2-75 solvent reducible alkyd
- .6 Primer for interior exposure not to receive a shop or field paint finish to CISC / CPMA Standard 1-73a or other pre-approved, unless noted otherwise.
- .7 Primer for exterior exposure not to receive a shop or field paint finish to CGSB 1-GP-40d or other pre-approved, unless noted otherwise.
- .8 Primer used in a multi-coat system where a final shop or field paint finish is to be applied shall conform to Section 09900 - Painting and shall be selected and preapproved by the Architect based on surface preparation, exposure conditions and compatibility with subsequent coatings, unless noted otherwise.
- .9 Framing materials exposed to weather, shall be galvanized to CSA G164.
- .10 Hot dip galvanizing galvanize steel, where indicated, to CSA-G164, minimum zinc coating of 600 g/m².
- .11 Shear studs to CSA W59, Appendix H.v
- .12 Grout for column bases to be non-metallic, non-expanding and non-shrink type with a minimum strength of 35 MPa at 28 days, unless noted otherwise. Grout may be place in a dry pack or flowable consistency.
- 2.3 Fabrication**
- .1 Fabricate structural steel in accordance with CSA-S16 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by continuous welds. Grind smooth.
- .3 Unless noted otherwise, all hollow structural sections (HSS) shall be dry inside and closed airtight with end plates sealed with welds.
- .4 Obtain Structural Engineer's approval for holes required through structural steel that are not shown on the drawings.

- .5 Refer to Architectural drawings for extent and location of Architecturally exposed steel elements.
- .6 Remove and replace any work which is not acceptable to the Consultant, when and as directed. Such operation shall not become an extra charge to the Owner.
- 2.4 Shop Painting**
 - .1 Clean, prepare surfaces and shop prime structural steel in accordance with CSA-S16.
 - .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
 - .3 Apply one coat of primer in shop to steel surfaces, except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces on the underside of bearing or baseplates
 - .3 Surfaces to receive field installed stud shear connections.
 - .4 Surfaces and edges to be field welded.
 - .5 Faying surfaces of slip-critical connections.
 - .6 Coated or galvanized steel surfaces
 - .7 Below grade surfaces in contact with soil.
 - .4 Architecturally exposed steel members, related framing and exterior steel shall be primed.
 - .5 Other steel for interior exposure shall not be primed.
 - .6 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
 - .7 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
 - .8 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.
- 3.0 EXECUTION**
- 3.1 Application**
 - .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 General**
 - .1 Structural steel work: in accordance with CSA-S136.
 - .2 Welding: in accordance with CSA W59.
 - .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.
- 3.4 Marking**
 - .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior

- after erection.
- 3.5 Erection**
- .2 Match marking: shop mark bearing assemblies and splices for fit and match.
 - .1 Erect structural steel, as indicated and in accordance with CSA-S16 and in accordance with approved erection drawings.
 - .2 The erector is fully responsible for erection methods, equipment, workmanship and safety precautions.
 - .3 Confirm the setting of anchor bolts and bearing plates and make an instrument survey to verify the setting prior to erection of steel members.
 - .4 Cutting or burning of baseplates to accommodate anchor bolts shall be cause for rejection of baseplates.
 - .5 Install all temporary bracing that is required to stabilize the work against wind, earthquake and construction loads. Keep structure true and plumb until completion of the building.
 - .6 Assume complete responsibility for the extent and timing of the removal of temporary bracing.
 - .7 Any failure to make proper and adequate provisions for loads during erection shall be solely the responsibility of the Contractor.
 - .8 The Contractor shall be responsible for the design of all hooks, erection connections and handling gear.
 - .9 Provide all temporary flooring, planking and scaffolding necessary in connection with erection of structural steel, or support of erection machinery in accordance with governing regulations and by-laws.
 - .10 All construction loads shall be adequately distributed so as not to exceed the capacity of any member.
 - .11 Structural steel work on concrete shall be carefully located at the proper grade and rigidly secured in place, using steel shims. Spaces under the steel shall then be filled with non-shrink premix grout as soon as possible, and before placing any concrete toppings or precast concrete units.
 - .12 Plumb, level and align individual members of steel work as specified in CSA S16.
 - .13 The various members forming parts of complete frame or structure after being assembled shall be aligned and adjusted accurately before being fastened.
 - .14 Bearing surfaces and surfaces which will be in permanent contact shall be cleaned before the members are assembled.
 - .15 Temporary bolts, clips and angles etc. used to facilitate erection shall be removed unless noted otherwise on the

drawings.

.16 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.17 Continuously seal members by continuous welds where indicated. Grind smooth.

3.6 Fielding Painting

.1 Provide touch-up for galvanized steel. After erection and after connections are completed, provide a field touch-up coat of zinc rich paint to all surfaces that have been chipped or scraped.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of the Contract and all Sections of Divisions 00 and 01, shall form an integral part of the requirements of this Section.
		.2	All addenda or corrections issued during the time of the bidding process shall also become part of the contract documents and shall be covered in the Trade Contractor's bid.
		.3	Cooperate and coordinate with the requirements of other Trade Contractors specified in other Sections.
1.2	Section Includes	.1	Section includes, but is not limited to: .1 Miscellaneous metal work (ferrous).
1.3	Related Sections	.1	03 20 00 Concrete Reinforcing
		.2	03 30 00 Cast-in-Place Concrete
1.3	Reference Standards	.1	General .1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. .3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements. .4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	Aluminum Association Designation System for Painted and Anodized Aluminum Finishes.
		.3	AMPP (formerly NACE International and SSPC: The Society for Protective Coatings) .1 SSPC Paint 20, Zinc-Rich Coating Inorganic and Organic. .2 SSPC Paint 33, Coal-Tar Mastic Coating, Cold-Applied.
		.4	ASTM International Inc. .1 ASTM A36/A36-19, Standard Specification for Carbon Structural Steel. .2 ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. .3 ASTM A108-18, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

- .4 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A194/A194M-20a, Standard Specification for Carbon, Alloy Steel and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- .6 ASTM A283/A283M-18, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- .7 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60 000 psi Tensile Strength.
- .8 ASTM F3125/F3125M-19e2, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 105 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- .9 ASTM A500/A500M-21, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- .10 ASTM A501/501M-14, Standard Specification for Hot-Formed Welded and Seam less Carbon Steel Structural Tubing.
- .11 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .12 ASTM A780/A780M-20, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- .13 ASTM B221-20, Standard Specification for Aluminum and Aluminum -Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .14 ASTM B221M-13, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].
- .15 ASTM D1187/D1187M -97(2018), Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
- .16 ASTM E935-21, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- .17 ASTM F436/F436M-19, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
- .18 ASTM F1554-20, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

- .1 D1.1/D1.1M:2020, Structural Welding Code – Steel.
- .2 A2.4:2020, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- .6 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
 - .1 Handbook of Steel Construction – 11th Edition.
 - .2 Standard 2-75: A Quick-drying Primer for Use on Structural Steel
- .7 CSA International
 - .1 CSA G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-19, Design of steel structures.
 - .4 CSA S136-16, North American Specification for the Design of Cold Formed Steel Structural Members.
 - .5 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W47.1-19, Certification of Companies for Fusion Welding of Steel Structures.
 - .7 CSA W 55.3-08 (R2018), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .8 CSA W59-18, Welded Steel Construction.
 - .9 CSA W178.1-18, Certification of Welding Inspection Organizations.
 - .10 CSA W 178.2-18, Certification of Welding Inspectors.
 - .11 CSA G30.18-09(R2019), Carbon steel bars for concrete reinforcement.
 - .12 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .13 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .8 NAAMM - National Association of Architectural Metal Manufacturers.
 - .1 AMP 555-92, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron)
 - .2 AMP 521-01(R2012), Pipe Railing Manual.
 - .3 MBG 531-17, Metal Bar Grating Manual.
 - .4 MBG 532-19, Heavy Duty Metal Bar Grating Manual.

- .5 AMP 500-06, Metal Finishes Manual.
- .9 If requested by the Consultant provide a PDF digital copy of any or all of the Standards above as selected by the Consultant at no additional cost.
- 1.4 **Work Supplied but Installed under other Sections**
 - .1 Supply the following materials specified to be installed under other sections of the specifications:
 - .1 Anchor bolts, bearing plates, sleeves, restraining straps and other inserts to be built into concrete and masonry elements and required for anchorage and support of fabricated steel components.
 - .2 Fabricated steel components to be built into concrete or masonry unless specified elsewhere.
 - .2 Supply instructions and templates as required for accurate setting of inserts and components.
- 1.5 **Shop Drawings**
 - .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Clearly indicate materials, components, core thicknesses, finishes, dimensions, connections, joints, method of anchorage, number of anchors, supports, reinforcement, fabrication and installation details and accessories.
 - .3 Include erection drawings, elevations and details where applicable.
 - .4 Indicate welded connections using standard welding symbols. Clearly indicate net weld lengths.
- 1.6 **Qualifications**
 - .1 Fabricator and erector must be certified and approved by the Canadian Welding Bureau in conformance with CSA W47.1 Division 1 or 2.2. Perform welding using currently licensed welders only.
 - .2 Welding Procedures, welders and welding operations shall be qualified in accordance with Canadian Welding Bureau Standards.
 - .3 All welders employed to weld load-carrying structures in the field must possess a valid "S" classification Class "O" certificates issued by the Canadian Welding Bureau.
- 1.7 **Design**
 - .1 Design details and connections and fabricate in accordance with the requirements of CAN/CSA-S16-01 to resist forces, moments and shears as indicated. Fabricate work of this Section using a fabricator certified in accordance with CSA W47.1.
 - .2 Where forces, moments and shears are not indicated, design connections for not less than 100% of the resistance of the member.
 - .3 For standard connections, select details from CISC Handbook

			of Steel Construction to ensure adequacy, unless detailed otherwise.
		.4	Design and fabricate steel stairs, handrails and balustrades to conform with the requirements of the British Columbia Building Code.
1.8	Product Delivery and Storage	.1	Schedule delivery of components to site to coincide with installation of Work.
		.2	Store components to prevent damage and distortion.
		.3	Protect finishes from scratches and soiling.
1.9	Co-ordination with Other Trades	.1	Supply necessary instructions, templates and drawings to other trades for setting anchor bolts and other members that are to be built in with Work of other trades. Assist in placing. Supply necessary materials before building in, at the correct time.
1.10	Field Quality Control	.1	If considered necessary by the Owner/Consultant, an independent testing laboratory will carry out inspection and testing of the materials and workmanship as designated by the Owner/Consultant.
2.0	PRODUCTS		
2.1	Materials	.1	Supply new materials, free from defects impairing strength, durability or appearance, of best commercial quality for purposes specified. Where metal fabrications are exposed and painted, ensure that manufacturer's stamps are not visible.
		.2	Miscellaneous and structural steel: to CAN/CSA-G40.21, 300W yield strength.
		.3	Hollow Structural Sections (HSS): To CAN/CSA-G40.21, 350W yield strength, Class C.
		.4	Steel pipe: structural grade pipe, standard schedule 40 black pipe conforming to ASTM A53/A53M, grade B, continuous or electric resistance welded; size as indicated on the drawings.
		.5	Bolts: to ASTM F3125, type 1 medium carbon steel bolts, galvanized finish; ASTM A194/A194M, Grade 2H nuts, galvanized finish; ASTM F436, type 1 washers.
		.6	Inserts: Hilti HSL.
		.7	Anchoring System: Hilti Hit HY200 for concrete.
		.8	Shear Connectors: Nelson stud.
		.9	Welding Material: Conforming to the requirements of CSA W59
		.10	Shop galvanizing: hot dipped galvanizing with a minimum zinc coating of 600 g/m ² to CSA-G164.

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| 2.2 | Fabrication | <p>.1 Perform work to the highest standard of modern shop and field practice, performed by personnel specializing in this work. Accurately fit joints and intersecting members and make in true planes, with adequate fastening. Fabricate work, plum b, true, square, straight, level, accurate to sizes detailed, free from distortion or defects.</p> <p>.2 File or grind and sand exposed welds, sharp edges and burrs, smooth and flush. All welds must be ground smooth and flush with adjacent surfaces.</p> <p>.3 Fabricate items in accordance with CSA S16, of sizes and profiles indicated on drawings and reviewed shop drawings, of sufficient size and strength to perform function for which they are designed with joints neatly fitted and properly secured.</p> <p>.4 Shop assemble in largest practical sections for delivery to site.</p> <p>.5 Provide flush butt type hairline exposed joints where mechanically fastened.</p> <p>.6 Provide flush countersunk screws or bolts to all exposed mechanical fastenings, located consistent with design.</p> <p>.7 Supply all components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication.</p> <p>.8 Where work of other Sections is to be attached to Work of this Section, prepare work by drilling and tapping holes as required to facilitate installation of such work.</p> <p>.9 Verify all dimensions on site prior to fabrication.</p> <p>.10 Supply all components in ample time for construction schedule as required, for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication.</p> <p>.11 Thoroughly clean all surfaces of rust, scale, grease and foreign matter prior to prime painting or galvanizing.</p> |
| 2.3 | Welding | <p>.1 Perform welding in accordance with the requirements of CSA W59.</p> <p>.2 Perform welding inspection in accordance with the requirements of CSA W178.1 and W178.2.</p> <p>.3 Perform resistance welding to CSA W55.3.</p> <p>.4 Continuously weld all exterior visible steel connections.</p> <p>.5 Continuously weld all exterior visible steel connections.</p> |
| 2.4 | Surface Preparation | <p>.1 Thoroughly clean and suitably pre-treat steel prior to finishing.</p> <p>.2 Remove loose mill scale, rust, oil, grease, dirt and other</p> |

- foreign matter using SSPC - SP No.6, Commercial Blast Cleaning, followed by SSPC - SP No. 1, solvent cleaning.
- .3 Grind and sand all sharp projections smooth.
- 2.5 Finishes**
- .1 Shop paint items, all miscellaneous metal items with the exception of those which are to be galvanized.
- .2 Prime paint to CSA S16.
- .3 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale or grease. Do not paint when temperature is lower than 7°C.
- .4 After fabrication, clean, remove rust, mill scale, grease or extraneous material. Unless specified otherwise, apply to all items, in shop, a full smooth coat of primer (see materials). Work paint into corners and open spaces.
- .5 Apply two (2) coats of primer to parts inaccessible after assembly.
- .6 Apply one (1) coat of primer to steel surfaces except where encased in concrete. Leave these surfaces clean and uncoated.
- .7 Touch-up burnt or scratched surfaces. Touch up bare or worn areas on site after installation, and apply field painting also to field-installed bolts, welds, screws, etc.
- .8 Make good corrosive protection after welding where burnt by welding operations and where removed to facilitate welding operations, using 2 coats of zinc rich touch-up primer.
- .9 Back prime with bituminous paint all aluminum surfaces in contact with concrete or masonry.
- .10 Provide hot dipped galvanized finish at all exterior metal fabrications and elsewhere indicated.
- 2.6 Angle Lintels and Ledgers**
- .1 Provide angle lintels and steel ledger angles with anchors or bolts, as indicated. Fabricate and install level and true to line, to support all superimposed loading.
- 2.7 Anchor Bolts, Lag Screws, etc.**
- .1 Provide anchor bolts, bolts, bolt washers and nuts, lag screws, expansion shields, toggles, straps, sleeves, brackets, etc. where required and where indicated.
- 2.8 Miscellaneous Framing**
- .1 Fabricate and install wall mounted supports to vanities and counters as detailed on the drawings and elsewhere as indicated; coordinate with vanity tops and counters specified in Section 06 40 00 Architectural Woodwork.
- .2 Fabricate and install all other metal brackets for millwork as detailed on the drawings; coordinate with Sections 06 40 00 Architectural Woodwork.
- .3 Fabricate and install all required bent plate framing, supports

and bracing required for overhead doors as indicated on the drawings and reviewed shop drawings.

.4 Refer to structural drawings for miscellaneous metal items which are to be fabricated, supplied and installed under this Section.

.5 Fabricate all other metal fabrication items or miscellaneous metal items required to complete the project.

3.0 EXECUTION

3.1 Erection

.1 Obtain Owner/Consultant's acceptance prior to site cutting or making adjustments to other work.

.2 Make provision for erection stresses and temporary bracing to keep work in alignment at all times.

.3 Install items rigid and secure, square and level, accurately fitted, free from distortion or defects detrimental to appearance and performance, in accordance with CSA S16.

.4 Securely anchor components in place. Unless indicated otherwise, anchor components as follows:

.1 To concrete and solid masonry with expansion shields and bolts or as shown on the drawings.

.2 To thin metal with screws or bolts.

.3 To thick metal with bolts or by welding.

.4 To wood with bolts for heavy and medium duty fastenings; with screws for light duty fastenings.

.5 Replace members damaged in course of construction.

.6 Perform required field welding in accordance with CSA W59.

.7 Items required to be cast into concrete, precast concrete or built into masonry to be handed over to the appropriate Section together with all necessary setting tem plates.

.8 After installation touch-up field welds, scratched and dam aged prime painted and galvanized surfaces.

.9 After installation, site clean and refinish damaged finishes, welds, bolt heads and nuts. Refinish with primer to match original finish.

3.2 Locations

.1 A comprehensive schedule of items is not included. Check drawings and specification to obtain all items and quantities.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts
1.2	Section Includes	.1	Section includes, but is not limited to: .1 The provision for Wood Treatment
1.3	Related Requirements	.1	06 10 00 Rough Carpentry
1.4	Reference Standards	.1	American Wood Preservers' Association .1 AWPA M2-19, Standard for the Inspection of Preservative Treated Products for Industrial Use. .2 AWPA M4-21, Standard for the Care of Preservative Treated Wood Products.
		.2	CSA International 1. CSA O80 Series-15 (R2020), Wood Preservation. 2. CSA O322-15(R2020), Procedure for Certification of Pressure Treated Wood Materials for Use in Preserved Wood Foundations.
		.3	South Coast Air Quality Management District, California State (SCAQMD) .1 SCAQMD Rule 1113-04, Architectural Coatings.
1.5	Submittals	.1	Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
		.2	Quality assurance submittals: .1 Submit certificates in accordance with Contract Documents .2 For products treated with preservative by pressure impregnation submit following information certified by authorized signing officer of treatment plant: .1 Information listed in AWPA M2 and revisions specified in CSA O80 Series, Supplementary Requirement to AWPA M2 applicable to specified treatment. .2 Moisture content after drying following treatment with water-borne preservative .3 Acceptable types of paint, stain, and clear finishes that may be used over treated materials to be finished after treatment.

- 1.6 Quality Assurance**
- .1 Plant inspection of products treated with preservative by pressure impregnation will be carried out by designated testing laboratory to AWPA M2, and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.
 - .2 Each piece of lumber and plywood for preserved wood foundations to be identified by CSA O322 certified stamp.
 - .3 Regulatory Requirements:
 - .1 Each bundle of fire retardant treated material to bear ULC label indicating Flame Spread Classification (FSC), and smoke developed
- 2.0 PRODUCTS**
- 2.1 Materials**
- .1 Treated wood material may be either air seasoned or kiln dried as Clause 1.7 of CSA 080.M1-15 (Guide for Purchasers and Specifiers of Treated Wood). Moisture content shall not be more than 19% prior to treatment.
 - .2 Treated wood shall be incised prior to treatment to provide at least the minimum penetration specified without damage and with the least loss of strength.
- 3.0 EXECUTION**
- 3.1 Application: Preservative**
- .1 Treat exterior wood framing exposed to the elements to CSA O80 Series using ACQ preservative to obtain minimum net retention of 6.4 kg/m³ of wood for exterior deck support and 2.4 kg/m³ of wood for deck wearing surface.
 - .2 Following water borne preservative treatment, dry material to maximum moisture content of 15%.
- 3.2 Application: Field Treatment**
- .1 Comply with AWPA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2.
 - .2 Remove chemical deposits on treated wood to receive applied finish.

END OF SECTION

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts
1.2	Section Includes	.1	Section includes, but is not limited to: <ul style="list-style-type: none">.1 Structural floor, wall, and roof framing.2 Built up structural beams and columns.3 Floor, wall, and roof sheathing.4 Sill gaskets.5 Preservative treatment of wood.6 Miscellaneous framing and sheathing.7 Telephone and electrical panel back boards.8 Concealed wood blocking for support of toilet and bath accessories, wall cabinets and siding
1.3	Related Requirements	.1	06 05 73 Wood Treatment
1.4	Reference Standards	.1	General <ul style="list-style-type: none">.1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply..2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work..3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements..4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	ANSI <ul style="list-style-type: none">.1 ANSI A208.1 2016 Particleboard. APA (American Plywood Association) <ul style="list-style-type: none">.1 Grades and Specifications. CANPLY (Canadian Plywood Association) <ul style="list-style-type: none">.1 Grading and certification.
		.2	CSA International

- .1 CSA O80 Series-15 (R2020), Wood Preservation.
 - .2 CSA O121-17, Douglas Fir Plywood
 - .3 CSA O151-17, Canadian Softwood Plywood.
 - .4 CSA O153-19, Poplar Plywood.
 - .5 CSA O325-21, Construction Sheathing
 - .3 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001 (V5-2) EN, FSC Principles and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002 (V3-0) EN, Structure, content and local adaptation of Generic Forest Stewardship Standards.
 - .4 NLGA (National Lumber Grades Authority)
 - .1 Standard Grading Rules for Canadian Lumber, 2017 Edition.
- 1.5 Submittals**
- .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
 - .3 Samples of Exposed to View Wood Members: Submit two (2) samples, illustrating wood grain, stain, and finish.
 - .4 Manufacturer's Certificate: Certify that Products conform to specified requirements.
 - .5 Sustainable Design:
 - .1 Provide required FSC documentation for Product FSC certified wood.

At minimum 28 days prior to site delivery, submit vendor invoices or letters from suppliers for each wood-containing product installed indicating whether the product is FSC certified, the product cost and the FSC chain-of- custody certificate number, and completed MRc7 tracking forms (included in this specification).
 - .2 Sustainable design requirement - CERTIFIED WOOD

Use a minimum of 75% of wood-based materials and products, by cost, certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for permanently installed wood components (Form to submit included in the last page of this document)
- 1.6 Quality Assurance**
- .1 Products of This Section: Manufactured to ISO 14000 certification requirements.
 - .2 Perform Work in accordance with the following agencies:

		.1	Lumber Grading Agency: Certified by NLGA.
		.2	Plywood Grading Agency: Certified by CANPLY.
		.3	In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate certifying that products meet or exceed specified requirements.
1.7	Delivery, Storage and Protection	.1	Protect materials from warping or other distortion by stacking in vertical position.
2.0	PRODUCTS		
2.1	Materials	.1	Dimensional Lumber: NLGA. Douglas Fir, No 1 or better, 15 percent maximum moisture content at time of installation.
		.2	Engineered Wood Products: Structural composites manufactured from veneer or strands of wood material (SCL, I-Joist, LVL, PSL, LSL etc), 13.8 MPa (2.0E) minimum modulus of elasticity. TJI, LPI, Microllam, Parallam, TimberStrand, Versa Lam.
		.3	Acceptable materials: acceptability of materials to Section 01 33 01 Submittal Procedures.
2.2	Panel Products	.1	Plywood Roof Sheathing: CSA O12 Grade SHG Veneer Grade C unsanded.
		.2	Plywood Wall Sheathing: CSA O121 Grade SGH, Veneer Grade C, unsanded.
		.3	Telephone and Electrical Panel Boards: Plywood.
2.1	Materials	.1	Dimensional Lumber: NLGA. Douglas Fir, No 1 or better, 15 percent maximum moisture content at time of installation.
2.5	Accessories	.1	Fasteners and Anchors: .1 Fasteners: Hot dipped galvanized steel. .2 Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.
		.2	Structural Framing Connectors: Joist and Beam Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
		.3	Sill Gasket on Top of Foundation Wall: 6 mm thick, plate width wide, closed cell foam from continuous rolls.
		.4	Sill Flashing (Under Sill Gasket): 6 mm thick, polyethylene sheet.
		.5	Building Paper: No.15 asphalt felt.
3.0	EXECUTION		

- | | | |
|------------|------------------|--|
| 3.1 | Framing | <p>.1 Set structural members level and plumb, in correct position.</p> <p>.2 Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.</p> <p>.3 Place horizontal members crown-side up.</p> <p>.4 Construct load bearing framing members full length without splices.</p> <p>.5 Double members at openings over 400 mm wide. Space short studs over and under opening to stud spacing.</p> <p>.6 Construct double joist headers at ceiling openings. Frame rigidly into joists.</p> <p>.7 Bridge framing in excess of 2.3 m span as detailed. at mid span. Fit solid blocking at ends of members.</p> <p>.8 Place sill gasket directly on cementitious foundation. Puncture gasket clean and fit tight to protruding foundation anchor bolts.</p> <p>.9 Coordinate installation of wood decking, glue laminated structural units, prefabricated wood trusses, and plywood web joists.</p> <p>.10 Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.</p> <p>.11 Coordinate curb installation with installation of decking and support of deck openings, roofing vapour retardant, parapet construction.</p> |
| 3.2 | Sheathing | <p>.1 Secure roof sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing.</p> <p>.2 Use sheathing clips between sheets between roof framing members. Fully engage tongue and groove edges.</p> <p>.3 Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.</p> <p>.4 Place plywood or structural use panel sheathing at building corners for a horizontal distance of 1200 mm.</p> <p>.5 Place building paper horizontally over wall sheathing; weather lap edges and ends.</p> <p>.6 Install plywood to two span continuous.</p> <p>.7 Install telephone and electrical panel back boards with plywood sheathing material where required. Size the back board by 300 mm beyond size of electrical panel.</p> |

3.3 **Erection Tolerances** .1 Framing Members: 6 mm from true position, maximum.

END OF SECTION

MRC7 Tracking Form
Certified Wood Company: _____

Contact
(Name and Phone Number): _____

Manufacturer: _____

Material or Product Cost: _____
(Note: This does not include Labour; Material Cost ONLY)

Use a minimum of 75% of wood-based materials and products, certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood bridge components including Glue-Laminated Structural Units.

Manufacturing Information				
Product Name	Vendor or Manufacturer	Wood Component Cost (\$)	Certified Wood by Cost (%) ¹	Forest Stewardship Council Chain-of-Custody Certificate Number

Back up documentation provided for all: YES / NO

(NOTE: Back up material includes product cut sheets; product literature; letters from the manufacturer; or other evidence indicating recycled content as well as manufacturing/extraction information)

¹ Certified Wood Material Portion [%] = $\frac{\text{FSC Certified Wood Cost [\$]}}{\text{Total New Wood Based Products Cost [\$]}}$

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of Contract, Division 01 General Requirements and all Addenda thereto form an integral part of and must be read in conjunction with the requirements of this Section.
		.2	This section, along with the drawings, forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts
1.2	Section Includes	.1	Section includes, but is not limited to: .1 The provision for Glued-Laminated Structural Units as shown on drawings.
1.3	Related Requirements	.1	05 55 00 Metal Fabrications 06 10 00 Rough Carpentry
1.4	Reference Standards	.1	General .1 The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. .2 Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work. .3 Refer to Division 01 General Requirements for the list of applicable regulatory requirements. .4 Withdrawn or obsolete standards may still apply unless it has been replaced with a different Standard in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instructions.
		.2	ASME 1. ASME B18.2.1 – 2010 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws.
		.3	ASTM International .1 ASTM A36/A36M-19, Standard Specification for Carbon Structural Steel. .2 ASTM A47/A47M-99 (2018), Standard Specification for Ferritic Malleable Iron Castings. .3 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength. .4 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

- .4 Canadian Construction Material Centre (CCMC)
 - .1 CCMC's Registry of Product Evaluations, On-line Edition.
 - .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
 - .6 CSA International
 - .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
 - .2 CSA G40.20-04/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
 - .3 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 CAN/CSA O122-16 (R2021), Structural Glued- Laminated Timber.
 - .5 CSA O86-19, Engineering design in wood.
 - .6 CSA O112.9-10 (R2019), Evaluation of adhesives for structural wood products (exterior exposure).
 - .7 CSA O112.10-08 (R2017), Evaluation of adhesives for structural wood products (limited moisture exposure).
 - .8 CSA O177-06 (R2020). Qualification Code for Manufacturers of Structural Glued-Laminated Timber.
 - .9 CSA S16-09, Design of steel structures.
 - .10 CSA W47.1-19, Certification of companies for fusion welding of steel.
 - .7 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001 (V5-2) EN, FSC Principles and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002 (V3-0) EN, Structure, content and local adaptation of Generic Forest Stewardship Standards.
 - .8 Green Seal Environmental Standards (GS)
 - .1 GS-11-2008, 2nd Edition, Paints and Coatings
- 1.5 Submittals**
- .1 Provide submittals in accordance with 01 33 00 Submittal Procedures and as outlined in contract documents.
 - .2 Shop Drawings - Clearly indicate stress grade, service grade, appearance grade, connection details, shop applied finishes, shop and erection details, including cuts, holes, fastenings, camber and connection hardware.
 - .3 Submit PDF shop drawings showing all applicable details and material specifications to the Engineer for review prior to fabrication. Shop drawings shall be accompanied by a certificate of conformance to manufacturing standard

- .4 Do not fabricate until shop drawings are reviewed without further changes
 - .5 Sustainable Design:
 - .1 Provide required FSC documentation for Product FSC certified wood.

At minimum 28 days prior to site delivery, submit vendor invoices or letters from suppliers for each wood-containing product installed indicating whether the product is FSC certified, the product cost and the FSC chain-of- custody certificate number, and completed MRC7 tracking forms (included in this specification).
 - .2 Sustainable design requirement - CERTIFIED WOOD

Use a minimum of 75% of wood-based materials and products, by cost, certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for permanently installed wood components (Form to submit included in the last page of this document)
 - .6 All visible surfaces to be paint coated.
- 1.6 Quality Assurance**
- .1 Manufacturer's Qualifications
 - .1 All glulam to be certified by the American Plywood Association - Engineered Wood Systems (APA EWS) and bonded with polyurethane resin (clear) adhesive meeting the requirements of CSA 0112.9-10.
 - .2 Glued-Laminated (GL) certified by CSA Administrative Board, Structure Glued Laminated Timber Division in accordance with CAN/CSA O177- to manufacture:
 - .1 Class 1 interior softwood glued laminated members.C
 - .2 lass X exterior softwood glued laminated members.
 - .3 Submit certificate in accordance with CAN/CSA O177.
- 1.7 Delivery, Storage and Protection**
- .1 Deliver, store and handle materials in accordance with Contract Documents and manufacturer's written instructions.

Delivery and Acceptance Requirements:

 - .1 Arrange delivery of members in accordance with construction schedule to designated delivery location.
 - .2 Affix authorized label to all members supplied. Also identify each member with mark number.
 - .3 Use padded, non-marring slings for handling glued-laminated members.
 - .4 Protect corners with wood blocking.
 - .5 Deliver materials to site in original factory packaging, labeled with manufacturer's name and address.

- .6 Apply protective sealer to glued-laminated and/or cross-laminated units before shipping unless specified otherwise.
- .7 Wrap all members prior to leaving plant with a moisture resistant wrapping.
- .8 Make adequate provision for delivery and handling stresses.
- .9 Arrange delivery of panels in accordance with construction schedule to designated delivery location.

.3 Storage and Handling Requirements:

- .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Slit underside of membrane covering during storage at site without defacing member.
- .3 Store units and protect from weather, block off ground and separate with stripping, so air may circulate around faces of members.
- .4 Cover units with opaque moisture resistant membrane if stored outside.
- .5 Store and protect products from nicks, scratches, and blemishes.
- .6 Replace defective or damaged materials with new unless written approval by the manufacturer.

2.0 PRODUCTS

2.1 Design Requirements

- .1 All shipping, loading, packing, and assembly stress are the design responsibility of the contractor.
- .2 Unsolicited alternative proposals, and unsolicited substitutions of materials, structure, connections or otherwise, must be submitted with sketches and calculations sealed by a Professional Engineer registered in the Province of BC and will require reviews by the consultants. Detailed reviews such as these, including changes to construction drawings and coordination, will be undertaken on an additional fee basis, at the Contractor's cost. This cost must be included in the proposal by the Contractor. Such review does not guarantee acceptance of the unsolicited alternative proposal(s). The Professional Engineering firm shall hold a Certificate of Authorization for Professional Engineering in BC.

2.2 Materials

- .1 All wood materials to meet FSC certification requirement.
- .2 Sealer for glued-laminated: penetrating type, clear, non-yellowing liquid.
- .3 Fastenings

- .1 Lag screws: to ASME B18.2.1.
 - .2 Bolts: to ASTM A307.
 - .3 Side plates: to CSA G40.20/G40.21 or ASTM A36.
 - .4 Drift pins: to ASTM A307.
 - .5 Nails and spikes: to CSA B111.
 - .6 Wood screws: to ASME B18.2.1.
- 2.5 Accessories**
- .1 Steel Connectors: Hot dipped galvanized
 - .2 Wrapping material: Weatherproof, lightproof, stain free material. Cut holes on site on underside of wrapping to avoid accumulation of condensation
- 2.6 Coating Paint**
- .1 Use two coats of Sikkens Cetol® Log & Siding in Natural color finish.
- 2.7 Fabrication**
- .1 Fabricate glued laminated members in accordance with CSA 0122 except where specified otherwise and to following classifications:
 - .1 Stress grade: bending grade for continuous members and members with cantilevers. Camber simple span beams where indicated on the drawings. Douglas Fir - 24-f-EX.
 - .2 Service grade: exterior as located on drawings.
 - .3 Appearance grade: Sanded, quality appearance grade finish where exposed, commercial grade where concealed (blocking and concealed drag struts).
 - .2 Service grade: Exterior
 - .3 All glued laminated members to be fabricated without chamfers, 90° corners are required.
 - .4 Provide cambers as specified on the structural drawings. 6mm round over if not specified.
 - .5 Mark members for identification during erection, ensure that marks will be concealed in final assembly for appearance grade members. Clearly mark top surface.
 - .6 Coat all cuts, holes, and slots with wax emulsion sealer in the shop immediately subsequent to fabrication.
 - .7 Apply sealer to all sides of laminated members. Double coat ends of laminated members.
 - .8 All structural steel connecting glulam elements to each other and to supporting members shall be detailed, supplied and test fitted in the shop by the glulam supplier.
- 3.0 EXECUTION**
- 3.1 Examination**
- .1 Prior to fabrication, check all dimensions relating to this

section of work. Report any discrepancies to Engineer.

- | | | |
|------------|-------------------|--|
| 3.2 | Erection | <p>.2 Prior to site erection, examine all site conditions and ensure an acceptable condition.</p> <p>.1 Erect glued laminated members in accordance with final reviewed shop drawings.</p> <p>.2 Make adequate provision for possible erection stresses. Set members level and plumb to correct positions. Securely brace members and anchor in place to maintain plumb until permanently secured by finished structure.</p> <p>.3 Fit glued laminated members closely and accurately, without trimming, cutting or other modifications, unless approved in writing by Engineer.</p> <p>.4 Site cutting or boring of laminated members, other than shown on shop drawings not permitted without written consent of Engineer.</p> |
| 3.3 | Protection | <p>.1 Protect installed products and components from damage during construction.</p> <p>.2 Repair damage to adjacent materials caused by glued-laminated and/or cross-laminated construction installation.</p> |

END OF SECTION

MRc7 Tracking Form Certified Wood Company: _____ Contact (Name and Phone Number): _____

Manufacturer: _____ Material or Product Cost: _____
 (Note: This does not include Labour; Material Cost ONLY)

Use a minimum of 75% of wood-based materials and products, certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood bridge components including Glue-Laminated Structural Units.

Manufacturing Information				
Product Name	Vendor or Manufacturer	Wood Component Cost (\$)	Certified Wood by Cost (%) ¹	Forest Stewardship Council Chain-of-Custody Certificate Number

Back up documentation provided for all: YES / NO

(NOTE: Back up material includes product cut sheets; product literature; letters from the manufacturer; or other evidence indicating recycled content as well as manufacturing/extraction information)

¹ Certified Wood Material Portion [%] = $\frac{\text{FSC Certified Wood Cost [\$]}}{\text{Total New Wood Based Products Cost [\$]}}$

1.0	GENERAL		
1.1	General Requirements	.1	The General Conditions of the Contract and all Sections of Divisions 00 and 01, shall form an integral part of the requirements of this Section.
		.2	All addenda or corrections issued during the time of the bidding process shall also become part of the contract documents and shall be covered in the Trade Contractor's bid.
		.3	Cooperate and coordinate with the requirements of other Trade Contractors specified in other Sections.
1.2	Section Includes	.1	This section refers to the labour, materials, and equipment necessary for the supply and installation of site furnishings specified herein.
1.3	Related Sections	.1	055000 Metal Fabrications
		.2	062013 Exterior Finish Carpentry
1.3	Shop Drawings and Product Data	.1	Submit shop drawings and product data in accordance with Section 013300 Submittal Procedures. All pre-manufactured site furnishing products shall be submitted in full size and in complete form to Consultant 120 days in advance of installation. Consultant must approve sample and any relevant colours, finishes and sizes prior to Contractor placing final order.
		.2	Indicate dimensions, sizes, assemblies, anchorage, and installation details for each furnishing specified.
		.3	In instances with powdercoat finish or coloured material application; provide a sample of paint chips and coloured samples for review prior to purchase and order of materials.
1.4	Maintenance Data	.1	Provide maintenance data for care and cleaning of site furnishings.
1.5	Quality Assurance	.1	A manufacturer's warranty is required for all pre-manufactured site furnishing specified in this section.
2.0	PRODUCTS		
2.1	Materials	.1	Metals: <ol style="list-style-type: none">1. Nails, spikes, bolts, lag screws, nuts and washers shall be stainless steel or shall be an approved nonferrous type.2. All connecting steel shall be medium structural steel conforming to CSA-G40.4. All connecting steel shall be hot-dipped galvanized after fabrication.3. All painted metals shall be prime coated and then finished with a minimum of two coats of paint.
		.2	Site Furnishings: <ol style="list-style-type: none">1. Drinking fountain:<ol style="list-style-type: none">1. Quantity: 1

2. Supplier: Murdock
3. Model: GYM74
4. Finish: Satin stainless steel

2. Picnic Table:

1. Quantity: 3
2. Supplier: Wishbone
3. Model: Bayview Hexagonal, BVHPTWC-84
4. Finish: Frame—Textured silver, Wood slats-Walnut

3. Bench:

1. Quantity: 5
2. Supplier: Wishbone
3. Model: Bayview, BV-6 with armrests
4. Finish: Frame—Textured silver, wood slats-Walnut

4. Waste Receptacle:

1. Quantity: 2
2. Supplier: Haul-All
3. Model: HBIS-Standard SP-HBIS-N
4. Finish: Brown

5. Tennis Court Posts and Net:

1. Supplier: Tomko Sports Systems
2. Post model: TN-CLASSIC (3" OD, round)
3. Post quantity: 2
4. Post Finish: Black
5. Post sleeve model: TN-GS24 c/w end plugs
6. Post sleeve quantity: 2
7. Net model: TN-TN90HT
8. Net quantity: 1
9. In-ground center anchor model: TN-ANCHOR
10. Anchor quantity: 1
11. Center strap model: TN-QKSET
12. Strap quantity: 1

6. Pickleball Court Posts and Net:

1. Supplier: Tomko Sports Systems
2. Post model: TP-CLASSICPB (3" OD, round)
3. Post quantity: 2
4. Post Finish: Black
5. Post sleeve model: TN-GS24 c/w end plugs
6. Post sleeve quantity: 2
7. Net model: TP-HDPN
8. Net quantity: 1
9. In-ground center anchor model: TN-ANCHOR
10. Anchor quantity: 1
11. Center strap model: TN-QKSET
12. Strap quantity: 1

- 2.2 Execution**
- .1 All materials and/or components damaged or deteriorated during delivery and storage will be rejected and shall be removed from the site and replaced at no cost to the Owner.
 - .2 All materials and components will be subjected to inspection

- upon arrival to site. Materials and/or components which do not meet the requirements stated herein shall be rejected and be removed from the site at no cost to the Owner.
- .3 All materials and components shall be protected from weather while in transit to the site.
 - .4 All materials and components shall be stored off the ground and be adequately protected from weather to prevent deterioration, damage, or impairment of structural or their essential properties.
 - .5 The Contractor shall be responsible for protection and maintenance of all completed work and finishes from time of completion until acceptance of work and shall make good any damage to work caused during projection and maintenance period at no cost to the Owner.
 - .6 Installation work shall be carried out in accordance with the drawings, approved shop drawings, and requirements stated herein and as per manufacturer's specifications.
 - .7 Installation work shall be laid out plumb, true to line and level. Structural supports and members shall be accurately placed in position and securely braced to remain plumb and true until permanently fixed.
 - .8 Fastening shall be done with nails, bolts, spikes, or framing anchors as detailed and as per manufacturer's specifications. Bolt holes shall be bored 1.5mm larger than the diameter of the bolt.
 - .9 All cutting and framing where required for the installation of the work shall be executed as shown on the drawings.
 - .10 Touch-up damaged finished to the approval of the Consultant.

END OF SECTION

SITE GRADING

1.0 – GENERAL

1.1 GENERAL REQUIREMENTS

1. Section 31 22 01 is a 'Landscaping' Section and refers to those portions of the Works that are unique to the preparation of sub grade, by rough grading and filling to provide a base that will allow placing of growing medium (topsoil) to specified depths. This Section does not apply to grading prior to placement of paved or concreted surfaces. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the Works described herein.
2. This section is based upon the 'British Columbia Landscape Standard' published by the B.C. Society of landscape Architects and the Nursery Trades Association.

1.2 RELATED WORK

1. Section 31 11 00 - Clearing and Grubbing
2. Section 31 23 01 – Excavation and Backfill
3. Section 32 11 23 - Aggregate Base Courses
4. Section 32 91 21 - Topsoil and Finish Grading
5. Section 32 92 13 - Hydraulic Seeding
6. Section 32 92 23 – Turf and Grasses
7. Section 32 92 01 - Planting of Trees, Shrubs and Ornamentals

1.3 REFERENCES

1. Master Municipal Construction Documents (MMCD) Volume II 2009 Edition
2. British Columbia Landscape Standards (current edition)
3. Canadian System of Soil Classification (current edition)

1.4 INTERPRETATION OF THE WORK

1. The Landscape Contractor shall be fully acquainted with the existing site and shall fully understand the difficulties and restrictions attending the execution of the work under this contract. Any 'interpretations' by the Landscape Contractor of the meaning of any section of the contract drawings and specifications herein prior to submitting a tendered price shall not remove the responsibility of completing the Works as per the directions of the Owner's Representative/ Consultant, including all costs associated with the Works, should the Landscape Contractor's 'interpretation' be incorrect. Prior to submitting a tendered price for the Works, the Landscape Contractor must seek clarification from the Owner's Representative/Consultant for any items within the contract drawings and specifications that may appear to be unclear or conflicting.

1.5 PROTECTION

1. Examine site with Owner's Representative/Consultant and obtain approval of previous work prior to commencing Site Grading.
2. Comply with MMCD General Conditions, Clause 4.3 - Protection of Work, Property and the Public and, MMCD General Conditions, Clause 4.5 - Errors, Inconsistencies or Omissions in the Contract Documents.

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3. Protect existing fencing, natural features, bench marks, existing buildings, existing pavement, sub surface and surface utility lines, and water courses and miscellaneous items noted on contract drawings as to remain.
4. Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas within the area to be rough graded that have been identified to remain on the contract drawings.
5. Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas that are outside of area to be rough graded.
6. Notify the Consultant immediately if any damage occurs.
7. Maintain access routes to prevent accumulation of mud on roads. Use all means necessary to control dust on and near the work caused by operations
8. The Contractor, at no cost to the Owner shall make good all damages incurred during the rough grading operation.

1.6 QUALITY ASSURANCE

1. The Owner's Representative/Consultant is to inspect and approve all stages of the work.
 1. Provide forty-eight (48) hours' notice to the Owner's Representative/Consultant when inspection is required.
2. At the Owner's Representative/Consultant discretion, a licensed testing agency will be retained by the Contractor to perform periodic testing of the sub grade preparation to demonstrate proctor density has been achieved at no extra cost to the Owner.
3. Remove any base materials which are unacceptable for required sub-grade bearing capacities or Corrected Maximum Dry Density (MPD) as specified.

1.7 COORDINATION

1. The work shall include;
 1. Stripping and stockpiling of approved onsite fill material
 2. Importing and placement of fill material in place of unsuitable sub grade material
 3. Grading operation to attain sub grade design grades
 4. Compaction of fill materials
 5. Removal and off-site disposal of unsuitable material.
2. If sub grade non-structural, or structural, fills are required to meet design sub grades, use granular material as per MMCD Section 31 05 17 - Aggregate and Granular Materials.
3. Over Excavation
 1. Based on the Geotechnical Report prepared by the Consultant, the Owner/Consultant does not anticipate need for over excavation unless it is discovered that conditions differ from those encountered at test hole locations. These changes or variations may be one of the following:
 1. Organics or topsoil encountered below the anticipated design sub grade elevations for:
 1. Footings

SITE GRADING

2. Soft or wet, silty with clay soils within the sub grade.
3. Buried concrete, wood debris or old foundations.
2. If these conditions are encountered the contractor must notify the Owner's Representative/Consultant, prior to over excavation.
3. If unsuitable bearing materials are encountered at indicated elevations, carry excavation deeper and replace excavated material with suitable materials as directed by the Owner's Representative/Consultant.
4. Perform over excavation only by written authorization of the Owner's Representative/Consultant. If additional over excavation is required, Owner's Representative/Consultant shall be notified so that exact quantities can be measured.
4. Unauthorized Excavation
 1. Unauthorized excavation shall be any excavation beyond elevations and dimensions indicated, without specific direction by the Owner's Representative/Consultant.
 2. The Landscape Contractor shall fill unauthorized excavation with approved fill material, to elevations and dimensions indicated, to the requirements of this section.
 3. Unauthorized excavation and remedial work shall be at Landscape Contractor's expense.

1.8 MEASUREMENT AND PAYMENT

1. Measurement and payment for topsoil stripping including, stockpiling for re-use will be made before and after cross sections of stripped area as determined by field measurements on site by the Owner's Representative/Consultant.
2. Measurement and payment for rough site grading shall be by the square meter of area rough grading and, shall include cut and fill excavation and its on-site redistribution and compaction to design elevations and grades for the entire area graded.
3. Measurement and payment for excavation and offsite disposal of unsuitable materials, as determined by the Owner's Representative/Consultant, will be by loose truck box volume of
4. Measurement and payment for removal and off-site disposal of soft or unsuitable material revealed during proof-rolling includes all remedial work, equipment, materials and requirements for over excavation (over the sub grade design elevations) shall be made by loose truck box volume as determined by Owner's Representative/Consultant.
5. Loads removed offsite that are not witnessed by the Owner's Representative/Consultant will not be paid.
6. Measurement and payment for topsoil stripping including, stockpiling for re-use then, placement and spreading of native topsoil previously stockpiled on-site will be made before and after cross sections of stripped area as determined by field measurements on site by the Owner's Representative/Consultant.

2 – PRODUCTS

2.1 MATERIALS (IF BACKFILL REQUIRED)

1. Fill Material
 1. Soft Landscape Areas: Loose, friable, well drained, native on site fill or imported fill shall be free of rocks and boulders in excess of 100 mm (4") in size. Provide sample for review and approval by the Owner's

SITE GRADING

Representative/Consultant prior to use or import to site. Use suitable existing inorganic material and compact to at least 80% Standard Proctor maximum dry density.

2. Type

1. Granular and fill material shall be as identified in:

1. Section 31 23 01 – Excavating, Trenching and Backfilling
2. Section 31 05 17 – Aggregate and Granular Materials
3. Excavated or graded material conforming to the backfill specification may be used as site fill or for grading work after approval by the Owner’s Representative/Consultant.
4. The Owner’s Representative/Consultant reserves the right to approve which of the excavated material is to be reused, and which is to be disposed offsite, based upon material quality and suitability for its intended purpose.
5. Protect approved material from contamination.
6. Pit Run Gravel

1. To be well graded granular material, substantially free form clay clumps, organic material and other extraneous material, screened to remove all stones in excess of 75mm. Material to compact to specified density and conform to the following gradations:

Sieve Size (mm)	Percent passing (%)
75	100
50	70-100
25	50-100
4.75	22-100
2.36	10-85
0.075	2-8

7. Recycled concrete free form contaminated and other extraneous materials conforming to the specified gradations may be used as pit run gravel.

3 – EXECUTION

3.1 ROUGH GRADING OPERATIONS

1. Rough grade site to contours, lines, grades, elevations, and dimensions to the following minimum sub grade depths allowing for depths of finished surface treatment as indicated on contract drawings and to accommodate planting areas shall be as follows:

Depths	Areas
150mm (6")	Lawn
300mm (12")	Perennials, Grasses, and Groundcovers
450mm (18")	Shrub Planting
900mm (36")	Tree Planting

2. Remove and dispose all deleterious material, grass sod, organic material, roots, branches, stones, concrete, asphalt waste, building materials or any other elements which may interfere with the installation of proposed

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hard landscape components noted on contract drawings. All material shall be disposed of in an approved off site disposal area.

3. Remove and dispose all deleterious material, grass sod, organic material, roots, branches, stones, concrete, asphalt waste, building materials, visible weeds and any other elements which may interfere with the healthy growth of the proposed landscape plant material. All material shall be disposed of in an approved off site disposal area.
4. Shape and roll alternately to obtain smooth, even and uniformly compacted sub grade surface. Finished sub grade shall have no irregularities exceed 15mm (5/8") when checked with a 3.0 metre (10'-0") straight edge placed in any direction.
5. Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.
6. Compaction Densities:
 1. Ensure that all rough grade sub grade areas are compacted to the following Modified Proctor Densities (MPD):
 1. Soft Landscape Areas - 80% MPD in compliance with ASTM D1557
 2. Hard Landscape Areas - 95% MPD in accordance with ASTM D1557
7. All landscape areas to be scarified to a depth of 200 mm (8") after compaction to ensure proper drainage.
8. Remove and dispose offsite all obstructions or debris encountered during excavation before any construction procedures commence to avoid contamination of sub grade.
9. Ensure the sub grade has a minimum gradient for positive subsurface drainage.
10. Re-usable common excavation may be stockpiled but must not cover any on-site stockpiled topsoil or grassed areas.
11. Do not disturb soil or rock below bearing surfaces.
12. Notify Owner's Representative/Consultant when excavations are complete.
13. Excavation taken below depths shown on the Contract Drawings without the written authorization of the Owner's Representative/Consultant must be filled at Landscape Contractor's expense.
14. If bearings are unsatisfactory, additional excavation will be authorized by Owner's Representative/Consultant in writing, and paid for as per the contract unit price for common excavation.
15. Dispose of surplus and unsuitable excavated material offsite at an approved disposal area.
16. Do not obstruct flow of surface drainage or water courses.
17. Obtain Owner's Representative/Consultant approval of completed excavation, backfilling, and rough grading.
18. Hand trim tree exposed roots, remove and make firm areas of loose materials and debris from excavations.

3.2 SHORTAGE AND SURPLUS

1. Supply all necessary fill to meet backfilling and grading requirements.

SITE GRADING

2. Remove surplus material unsuitable for fill, grading or landscaping from site and dispose at an approved disposal area.

3.3 DEWATERING

1. Keep excavations and construction site area free of water while work is in progress and protect against surface runoff.
2. Provide pumps, piping, temporary drains, trenches, sumps, and related equipment to remove water.
3. Provide settling basins, siltation fences, and or other siltation control facilities to remove suspended solids or other materials before discharging to storm sewers or water courses.
4. Submit for Owner's Representative/Consultant review details of proposed dewatering methods. Maintain groundwater table a minimum of 300mm below elevations for sub grade.
5. Do not use sanitary sewers or private property for discharge of water.
6. Dispose of water in a manner not detrimental to the environment, public and private property, or any portion of work completed or under construction.

3.4 GRADING TOLERANCES

1. General: Uniformly grade site, including adjacent transition areas. Smooth finish surface within specified tolerances of plus/minus 25mm; compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
2. Grade Control: During construction, maintain lines and grades including crown and cross-slope of sub grade course. Grading outside of the line defining the work of this contract shall consist of rough grading to grades indicated.
3. Grading Surface of Fill: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of ± 15 mm when tested with a 3 meter straight edge.
4. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.
5. Stripped grade below slabs shall be brought up to required elevation using free draining material in maximum 300 mm lifts and compacted to a minimum 98% Standard Proctor dry density.

3.5 ROUGH GRADING OPERATIONS

1. Fill Placement – Soft Landscape: Place fill materials over acceptable sub grade to elevations and sections shown on contract drawings. Place in maximum 200 mm (8") lifts, compacting each lift to 80% Modified Proctor Density.
2. Fill Placement – Hard Landscape Areas: Place fill materials over acceptable sub grade to elevations and sections shown on contract drawings. Place in maximum 150mm (6") lifts. Each lift to be compacted to 95% MPD.
3. Ensure gradients conform to slopes and grades indicated on the contract drawings. Contractor shall inform the Consultant if the following grading guidelines cannot be attained:

SITE GRADING

Location	Minimum	Maximum
Lawn and Grass	50:1 (2 %)	3:1 (33 %)
Grass Swales	50:1 (2 %)	10:1 (10 %)
Slopes along inverts	6:1 (16 %)	3:1 (33 %)
Side Slopes – Planted areas	50:1 (2 %)	2.5:1 (40 %)

*Unless directed otherwise by Owner's Representative/Consultant

4. Ensure grade transitions are smooth and even and carried out such that ponding will not occur on sub grade surface.

3.6 PROTECTION

1. Maintain finished surfaces in condition conforming to this section until acceptable by Contract Administrator.
2. Polyethylene sheets shall be placed on stockpiled re-usable native material to protect against erosion and contamination.
3. Polyethylene sheets shall be placed on all exposed surfaces to protect against erosion.
 1. Polyethylene sheets shall be pinned to prevent displacement by the wind.

3.7 EQUIPMENT

1. Excavation shall be carried out using an excavator equipped with a clean-up/landscape bucket to minimize disturbance to the sub grade.
2. Compaction equipment must be capable of obtaining required densities in materials on project. Equipment that does not achieve specified densities must be replaced or supplemented.

3.8 FINISH GRADING

1. See Section 32 91 00 – Topsoil and Finish Grading for placement and finish grading of growing medium (topsoil).

END OF SECTION

EXCAVATION AND BACKFILL

1 – GENERAL

1.1 GENERAL REQUIREMENTS

1. Section 31 23 01 refers to those portions of the Works that are unique to excavating and backfilling in the areas for hard and softscape infrastructure as shown on Contract Drawings.
2. Excavation and removals, as defined below, are all classified as 'common excavation' and shall be removed by acceptable methods to the design sub grade elevations or, as otherwise directed by the Owner's Representative /Consultant.
3. The Excavation Contractor shall furnish all services, labour, materials, equipment and operations for all common excavation and off-site disposal as specified herein. Refer to Contract Drawings and Details for the extents of the sub grade excavation work. All work shall be completed to the compete satisfaction of the Owner's Representative /Consultant.
4. The cost to load, haul and dispose of any common excavation which is surplus for the needs of on-site grading and backfilling or, is determined by the Owner's Representative /Consultant to be unsuitable for reuse as sub grade fill or back fill shall be included in the tender price shown on the Schedule of Quantities and Prices found in the Form of Tender
5. Measurement and Payment for this section does not include excavation, trenching and backfilling for utility installations including, but not limited to, irrigation, electrical, communications, storm, water, gas, manholes, lawn basins and the like.
6. Excavation, trenching and backfilling for utility installations shall be included in their relevant sections herein these Specifications and as shown on the Schedule of Quantities and Prices found in the Form of Tender.
7. The Contractor shall rough grade to the sub grade design elevations, as indicated on the Contract Drawings, ensuring the sub grade has minimum gradient for positive sub surface drainage.
8. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the Works described herein.

1.2 RELATED WORK

1. Section 01 57 01 - Environmental Protection
2. Section 31 11 01 - Clearing and Grubbing
3. Section 31 22 01 - Site Grading
4. Section 31 05 17 - Aggregate and Granular Materials
5. Section 32 91 21 - Topsoil and Finish Grading
6. Sediment Control - Sediment Control Bylaw

1.3 REFERENCES

1. Master Municipal Construction Documents(MMCD) Volume II 2009 Platinum Edition
2. British Columbia Landscape Standards (current edition)
3. Canadian System of Soil Classification (current edition)

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4. ASTM D698-[91(1998)], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft) (600 kN-m/m).
5. ASTM C 136-92, Method for Sieve Analysis of Fine and Coarse Aggregates.
6. ASTM D422-63(1990), Method for Particle-Size Analysis of Soils.
7. ASTM D4318-84, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
8. CAN/CGSB-8.2-M88, Sieves, Testing, Woven, Wire, Metric.
9. CAN/CSA-A23.1-[M94], Concrete Materials and Methods of Concrete Construction.

1.4 DEFINITIONS

1. Common Excavation:
 1. Excavation of materials of whatever nature including, but not limited to sod, organic material, underlying and unsuitable materials, dense tills, hard pan, partially cemented materials, clay or frozen materials, boulders and rock which can be ripped, excavated and loaded with heavy construction equipment and disposed at an approved off-site location.
2. Over Excavation:
 1. Excavation below design elevations of bottom of specified bedding and, including backfilling of resultant excavation with specified material, as authorized by the Owner's Representative/Consultant.
3. Removals:
 1. Removal and disposal at an approved location off-site of surface concrete structures and walls, curbs and gutters, manholes, catch basins, pipes, culverts, end walls and any other structures on surface or underground specifically designated on the Contract Drawings for removal. Removals shall include backfilling of resultant excavation with specified material, as authorized by the Owner's Representative /Consultant.
4. Native Material:
 1. Refer to Section 32 91 21 - Topsoil and Finish Grading

1.5 PROTECTION

1. Examine site with Owner's Representative/Consultant and obtain approval of previous work prior to commencing the excavation operation.
2. Comply with MMCD General Conditions, Clause 4.3 - Protection of Work, Property and the Public and, MMCD General Conditions, Clause 4.5 - Errors, Inconsistencies or Omissions in the Contract Documents.
3. Install and maintain all sediment and erosion control features prior to commencing excavation work, as specified, to the complete satisfaction of the Owner's Representative /Consultant.
4. Maintain sediment and erosion control features for the duration of the project.
5. Prior to commencing any excavation work the contractor shall establish the location of any existing active buried utility or service lines, including service entry points. Mark these locations clearly on site to prevent accidental disturbance during the work.

EXCAVATION AND BACKFILL

6. Any utility or service which is presently in use, or not established as abandoned but which must be moved or otherwise disturbed, shall be referred to the utility or service company concerned so that they may advise on, co-ordinate and inspect necessary operation for relocation.
7. Costs incurred by any disturbance of existing active utilities and service lines, not called for under the contract documents, shall be borne by the Contractor.
8. Any damage done including settlement or collapse to existing active services caused by inadequate measures taken by the Contractor to prevent such disturbances shall be rectified immediately by the Contractor at no cost to the Owner.
9. Keep excavations clean, free of standing water, and loose soil.
10. Protect existing fencing, natural features, bench marks, existing buildings, existing pavement, sub surface and surface utility lines, and water courses and miscellaneous items noted on contract drawings as to remain.
11. .Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas within the area to be excavated that have been identified on the contract drawings as to remain.
12. Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas that are outside of area to be excavated.
13. Notify the Owner's Representative/Consultant immediately if any damage occurs.
14. Contractor shall be responsible for implementation, maintenance, and decommissioning of vehicle wheel wash facility. Decommissioning of wheel wash facility includes but is not limited to fill and re-grading of affected area to the satisfaction of the Owner's Representative /Consultant.
15. Contractor shall be responsible for cleaning of adjacent municipal streets, private streets and driveways affected by vehicle movements on site or to and from the site.
16. Contractor shall be responsible for implementing and maintaining dust control measures for all on site activities of this section. Dust control measures shall meet all local bylaws and regulations
17. The Contractor, at no cost to the Owner shall make good all damages incurred during the excavation and backfilling operation.

1.6 SAFETY

1. Comply with MMCD General Conditions, Clause 4.2 – Safety.
2. Design and install shoring in accordance with the regulations of WorkSafe BC.
3. Contractor is responsible for complying with all current WorkSafe BC requirements for site safety related to the scope of work in this section. This includes but is not limited to protection of personnel and site safety procedures related to open excavation.

1.7 SITE ACCESS

1. The Contractor shall be responsible for ensuring that there is minimal disruption of vehicle and pedestrian traffic flow on adjacent existing roads during work of this section.
2. The Contractor shall be responsible for providing warning signs, flashing lights, flag people barricades, etc. to ensure vehicle and pedestrian movement associated with the site or adjacent to the site meets all applicable municipal, provincial or federal requirements.

1.8 DISPOSAL

EXCAVATION AND BACKFILL

1. Dispose of all surplus spoil from excavations on-site and/or off-site as shown on Contract Drawings or as specified in the Contract Documents.
2. Dumping of spoil on private property will be permitted only upon written approval from property owner and provided all necessary permits and approvals have been obtained.

1.9 LIMITATIONS OF OPEN EXCAVATIONS

1. Excavate only as far in advance as safety, traffic and weather conditions permit and, in no case to exceed 30 m. Before stopping work on last day of work before each weekend or holiday, completely backfill open excavations. If circumstances do not permit complete backfilling of all open excavations, adequately protect all open with approved fencing or barricades and, where required, with flashing lights.
2. Dumping of spoil on private property will be permitted only upon written approval from property owner and provided all necessary permits and approvals have been obtained.

1.10 PERMITS AND APPROVALS

1. Comply with MMCD General Conditions, Clause 20 - Laws, Notices, Permits and Fees.
2. The Contractor shall at no cost to the Owner obtain all damage and/ or crossing deposits required by the municipal, provincial, federal or utility to carry out the work of this section.

1.11 TESTING AND INSPECTIONS

1. The Contractor shall at no cost to the Owner and as part of the work of this section perform, or cause to be performed, all tests, inspections and approvals.
2. Should the test, inspection or approval require a representative sample of the material or workmanship the Contractor shall at no cost to the Owner supply the labour and materials necessary to provide the sample or test.
3. Should the test or inspection indicate that the material or work completed does not conform to the specifications the Contractor shall at no cost to the Owner promptly remove this work, dispose of it off site and re-execute it in accordance with the Contract Documents. The remedial work shall include retesting as required to establish conformance with the Contract Documents.
4. The Owner's Representative/Consultant is to inspect and approve all stages of the work.
 1. Provide forty-eight (48) hours' notice to the Owner's Representative/Consultant when inspection is required.
5. At the Owner's Representative/Consultant discretion, a licensed testing agency will be retained by the Contractor to perform periodic testing of the sub grade preparation to demonstrate proctor density has been achieved at no extra cost to the Owner.
6. Remove any base materials which are unacceptable for required sub-grade bearing capacities or Corrected Maximum Dry Density (MPD) as specified.

1.12 SUBMITTALS

1. Prior to the start of work for this section the Contractor shall submit the following to the Owner's Representative /Consultant for review:
 1. Sieve analysis of granular material

EXCAVATION AND BACKFILL

2. Source for supply of all materials (source shall be used throughout duration of project). Should a change of material source be proposed during work; provide samples and sieve analysis from proposed source.
3. Company name, address and contact information for material testing company.

1.13 GEOTECHNICAL REPORT

1. A Geotechnical Report has been prepared by the Consultant and is included herein these specifications.

1.14 INTERPRETATION OF THE WORK

1. The Contractor shall be fully acquainted with the existing site and shall fully understand the difficulties and restrictions attending the execution of the work under this contract. Any 'interpretations' by the Contractor of the meaning of any section of the contract drawings and specifications herein prior to submitting a tendered price shall not remove the responsibility of completing the Works as per the directions of the Owner's Representative/Consultant, including all costs associated with the Works, should the Contractor's 'interpretation' be incorrect. Prior to submitting a tendered price for the Works, the Contractor must seek clarification from the Owner's Representative/Consultant for any items within the contract drawings and specifications that may appear to be unclear or conflicting.

1.15 COORDINATION

1. Over Excavation

1. Based on the Geotechnical Report prepared by Consultant, the Owner's Representative/Consultant does not anticipate need for over excavation unless it is discovered that conditions differ from those encountered at test hole locations. These changes or variations may be one of the following:
 1. Organics or topsoil encountered below the anticipated design sub grade elevations for:
 1. Footings
 2. Soft or wet, silty with clay soils within the sub grade.
 3. Buried concrete, wood debris or old foundations.
 2. If these conditions are encountered the contractor must notify the Owner's Representative/Consultant prior to over excavation.
 3. If unsuitable bearing materials are encountered at indicated elevations, carry excavation deeper and replace excavated material with suitable materials as directed by the Owner's Representative/Consultant
 4. Perform over excavation only by written authorization of the Owner's Representative/Consultant. If additional over excavation is required, Owner's Representative/Consultant shall be notified so that exact quantities can be measured.
2. If sub grade non-structural, or structural, fills are required to meet design sub grades, use granular material as per MMCD Section 31 05 17 - Aggregate and Granular Materials.
3. Unauthorized Excavation
 1. Unauthorized excavation shall be any excavation beyond elevations and dimensions indicated, without specific direction by the Owner's Representative/Consultant.
 2. The Contractor shall fill unauthorized excavation with approved fill material, to elevations and dimensions indicated, to the requirements of this section.

EXCAVATION AND BACKFILL

3. Unauthorized excavation and remedial work shall be at Contractor's expense.

1.16 MEASUREMENT AND PAYMENT

1. Measurement for common excavation to include sod stripping; underlying organic materials; finish sub grade; grading to design elevations and grades; cut, backfill & compaction; temporary stockpiling and offsite removal of surplus to an approved disposal site. Stockpiling for re-use will be made before and after cross sections of the excavated area, as determined by field measurements on site, by the Owner's Representative/Consultant.
2. Measurement and payment for removal and off-site disposal of surplus, soft or unsuitable material revealed during proof-rolling includes all remedial work, equipment, materials and requirements for over excavation (over the sub grade design elevations) shall be made by loose truck box volume as determined by Owner's Representative/Consultant.
3. Loads removed offsite that are not witnessed by the Owner's Representative/Consultant will not be paid.
4. Measurement for imported fill materials to backfill over excavations, will include all remedial work, materials, requirements and compaction, and will be based on weigh tickets provided to Owner's Representative/Consultant as loads are delivered. Loads delivered that are not witnessed by the Owner's Representative/Consultant will not be paid.
5. Measurement and payment for topsoil stripping including, stockpiling for re-use then, placement and spreading of native topsoil previously stockpiled on-site will be made before and after cross sections of stripped area as determined by field measurements on site by the Owner's Representative/Consultant.

2 – PRODUCTS

2.1 MATERIALS (IF BACKFILL REQUIRED)

1. Backfill
 1. Use suitable existing inorganic material approved by the Owner's Representative/ Consultant and compact to at least 95% Standard Proctor maximum dry density.
 2. Should a Geotechnical Engineer not be part of the project team a Geotechnical Engineer shall be engaged by the Contractor at no cost to the Owner.
 1. Review and approvals by a Geotechnical Engineer engaged by the Contractor shall be signed and sealed and submitted to the Owner's Representative/Consultant prior to use of this material.
2. Type
 1. Granular and fill material shall be as identified in:
 1. Section 31 23 01 - Excavation and Backfill
 2. Section 32 11 23 - Aggregate Base Courses
 2. Excavated or graded material conforming to the backfill specification may be used as site fill or for grading work after approval by the Owner's Representative/Consultant.
 3. The Owner's Representative/Consultant reserves the right to approve which of the excavated material is to be reused, and which is to be disposed offsite, based upon material quality and suitability for its intended purpose.

EXCAVATION AND BACKFILL

4. Should a Geotechnical Engineer not be part of the project team a Geotechnical Engineer shall be engaged by the Contractor at no cost to the Owner.
 1. Review and approvals by a Geotechnical Engineer engaged by the Contractor shall be signed and sealed and submitted to the Owner's Representative/Consultant prior to use of this material.
5. Protect approved material from contamination.
6. Recycled Concrete
 1. Recycled concrete free from contaminated and other extraneous materials conforming to the specified gradations may be used as pit run gravel.
7. Pit Run Gravel
 1. To be well graded granular material, substantially free from clay clumps, organic material and other extraneous material, screened to remove all stones in excess of 75mm. Material to compact to specified density and conform to the following gradations:

Sieve Size (mm)	Percent passing (%)
75	100
50	70-100
25	50-100
4.75	22-100
2.36	10-85
0.075	2-8

8. Granular Sub Base
 1. Shall be 75 mm (3") minus, clean, granular material free of organic material conforming to following gradation limits:

Sieve Size (mm)	Percent passing (%)
80	100
75	55-100
4.8	30-100
38	60-100
19	35-80
9.5	26-60
4.75	20-40
2.36	15-30
1.18	10-20
0.6um	5-15
0.3um	3-10
0.075um	0-5

9. Granular Base
 1. The 19 mm (3/4") crushed granular base course shall consist of sound, durable particles, free from clay, organic material or other deleterious matter, evenly graded, to meet the following gradation requirements:

EXCAVATION AND BACKFILL

Sieve Size (mm)	Percent passing (%)
19	100
12.5	75-100
9.5	60-90
4.75	40-70
2.36	27-55
1.18	16-42
0.60	8-30
0.30	5-20
0.15	5-15
0.074	2-8

10. River Sand

1. River sand to be free of organic material, salt and foreign objects and conform to the following gradation:

Sieve Size (mm)	Percent passing (%)
19	100
4.75	80-100
0.6	20-80
0.15	0-20
0.075	0-8

3 – EXECUTION

3.1 EXCAVATION

1. Prior to commencing excavation the Contractor shall:
 1. Confirm in writing to the Owner's Representative/Consultant that he has verified the locations of all underground services.
 2. Obtained in writing and submitted to the Owner's Representative/Consultant at no Cost to the Owner permission from adjacent property owners to carry out work beyond the property limits of this contract if required to carry out the work of this section.
 3. Notify the Owner's Representative/Consultant for on-site review of sub grade preparation work twenty-four (24) hours prior to commencement of import, placement and grading operations.
2. Excavate to lines, grades, elevations, and dimensions indicated on contract documents or required by the work of this section or related sections.
3. Remove and dispose offsite all grass sod, organic material, wood, concrete, asphalt waste, and any other obstructions or debris encountered before any excavation procedures commence to avoid contamination of sub grade.
4. Ensure that work of this section provides sufficient space to permit erection of forms, site elements and miscellaneous elements of related sections.
5. Excavation shall to ensure that the placement of fill materials are minimized.

EXCAVATION AND BACKFILL

6. Contractor shall phase his operation so that a stable slope at the edge of excavation is maintained at all times. Where sloping of the sides of excavations are not possible the Contractor shall implement appropriate safety measures in accordance with current Work Safe BC requirements.
7. All exposed excavation faces shall be protected from weather with appropriate tarps or plastic sheeting as soon as possible after being cut.
8. Remove all boulders, rock and stones larger than 150 mm (6") in diameter from excavated surfaces encountered during excavation. Fill cavities created with crushed granular base course material compacted to 95% Modified Proctor Density. Boulders with a diameter of 600mm or larger are to be reviewed for form and character by the Owner's Representative/Consultant to be deemed satisfactory for use on site prior to disposal.
9. Bottom of excavation to be level, free from loose material and debris.
10. Protect excavations against freezing. Frozen areas shall be thawed and protected from further frost until subsequent work has been completed.
11. All necessary precautions shall be taken to preserve all materials outside the required excavations in an undisturbed condition.
12. Ensure the sub grade has a minimum gradient for positive subsurface drainage.
13. Re-usable common excavation may be stockpiled but must not cover any, on site, stockpiled topsoil or grassed areas.
14. Do not disturb soil or rock below bearing surfaces.
15. Notify Owner's Representative/Consultant/Geotechnical Engineer when excavations are complete.
16. Excavation taken below depths shown on the Contract Drawings without the written authorization of the Owner's Representative/Geotechnical Engineer must be filled at Contractor's expense.
17. Excavate trenches to provide uniform continuous bearing and support for specified thickness of pipe bedding material on solid and undisturbed ground.
18. For trench excavation, unless otherwise authorized by Owner's Representative/ Consultant in writing, do not excavate more than 30 meters of trench in advance of installation operations and do not leave open more than 15 meters at end of day's operation (provide barricades).
19. Excavate for concrete and concrete asphalt paving to sub grade design elevations.
20. If bearings are unsatisfactory, additional excavation will be authorized by the Owner's Representative/ Geotechnical Consultant in writing and paid for as per the contract unit price for common excavation.
21. Dispose of surplus and unsuitable excavated material offsite.
22. Install and maintain all sediment and erosion features to control flow of surface drainage. Do not obstruct or alter the flow of water courses.
23. Notify Owner's Representative/ Geotechnical Engineer when bottom of excavations appears unsuitable and proceed as directed by the Owner's Representative/ Geotechnical Engineer.
24. Obtain Owner's Representative/ Geotechnical Consultant approval of completed excavation.

EXCAVATION AND BACKFILL

25. Remove unsuitable material from bottom of excavation to extended depth as directed by Owner's Representative/ Geotechnical Engineer. Backfill and compact as directed by Owner's Representative/ Geotechnical Engineer.
26. Hand trim roots, make firm, and remove loose materials and debris from excavations.
27. Costs incurred as a result of deterioration caused by activities or neglect of the Contractor or and fill required for over excavation as a result of action by the Contractor are the responsibility of the Contractor.

3.2 PLACEMENT OF GRANULAR FILL

1. Prior to the backfill operation of site excavation ensure the following actions have been completed;
 1. Concrete foundation walls and footings shall have reached specified strength unless otherwise approved by the Owner's Representative/Geotechnical Engineer.
 2. All backfill materials shall have been inspected and approved by the Owner's Representative/Geotechnical Engineer
 3. Each component of the backfill operation shall have been inspected and approved by the Owner's Representative/Geotechnical Engineer at the time of placement.
 4. Compaction density tests shall have been completed and tests results reviewed and approved by the Owner's Representative/Geotechnical Engineer.
2. Place crushed granular sub-base in maximum 300 mm (1'-0") lifts to depths indicated on drawings. Compact each lift to 95% Modified Proctor Density, ASTM D 698.
3. Place granular base in maximum 150 mm (6") lifts to depths shown on the drawings. Compact each lift to 95% Modified Proctor Maximum Density, ASTM D 698.
4. Place all native material fill in uniform 300 mm (1'-0") compacted lifts to depths indicated on drawings. Compact each lift to 95% Modified Proctor Density, ASTM D 698.
5. Ensure that granular fill material is placed to the full width of the excavation, in uniform lifts, shaping each lift to smooth, even contours.
6. Ensure the placement and compaction of crushed granular sub-base and granular base does not segregate or degrade the aggregate.
7. Apply water as necessary during compaction to obtain specified density. If material is excessively moist aerate by scarifying with suitable equipment until moisture content is suitable for compaction.
8. Mechanical compaction equipment shall be used with extreme caution to prevent any undue pressure on foundation work. Do not use motorized compaction equipment directly adjacent to foundation or retaining walls.
9. Where backfill is required on both sides of foundation walls it shall be placed and compacted simultaneously on both sides of the wall.
10. All sub grade whether disturbed or undisturbed, shall be compacted to 95% Modified Proctor Density, ASTM D 698.
 1. Soft areas or areas that do not meet specified compacted densities shall be over excavated and filled with compacted crushed granular base course as required to obtain the specified compaction density.

3.3 EMBANKMENTS

EXCAVATION AND BACKFILL

1. Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces. Method used to be subject to prior approval of the Owner's Representative/Geotechnical Engineer.
2. Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.
3. Maintain crowned surface during construction to ensure ready run-off of surface water.
4. Drain low areas before placing material.
5. Place and compact to full width in layers not exceeding 300 mm loose thickness. The Owner's Representative/Geotechnical Engineer may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
6. Where embankment material consists of rock:
 1. Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.
 2. Carefully distribute rock material to fill voids with smaller fragments to form compact mass.
 3. Fill surface voids at subgrade level with rock spalls or selected material to form an earth- tight surface.
 4. Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevations.
 5. Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.
7. Polyethylene sheets shall be placed on all exposed surfaces to protect against erosion.
 1. Polyethylene sheets shall be pinned to prevent displacement by wind.
8. No extra payment shall be made for overbuild to embankments, unless previously authorized by the Owner's Representative/Geotechnical Engineer.

3.4 DISPOSAL AND STOCKPILE

1. Supply all necessary fill to meet backfilling and grading requirements.
2. Remove surplus material unsuitable for fill, grading or landscaping from site and dispose at an approved disposal area.
3. Polyethylene sheets shall be placed on stockpiled re-usable native material to protect against erosion and contamination.

3.5 DEWATERING

1. Keep excavations and construction site area free of water while work is in progress and protect against surface runoff.
2. Provide pumps, piping, temporary drains, trenches, sumps, and related equipment to remove water.
3. Provide settling basins, siltation fences, and or other siltation control facilities to remove suspended solids or other materials before discharging to storm sewers or water courses.

EXCAVATION AND BACKFILL

4. Ensure that sediment control devices are in place as per municipal/provincial regulations prior to the start of dewatering operations. Do not divert dewatering effluent to natural water bodies.
5. Submit for Owner's Representative/ Engineer review details of proposed dewatering methods. Maintain groundwater table a minimum of 300mm below elevations for sub grade.
6. Do not use sanitary sewers or private property for discharge of water.
7. Dispose of water in a manner not detrimental to the environment, public and private property, or any portion of work completed or under construction.

3.6 GRADING TOLERANCES FOR SUBGRADE AND GRANULAR FILL

1. General

1. Uniformly grade site, including adjacent transition areas. Smooth finish surface within specified tolerances of ± 15 mm; compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

2. Grade Control

2. During construction, maintain lines and grades including crown and cross-slope of sub grade course. Grading outside of the line defining the work of this contract shall consist of rough grading to grades indicated.

3. Grading Surface of Fill

1. Grade smooth and even, free of voids, compacted as specified, and to required elevation.
2. Provide final grades within a tolerance of ± 15 mm when tested with a 3 meter straight edge.

4. Compaction

1. After grading, compact sub grade surfaces to the depth and percentage of maximum density for each area classification.
5. Stripped grade below slabs shall be brought up to required elevation using free draining material in maximum 300 mm lifts and compacted to a minimum 95% Modified Proctor dry density.
6. Shaping of sub grade shall ensure uniform slope transitions with rounded, smooth profiles between changes in elevations
7. Ensure that sub grade preparation allows for depth of granular fill and finished materials as indicated on contract drawings.

3.7 PROTECTION

1. Maintain finished surfaces in condition conforming to this section until acceptable by Owner's Representative/Geotechnical Consultant.
2. Polyethylene sheets shall be placed on stockpiled re-usable native material to protect against erosion and contamination.
3. Polyethylene sheets shall be placed on all exposed surfaces to protect against erosion.
 1. Polyethylene sheets shall be pinned to prevent displacement by the wind.

EXCAVATION AND BACKFILL

3.8 EQUIPMENT

1. Excavation shall be carried out using an excavator equipped with a clean-up/landscape bucket to minimize disturbance to the sub grade.
2. Compaction equipment must be capable of obtaining required densities in materials on project.
3. Equipment that does not achieve specified densities must be replaced or supplemented.

3.9 FINISH GRADING

1. See Section 329121 – Topsoil and finish Grading for placement and finish grading of growing medium (topsoil).

3.10 CLEAN UP

1. Clean up and remove from the site, as the work proceeds any debris and waste material or rubbish resulting from the work of this section.
2. Transport all surplus excavated materials, fill materials and debris off site to an approval disposal area.

END OF SECTION

AGGREGATE BASE COURSES

1 – GENERAL

1.2 RELATED SECTIONS

1. Section 31 05 16 - Aggregate Materials
2. Section 32 11 16.01 - Granular Sub-base

1.3 REFERENCES

1. ASTM International
 1. ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 2. ASTM C131, Standard Test Method for Resistance to Degradation of Small- Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 3. ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 4. ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 5. ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
 6. ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 7. ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
2. Canadian General Standards Board (CGSB)
 1. CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 2. CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

1.4 SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements
2. Storage and Handling Requirements:
 1. Stockpile minimum 50% of total aggregate required prior to beginning operation.
 2. Replace defective or damaged materials with new.
 3. Store cement in weathertight bins or silos that provide protection from dampness and easy access for inspection and identification of each shipment.

2 – PRODUCTS

AGGREGATE BASE COURSES

2.1 MATERIALS

1. Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 1. Crushed stone or gravel.
 2. Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.

Gradation Method #1	% Passing	
(1)	75mm Minus	19mm Minus
100 mm		-
75 mm	[100]	-
50 mm	[60-100]	-
37.5 mm		-
25 mm		-
19 mm	[35-80]	[100]
12.5 mm		[75-100]
9.5 mm	[26-60]	[60-90]
4.75 mm	[20-40]	[40-70]
2.36 mm	[15-30]	[27-55]
1.18 mm	[10-20]	[16-42]
0.6 mm		[8-30]
0.3 mm		[5-20]
0.075 mm		[2-8]
0.6 um	[5-15]	
0.3 um	[3-10]	
0.075 um	[0-5]	

3 – EXECUTION

3.1 PREPARATION

1. Temporary Erosion and Sedimentation Control:
 1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment requirements of authorities having jurisdiction.
 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PLACEMENT AND INSTALLATION

1. Place granular base after sub-base and/or subgrade surface is inspected and approved in writing by Owner's Representative/Consultant.
2. Placing:
 1. Construct granular base to depth and grade in areas indicated.
 2. Ensure no frozen material is placed.

AGGREGATE BASE COURSES

3. Place material only on clean unfrozen surface, free from snow and ice.
 4. Begin spreading base material on crown line or on high side of one-way slope.
 5. Place material using methods which do not lead to segregation or degradation of aggregate.
 6. For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
 7. Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 1. Owner's Representative/Consultant may authorize thicker lifts (layers) if specified compaction can be achieved.
 8. Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 9. Remove and replace that portion of layer in which material becomes segregated during spreading.
3. Compaction Equipment:
1. Ensure compaction equipment is capable of obtaining required material densities.
 2. Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Owner's Representative/Consultant before use.
 3. Equipped with device that records hours of actual work, not motor running hours.
4. Compacting:
1. Compact to density not less than 100% corrected maximum dry density ASTM D698.
 2. Shape and roll alternately to obtain smooth, even, and uniformly compacted base.
 3. Apply water as necessary during compacting to obtain specified density.
 4. In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by the Consultant.
 5. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

1. Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.4 CLEANING

1. Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 1. Leave Work area clean at end of each day.
2. Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

3.5 PROTECTION

AGGREGATE BASE COURSES

1. Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Consultant.

END OF SECTION

ASPHALT PAVING

1 – GENERAL

1.1 SUMMARY

1. Section Includes:

1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving.

2. Hot-mix asphalt overlay. B.

1. Related Requirements:

1. Section 312301 Excavation and Backfill: For subgrade preparation, fill material, unbound- aggregate subbase and base courses, and aggregate pavement shoulders.
2. Section 321373 "Concrete Paving Joint Sealants: For joint sealants and fillers at pavement terminations.

1.2 PREINSTALLATION MEETINGS

1. Pre-installation Conference: Conduct conference at project site.

1.3 SUBMITTALS

1. Product Data: Contractor is to submit a Design Mix of each mix-type for Owner's Representative/Consultant to review and approve prior to ordering and/or placing on site.
2. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

1.4 QUALITY ASSURANCE

1. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction.

2 - PRODUCTS

2.1 AGGREGATES

1. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag from stone, gravel, cured blast-furnace slag, or combinations thereof.
2. Mineral Filler: ASTM D 242/D 242M or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.
3. Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.

ASPHALT PAVING

Sieve Designation	Percent Passing				
	*Lower Course #1	*Lower Course #2	*Upper Course #1	*Upper Course #2	*Fine Mix
25.0 mm	100	--	--	--	--
19.0 mm	--	100	100	--	--
12.5 mm	70-85	84-99	84-99	100	--
9.5 mm	--	73-88	73-88	--	100
4.75 mm	40-65	50-68	50-68	55-75	80-100
2.36 mm	32-53	35-55	35-55	38-58	64-89
1.18 mm	26-44	27-46	27-46	28-47	48-76
0.600 mm	18-36	18-36	18-36	20-36	32-60
0.300 mm	10-26	10-26	10-26	10-26	16-42
0.150 mm	4-17	4-17	4-17	4-17	6-23
0.075 mm	3-8	3-8	3-8	3-8	4-10

***Footnote to asphalt mix-type selection:**

Lower Course #1: Arterial and collector, lower course only.

Lower Course #2 Local, Lower course only.

Upper Course #1 Arterial and collector, upper course only.

Upper Course #2: Local, surface course only.

Fine Mix: Skim patch on existing asphalt surface.

2.2 ASPHALT MATERIALS

1. Asphalt Binder: AASHTO M 320, PG 64-22.

2.3 MIXES

1. Surface Course Limit: Recycled content no more than 10 percent by weight.
2. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 1. Provide mixes with a history of satisfactory performance in geographical area where project is located.
 2. Base Course: Lower Course #2 (Refer to table 2.1 D.)
 3. Surface Course: Upper Course #2. (Refer to table 2.1 D.)

ASPHALT PAVING

3 – EXECUTION

3.1 PATCHING

1. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 300 mm (12 inches) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
2. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.2 SURFACE PREPARATION

1. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
2. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

3.3 PLACING HOT-MIX ASPHALT

1. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 1. Spread mix at a minimum temperature of 121 deg C (250 deg F).
 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
2. Place paving in consecutive strips not less than 3 m (10 feet) wide unless infill edge strips of a lesser width are required.
3. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

1. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 1. Clean contact surfaces and apply tack coat to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of 150 mm (6 inches).
 3. Offset transverse joints, in successive courses, a minimum of 600 mm (24 inches).
 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.5 COMPACTION

ASPHALT PAVING

1. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 85 deg C (185 deg F).
2. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
3. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot- mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
4. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
5. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
6. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
7. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

1. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 13 mm (1/2 inch).
 2. Surface Course: Plus 6 mm (1/4 inch), no minus.
2. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 3-m (10-foot) straightedge applied transversely or longitudinally to paved areas:
 1. Base Course: 6 mm (1/4 inch).
 2. Surface Course: 3 mm (1/8 inch).

3.7 FIELD QUALITY CONTROL

1. Replace and compact hot-mix asphalt where core tests were taken.
2. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements

3.8 ENVIRONMENTAL CONDITIONS

1. Do not install hot-mix asphalt concrete pavement, base, or sub-base during heavy rain or snowfall, cool temperatures, or other unsuitable conditions as determined by Staff. Place paving under favourable weather conditions; with temperatures exceeding 4 degrees Celsius. Base and sub-base surface should be dry and stable. Air temperature must be at least 5 degrees Celsius to place asphalt mixtures. (Air temperature must be 10 degrees and rising for tennis and sport courts)

ASPHALT PAVING

2. Do not install asphalt concrete paving on frozen, wet, muddy, or rutted base(s).
3. Examine substrates and notify Staff of any deficiencies related to compaction or incorrect grades or slopes. Ensure deficiencies are corrected prior to commencement of work of this Section.
4. Use Oil Soak Blotters in catch basin spillways and elsewhere as directed to avoid spilling oil into site drainage system(s) or adjacent watercourses.
5. Allow asphalt concrete paving to completely cure prior to washing the surface to avoid spilling oil into site drainage system(s) or adjacent watercourses.

3.9 WASTE HANDLING

1. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 -Construction Waste Management and Disposal.

END OF SECTION

CHAIN LINK FENCING AND GATES

1 – GENERAL

1.1 GENERAL REQUIREMENTS

1. Section 32 31 13 refers to those portions of the Works that are unique to the supply and installation of chain link fences and gates. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the Works described herein.
2. Industry standards to apply where details and procedures not specified.

1.2 RELATED WORK

1. Section 03 30 53 Cast-in-Place Concrete.

1.3 REFERENCES

1. Master Municipal Construction Documents (MMCD) Volume II 2009 Edition
2. CAN/CGSB-138.1-M80, Fence, Chain Link Fabric.
3. CAN/CGSB-138.2-M80, Fence, Chain Link, Framework, Zinc-Coated, Steel.
4. CAN/CGSB-138.3-M80, Fence, Chain Link Installation.
5. CAN/CGSB-138.4-M82, Fence, Chain Link, Gates.
6. CSA G164-M1981, Hot Dip Galvanizing of Irregularly Shaped Articles.
7. ASTM A90-81, Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
8. ASTM A53-88a, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
9. CGSB 1-GP-181M-77, Coating, Zinc-Rich, Organic, Ready Mixed.

1.4 INTERPRETATION OF THE WORK

1. The Fencing Contractor shall be fully acquainted with the existing site and shall fully understand the difficulties and restrictions attending the execution of the work under this contract. Interpretations by the Fencing Contractor of the meaning of any section of the contract drawings and specifications herein prior to submitting a tendered price shall not remove the responsibility of completing the Work as per the directions of the Owner's Representative/Consultant, including all costs associated with that Work, should the Fencing Contractor's interpretation be incorrect. Prior to submitting a tendered price for the Work, the Fencing Contractor must seek clarification from the Owner's Representative/Consultant for any items within the contract drawings and specifications that may appear to be unclear or conflicting.

1.5 SAMPLES AND SUBMITTALS

1. Prior to the start of the work, submit a 300mm long powder-coated pipe sample that will be representative of the quality of the powder-coating for all powder-coated fencing materials installed as part of the Works.

1.6 QUALIFICATIONS

1. Execute work in this Section only by a Fencing Contractor who has adequate equipment, skilled tradesmen, and materials to perform it expeditiously and to the specifications and who has at least two similar successful installations to that specified over the previous three years. Previous installations must have been installed under the same company ownership and with the same project supervisor proposed for this project.

CHAIN LINK FENCING AND GATES

1.7 SUPERVISOR

1. The Fencing Contractor must provide an experienced on-site supervisor to direct the Works at the site.

1.8 TESTING

1. Refer to MMCD General Conditions, Clause 4.12, Tests and Inspections
2. The surface of the posts and rails will be scratch tested to ensure the finish does not flake. Finishes that flake when scratched will be rejected.

1.9 BONDS, WARRANTIES, AND INSURANCE

1. Provide a company warranty covering products and installation that shall endure for one (1) year starting from the date of Substantial Completion.
2. The company warranty shall cover workmanship, defects in materials, and any other feature that is deemed to be not ordinary wear for chain link fencing.
3. The Contractor shall promptly replace or repair, to the specifications herein, any portions of the chain link fencing that are not performing to the standards of the company warranty within 30 days of being notified by the Owner of the defect(s). All direct and associated costs of the repair work shall be at the sole expense of the Contractor.

1.10 MEASUREMENT AND PAYMENT

1. Payment for chain link fences shall be made by separate items for each height and type of fence as detailed on the Contract Drawings & Details and, as listed in the Schedule of Quantities and Prices.
2. Payment to include post hole digging, offsite disposal of hole digging spoil, concrete supply and installation, chain link fence supply and installation, including, equipment, labour, and materials, and all incidentals required to complete the chain link fence installation work as outlined herein and in the Contract Drawings and Details.
3. Measurement will be made along the surface of the ground for the length of each item of fence installed.
4. Payment for chain link gates shall be made by separate items of each height and type of gate as detailed on the Contract Drawings & Details and, as listed in the Schedule of Quantities and Prices. No additional price will be paid for fence gates in the chain link fencing section
5. Payment for chain link fencing using existing onsite re-usable materials will be the same as for chain link fencing using new materials
6. Payment to remove and reinstate fencing will only be made for approved sections of fence which, as decide by the Owner's Representative, are re-useable. Payment of these sections shall include careful removal of existing fence, including gates, posts, mesh and associated hardware, cleaning and storing fence, gates, post, mesh and associated hardware removed and reinstating to same details as previous to removal and all necessary new materials to complete reinstatement.

2 – PRODUCTS

2.1 DELIVERY, STORAGE, AND HANDLING

1. Deliver and store the products in the original manufacturer's packaging with labels intact and store the products where they will be protected from damage. Determine a suitable, Owner's Representative approved, on-site location for products.

CHAIN LINK FENCING AND GATES

2.2 MATERIALS

1. All concrete work to Contract Drawings and Specification Section 03 30 53.
 1. Nominal coarse aggregate size: 19mm.
 2. Compressive strength: 20 MPa minimum at 28 days.
2. Fencing, posts, rails, and fabric is to be constructed as indicated on the Contract Drawings and Specifications herein.
3. Chain-link fence fabric: to CAN/CGSB-138.1.
 1. All chain link fabric is to be galvanized, vinyl coated, black, commercial and heavy grade with 50mm openings. The widest rolls of fabric are to be employed in the construction of the appropriate fence type (i.e. 1200mm wide rolls for 1200mm high fencing and 2400mm wide rolls for 2400mm high fencing, etc.).
 2. Fabric gauges, fabric opening sizes, fence heights, and post spacing are to be as follows:
 1. For passive and low activity park areas the chain link fence is to be:
 1. 1200mm high with the post spacing 3000mm o.c. and,
 2. Chain link fabric to be 9 gauge (3.55mm diameter) galvanized, vinyl coated, black, commercial grade with 50mm openings.
 2. For high activity park areas the chain link fence is to be:
 1. 1200mm high with the post spacing 2400mm o.c. and,
 2. Chain link fabric to be 6 gauge(4.50mm) galvanized, vinyl coated, black, commercial and heavy grade with 50mm openings
 3. For the baseball diamond backstop the chain link fence is to be:
 1. 4600mm and higher with the post spacing 2400mm o.c and,
 2. Chain link fabric to be 6 gauge (4.50mm) galvanized, vinyl coated, black, commercial and heavy grade with 38mm openings.
 4. For the soccer playing field backstop fences the chain link fence is to be:
 1. 6000mm and higher with the post spacing 2400mm o.c and,
 2. Chain link fabric to be 6 gauge (4.50mm) 6 gauge galvanized, vinyl coated, black, commercial and heavy grade with 38mm openings.
 3. Posts and rails for all fencing locations are to CAN/CGSB-138.2, schedule 40 galvanized steel pipe and are to be powder-coated black steel pipe. No short lengths, tubing, conduit or open seam material will be permitted.
 1. Post and rail sizes are to be as follows:
 1. For passive/active public/non-public areas which are 1200mm or 2400mm and higher:
 1. Corner and gate posts are to be 75mm nominal outside diameter, standard continuous weld Schedule 40 powder-coated black steel pipe.

CHAIN LINK FENCING AND GATES

2. Line posts are to be 60mm nominal outside diameter, standard continuous weld Schedule 40 powder-coated black steel pipe.
 3. Top and bottom rails and horizontal braces are to be 48mm nominal outside diameter, plain ends, continuous lengths, standard continuous weld Schedule 40 powder-coated black steel pipe.
 4. Bottom tension wire to be single strand, 6 gauge (4.50mm diameter) vinyl coated, galvanized steel wire.
2. Baseball diamond backstop which are 4600mm and higher:
 1. Corner and line posts to be 114mm nominal outside diameter, standard continuous weld Schedule 40 powder-coated black steel pipe.
 2. Top, bottom, and horizontal bracing rails to be 48mm nominal outside diameter, plain ends, continuous lengths, standard continuous weld Schedule 40 powder-coated black steel pipe.
 3. Post extensions for the overhang to be 75mm nominal outside diameter, standard continuous weld Schedule 40 powder-coated black steel pipe. At connection install welded 13mm plate steel gussets as per the drawings herein. Overhang horizontal rails and bracing to be 48mm nominal outside diameter, plain ends, continuous lengths, standard continuous weld Schedule 40 powder-coated black steel pipe.
 3. Soccer playing field backstop which are 6000mm and higher:
 1. Corner and line posts to be 89mm nominal outside diameter, standard continuous weld Schedule 40 powder-coated black steel pipe.
 2. Top, bottom, and horizontal bracing rails to be 48mm nominal outside diameter, plain ends, continuous lengths, standard continuous weld Schedule 40 powder-coated black steel pipe.
4. Tie wire fasteners are to be single strand, black vinyl coated galvanized aluminum or steel wire conforming to requirements of fence fabric.
 5. All fence connections to be cove fitted and welded construction. Chain link and steel picket fence connections to be all welded construction.
 6. Tension bars: 4.76 x 19mm minimum galvanized black powder coated steel.
 7. Tension bar bands: 3 x 20 mm galvanized black powder coated steel or 5x20mm minimum black powder coated aluminum.
 8. All fastenings and fittings to be hot dip galvanized.
 9. All caps to be powder coated black and welded in place.
 10. Install the chain link fence person gates and vehicle gates as indicated on the Contract Drawings.
 1. Chain Link Vehicle Gates.
 1. The vehicle gates are not to use a centre post. The closure device is to operate by securing the gates together when in the closed position. The closure device is to operate independent of the locking pins. Closure device must accept a standard padlock.

CHAIN LINK FENCING AND GATES

2. The vehicle gate is to have locking pins with locking pin aluminum sleeves recessed 25mm into the concrete walkway to secure the gates in the open and closed positions. The top of the sleeve is to be flush with the surrounding concrete surface. The locking pin rod is to be spring-loaded so that the pin is always in the raised position unless pushed and turn locked into place, as per the drawings herein.
 3. The vehicle gate is to be to the full height of the fence and is not to be bridged with a top rail over it as to eliminate any restrictions on the height of objects passing through the gate.
 4. The vehicle gate is to operate on wheels which fully support the weight of the gate. The wheels must be suitable for use on concrete surfaces and must not mark the concrete surface.
 5. Vehicle gates are not to have signage inserts.
 6. All hinges are to be welded into place.
2. Chain Link Person Gates.
1. The person gates are to have clear openings of 1219mm (4') to accommodate handicapped accessible for sports wheelchairs.
 2. The person gates are to use a closure device operated by securing the gate to the gate post when in the closed position. Closure device must accept a standard padlock.
 3. The Dog Park gates are to be able to swing 90 degrees if they will hit the adjacent fence and 135 degrees if they open into the dog park area.
 4. For soccer playing field entry gates, the gates are not to have locking pins for the open positions. Field entry gates are to be able to swing 180 degrees wide and lock open by attaching to main fence line.
 5. The person gates are to be to the full height of the fence and are not to be bridged with a top rail over them as to eliminate any restrictions on the height of objects passing through the gate.
 6. All hinges are to be welded into place.

2.3 FINISHES

1. Galvanizing:
 1. For chain link fabric: to CAN/CGSB-138.1.
 2. For pipe: 550 g/m² minimum to ASTM A90.
 3. For other fittings: to CSA G164.
 4. For vinyl coating: 0.045mm minimum dry film thickness
2. Powdercoating:
 1. Powdercoat all exposed surfaces. Powder coating to use powdercoat paint on acid washed surfaces. Wash and coating to be completed on a conveyor system. Dipping is not acceptable. Finish must be baked dry. Colour to be black except for backstop signage and signage inserts which are to have Owner selected custom colours.
 2. The powder-coat finish must not crack or chip when scratched tested.

CHAIN LINK FENCING AND GATES

3. Organic zinc rich Galvicon paint coating: to CGSB 1_GP-181M is to be applied to all joints, welds and damaged areas. Two coats are required. Paint to have a high gloss finish. Use black or a custom colour as necessary to match the surrounding powder-coating.

3 – EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

1. Work is to commence and continue only if the environmental and site conditions are in accordance with the manufacturer's recommendations for product placement.

3.2 PROTECTION

1. The Contractor is responsible for the protection of all new and existing facilities from damage and/or disfiguration from the processes of the Work and from vandalism. Any damage or disfiguration must be repaired promptly and to the original condition of the facility prior to the damage.
2. Acceptance of the repair work is at the sole discretion of the Consultant. All repairs must be completed and accepted prior to Total Performance of the Work being granted and the release of any deficiency holdback amount.
3. Any deficiency holdback amount will be calculated at two times greater than the actual value of the labour and materials required to correct the deficiencies. The value of the labour and materials required to correct the deficiencies will be determined by the Consultant.

3.3 PREPARATION

1. Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
2. Clean off dirt, oils, and other debris that may inhibit the application of the product. Ensure that all areas and surfaces are clean and free of debris.
3. Accurately survey and layout the specified work according to the Contract Drawings and Specifications herein.
4. The installation procedures for all materials must be in strict accordance with the manufacturer's specifications and provide for a long-term successful installation of all materials.

3.4 ERECTION OF FENCE

1. Erect fences along lines as indicated on the Contract Drawings and in accordance with CAN/CGSB-138.3.
2. Space straining posts at equal intervals not exceeding 150 metres if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade is greater than 150 metres.
3. Install end posts at end of fence and at changes in fence alignment. Install gate posts on both sides of gate openings.
4. Embed posts into concrete to depths indicated. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
5. Do not install fence fabric or pickets until concrete has cured a minimum of 5 days.

CHAIN LINK FENCING AND GATES

6. Install intermediate rail between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface. Install intermediate rails on both sides of corner and straining posts in similar manner.
7. Install and weld overhang tops and caps.
8. Install rails between posts and weld securely to terminal posts and secure waterproof caps and overhang tops.
9. 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. Knuckled selvedge at bottom. Twisted selvedge at top.
10. Provide a clearance between bottom of fence and finished grade of 50mm. The clearance under all rails is to be consistent.
11. Secure fabric to rails and posts with tie wires as follows. Give tie wires a minimum of two twists.
 1. At every knuckle for 50mm opening mesh.
 2. At every second knuckle for 38mm opening mesh.
 3. At every fourth knuckle for 25mm opening mesh.

3.5 REMOVAL AND RE-USE OF USEABLE EXISTING CHAIN LINK FABRIC

1. Cut tie wires and remove existing fabric. Take care not to stretch or otherwise damage the fabric. Do not re-use damage portions of existing fabric.
2. Cut fabric to length and height as required. Ensure cut edges are properly and securely tied. Attach fabric as per the specifications herein.
3. All surplus fabric is to be rolled up into roll sizes that are manageable by one person and handed over to the Owner's Representative if, requested to do so. Damaged fabric to be disposed of off-site.

3.6 REMOVAL AND RE-USE OF USEABLE EXISTING CHAIN LINK POSTS AND RAILS

1. Cut existing posts and rails taking care to maximize the usable length of the existing post or rail. Do not re-use damage posts or rails.
2. Cut posts and rails as required. Prepare surfaces and powder-coat as per the specifications herein. Install posts and rails as per the specifications herein. 2400mm post spacing can be adjusted to accommodate re-used rails. Ensure that where spacing is adjusted it is consistent and in one section of fence.
3. Dispose of damaged or surplus posts, rails, and mesh off-site

3.7 TOUCH UPS

1. Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of black high gloss organic zinc-rich Galvicon paint to damaged areas, allowing the manufacturer's recommended drying time between coats. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.
2. Wire brush, clean, and paint all welds with two coats of high gloss zinc rich Galvicon paint, allowing the manufacturer's recommended drying time between coats. Use paint colour that matches surrounding powder-coated surfaces.

3.8 SITE CLEAN-UP

CHAIN LINK FENCING AND GATES

1. Upon completion of the work remove all containers, surplus materials, and installation debris, etc. Project area must be left in a clean and orderly condition.

3.9 MAINTENANCE SUPPLIES

1. .1 Upon completion of the work, the Contractor shall provide the Owner with maintenance materials consisting of the following.
 1. Two (2) 500 ml cans of black high gloss organic zinc-rich paint.
 2. One (1) 500 ml can of high gloss organic zinc-rich paint of each custom colour.
 3. Four (4) packages of 50 tie wires.

END OF SECTION

TOPSOIL AND FINISH GRADING

1 – GENERAL

1.1 SECTION INCLUDES

1. All materials, labour, equipment, and services to supply and install all
 1. Planting medium
 2. Finish grade the site

1.2 RELATED SECTIONS

1. Section 31 23 13 — Subgrade Preparation
2. Section 32 05 00 — Common Work Results for Exterior Improvements
3. Section 32 92 23 — Turf and Grasses
4. Section 32 93 10 — Trees, Shrubs, and Ornamentals
5. Section 32 93 53 — Exterior Maintenance

1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
 1. ASTM C602-95a (2001), Standard Specification for Agricultural Liming Materials
 2. ASTM D5268-92 (1997), Standard Specification for Topsoil Used for Landscaping Purposes
2. Canadian Council of Ministers of the Environment (CCME)
 1. CCME 106E, Guidelines for Compost Quality (1996)
3. Standards Council of Canada
 1. CAN/BNQ 0413-200-M95 Amendement organiques – Compost (Organic Soil Conditioners - Compost)

1.4 DEFINITIONS

1. For the purpose of this specification, the term “planting medium” shall mean a mixture of mineral particulates, micro-organisms and organic matter that provides suitable medium for supporting intended plant growth. Commercially available soils or native site soils, if proposed for use, will be also be subject to landscape soil assessment analysis.

1.5 SOURCE QUALITY CONTROL

1. Advise Consultant of sources of topsoil or manufactured soil 28 days or more in advance of delivery. Provide samples of material in time to allow testing, review of test results and recommendations, and repetition of the testing and approval cycle if materials are rejected, prior to delivery.
2. Provide samples of lime, if required, for laboratory tests, or provide manufacturer’s certified tests of ECCE to the Agrologist.
3. Contractor is responsible for soil analysis, compost analysis, Agrologist recommendations, and requirements for amendments to supply topsoil as specified.

TOPSOIL AND FINISH GRADING

1.6 QUALITY ASSURANCE

1. Soil Testing Laboratory Qualifications: Engage an independent soil testing laboratory, acceptable to the Consultant, with the experience and capability to conduct the testing indicated, that specializes in the types of tests to be performed. The laboratory shall be accredited by the Standards Council of Canada for all specified tests and procedures for which such accreditation is available.
2. Soil Analysis: Furnish soil analysis stating test results for all parameters specified. Include in addition any parameters necessary to determine conformance with applicable referenced standards, and any analyses required by the Agrologist responsible for making recommendations. Indicate test methods used. Test texture and organic content in accordance with ASTM D5268.
3. Compost Analysis: Determine if compost to be used conforms to specified requirements.
4. Lime Analysis: Determine ECCE of lime, if lime is required, by testing or manufacturer's certification.
5. Recommendations: Provide a report based on the soil and compost analyses, and with reference to the contract documents, prepared by an accredited and approved professional Agrologist.
 1. Report suitability of soil for lawn and woody plant growth.
 2. State all aspects of the soil analysis that indicate the soil does not conform to referenced standards.
 3. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory soil for lawns and other plantings indicated or specified.
 4. Take into account and adjust recommendations for soil depths indicated and amendments already specified.
6. The cost of soil testing and Agrologist's reports is included in the Contract.
7. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of lawns and grasses.
8. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.
9. Pre-installation Meeting: Conduct meeting at Project site to address quality of materials, inspection schedule and samples including, but not limited to, the following:
 1. Protection of existing trees and facilities.
 2. Landscape materials and installation procedures.
 3. Layout and stacking of tree trenches and shrub beds prior to excavation.
 4. Verification of required soil depths at sod, shrub beds and tree trench locations prior to installation of topsoils/ manufactured soils.

TOPSOIL AND FINISH GRADING

1.7 SUBMITTALS

1. Provide submittals and wait for Consultant's review and acceptance, prior to placement of any materials on site.
2. Submit product data for each type of product indicated.
3. Submit product certificates for soil amendments and fertilizers, signed by product manufacturer.
4. Submit soil analysis report and Agrologist's recommendations indicating recommended amendments.
5. Resubmit samples of soil amended as recommended by report for verification of compliance with specified requirements.
6. Submit one copy of all new soil reports to Consultant until approval.

1.8 DELIVERY, STORAGE, AND HANDLING

1. Stockpile topsoil off-site, in a location dedicated to this project, or in a location on site approved by the Owner.
2. If stockpile is accessible to the public, never leave a slope that is steeper than the angle of repose unattended.
3. Stockpile materials in bulk form in paved area(s) approved by Consultant. Take all precautions to prevent contamination of basic materials from wind-blown soil particles, weed seeds and insects. Contamination of ingredients shall result in their rejection for use. Where paved surfaces are not available, prevent contamination by on-site soil or sub-soil or construction materials.
4. Store fertilizer and chemical ingredients in the manufacturer's original containers.

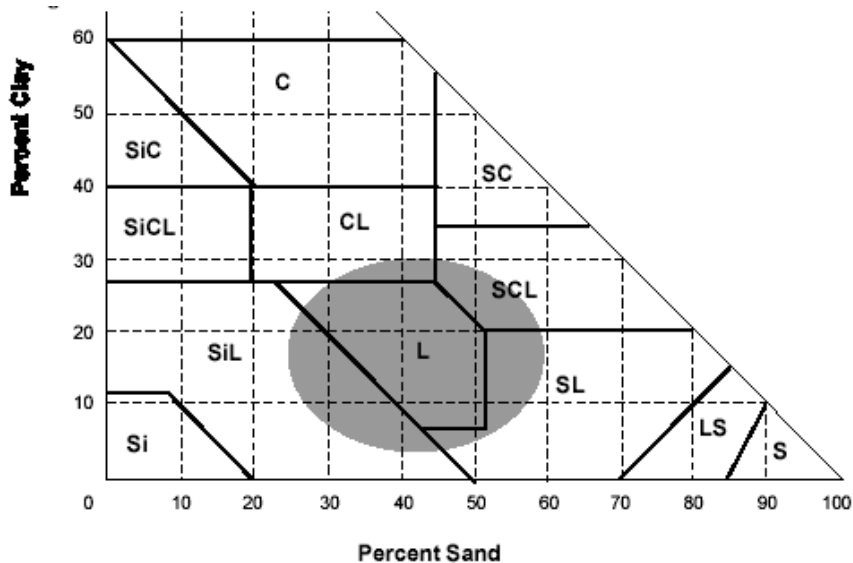
2 – PRODUCTS

2.1 MATERIALS

1. Topsoil: Natural A-horizon soil imported to the site from natural or agricultural sites in the region, with or without added sand, conforming to the following requirements when tested to ASTM D562;
 1. Organic Material 5% - 10% by dry mass
 2. Toxic Chemicals: None
 3. Specific Conductivity 1.5 dS/m maximum
 4. pH 6.0 - 7.5
 5. Sodium Adsorption Ratio < 6

TOPSOIL AND FINISH GRADING

2. Texture of topsoil: "Clay Loam" with maximum 30% of Clay, or "Loam", as defined by percentages of sand, silt, and clay particles as fractions of the dry mass of material passing a 2mm sieve, excluding organic matter, in the following diagram:



3. Compost: Conforming to CCME Guidelines, Category A requirements, including:
 1. Trace elements
 2. Foreign matter (also conforming to CAN/BNQ 0413-M95, Type A)
 3. Pathogenic organism content
4. Peat Moss: Decomposed plant material, fairly elastic and homogeneous, of good horticultural quality, free of decomposed colloidal residue, wood, sulphur, iron, foreign material, lumps, ice, clay, soil, rocks, and weeds, pulverized to pass a 30mm screen, with the following properties when tested:
 1. Organic matter, by dry mass: 60% minimum
 2. pH 4.5 to 6.0
 3. Specific conductance: 2.0 dS/m maximum
 4. Sulphate content: 200 ppm maximum
 5. Lime content: nil
5. Sand: Hard, granular sharp coarse sand, washed, and free of gravel and very fine material, free of impurities, chemical or organic matter. Reasonable care in the selection of material in a pit shall be used to produce a uniform product.

TOPSOIL AND FINISH GRADING

6. Sand gradation: Uniform (well graded), and within the following limits:

Sieve Size (mm)	Minimum % Passing, by mass
No. 8 (2.5 mm)	100 %
No.16 (1.25 mm)	90 – 100 %
No. 20 (0.8 mm)	80 – 90 %
No. 50 (0.315mm)	60 – 80 %
No. 100 (0.16 mm)	2 – 10 %
No. 200 (0.63 mm)	1 % maximum

7. Lime: Ground agricultural limestone, dry, free-flowing, conforming to ASTM C602, with a minimum effective calcium carbonate equivalent (ECCE) of 60.
8. Sulphur: Finely crushed agricultural elemental sulphur, free of impurities.
9. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4% nitrogen and 20% phosphoric acid.

2.2 TOPSOIL MIXES

- For maintained lawns, use topsoil with amendments recommended by the Agrologist, without added sand, peat or compost.
- For tree pits, tree trenches, and planting beds for trees, shrubs, and ornamental grasses, mix topsoil with sand, peat and or compost specified as soil mix.
 - Soil mix: 3 parts topsoil, 1 part either peat or compost, and 1 part sand, measured by volume.

3 – EXECUTION

3.1 VERIFICATION OF CONDITIONS

- Verify that subgrade is ready to receive soil in accordance with Section 31 23 13 — Subgrade Preparation, and do not proceed until it is.
- Check subgrade compaction, and ensure that the density is as specified, or if unspecified then at least 95% of standard density (Modified Proctor). Verify that compaction is uniform.

3.2 PROTECTION OF EXISTING WORK

- Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, culverts and utility lines which are to remain. Make good any damage.

3.3 PREPARATION OF SUBGRADE

- Locate utility lines before commencement of work and protect from damage.
- Remove foreign material, undesirable plants, roots, stones in excess of 25mm diameter, debris, and soil contaminated with oil or gasoline, from site. Do not bury foreign material beneath areas to be landscaped.
- Grade subgrade to eliminate uneven areas, low spots and ensure positive drainage.
- Maintain maximum 1:1 slope from back of curb faces and pavement edges. Do not excavate vertically at pavements and curbs so as to compromise the structural integrity of adjacent sub base material.

TOPSOIL AND FINISH GRADING

5. Cultivate clayey or silty subsoil, if present, to depth of 100 mm. Rip top 100mm of granular soil.
6. Immediately prior to spreading of topsoil for lawns, broadcast bonemeal onto the subsoil at a rate recommended by the Agrologist.
7. Re-cultivate clayey or silty subsoil compacted during hauling or spreading.
8. Place the soil to the following depths:
 1. Trees: 900mm min.
 2. Shrubs: 450mm min.
 3. Groundcovers: 300mm min.
 4. Lawn (seeded or sodded): 150mm min.

3.4 SOIL CONDITIONING

1. Apply lime, peat moss, sulphur or other recommended soil conditioning at rates recommended by the Agrologist.

3.5 CLEAN-UP

1. Keep roadway, walkway, and surrounding areas free of soil and debris as a result of work done under this section at the end of each working day or as directed by the Owner.
2. Dispose of surplus soil not required for fine grading and landscaping off site.
3. Restore stockpile sites on site to "rake clean" condition acceptable to the Owner.
4. Dispose of unacceptable soil material off site.

END OF SECTION

HYDRAULIC SEEDING

1 – GENERAL

1.1 RELATED SECTIONS

1. Section 32 91 21 - Topsoil and Finish Grading
2. Section 31 23 13 – Subgrade Preparation

1.2 SUBMITTALS

1. Comply with requirements of Division 01.
2. Submit to Consultant 500g sample of each seed mixture intended to be used. Label sample to include Name, Project and date. Confirm that seed mix represents tested seed lots.
3. Certificate(s) of analysis with each seed sample. Seed analysis report to be current and show specie and variety of seed, date and results of all tests.
4. Copy of purchase order and invoice/receipt from seed supplier indicating all seeds, quantity and lots acquired and all original seed package labels. Submit at completion of seeding, when requested by Consultant, to confirm total quantity of seed purchased and used on project. Contractor shall ensure all original seed labels are preserved and maintained during seeding operations.
5. Fibre mulch and tackifier manufacturer's product data, installation instructions and application rate for approval.
6. Written documentation for approval before commencing work regarding:
 1. Type and volume capacity of hydraulic seeding and mulching equipment in litres.
 2. Amount of each material in kilograms and including water in litres to be used per tank based on volume to achieve required application rate.
 3. Number of tankloads required per hectare to apply specified slurry mixture per hectare.

1.3 TESTING

1. Owner may appoint and pay for services of testing laboratory to verify seed conformance to specified requirements.

1.4 DELIVERY AND STORAGE

1. Fertilizer:
 1. Deliver and store in original sealed waterproof packages showing net mass, analysis and manufacturer.
 2. Store on pallets in dry location and protect from the elements.
2. Grass seed: deliver in original package and store in dry location protected from the elements and rodents. Each seed package to contain suppliers label indicating:
 1. Analysis of seed mixture.
 2. Percentage of pure seed by weight.
 3. Year of production.

HYDRAULIC SEEDING

4. Net mass.
5. Date tagged and location of seed supplier.
3. Mulching material: deliver and store in original packages and protect from the elements.

1.5 SCHEDULING

1. Schedule hydraulic seeding to coincide with preparation of soil surface.

1.6 MAINTENANCE PERIOD

1. Maintain seeded areas from time of seeding until one year after date of Substantial Completion the Work.

2 – PRODUCTS

2.1 MATERIALS

1. Fertilizer:
 1. To Canada "Fertilizers Act" and "Fertilizers Regulations".
 2. Complete commercial granular fertilizer, minimum of 50% of elements derived from organic sources.
 3. Consultant may adjust specified fertilizer analysis after topsoil test analysis results are received, with no change in Contract Price.
2. Grass seed: Certified Canada No. 1 seed, free of disease, weed seeds or other foreign materials in accordance with the Canada "Seeds Act" and "Seeds Regulations" for forage mixtures, having minimum purity of 97% and germination of 75%.
3. Water: clean water free of contaminants that may inhibit germination and plant growth.
 1. Water for water hauling equipment: supplied and paid for by Contractor.
 2. Water for hydraulic seeding and mulching equipment: supplied and paid for by Contractor.
4. Hydraulically Applied Growth Medium:
 1. Flexterra Flexible Growth Medium as manufactured by Profile Products LLC, 750 Lake Cook Rd, Suite 440, Buffalo Grove, IL 60089 and supplied by Brett Young, ph: (780) 985-7308.
 2. Composition;
 1. Free of growth or germination inhibiting ingredients.
 2. Specially manufactured for use in hydraulic seeding and mulching equipment.
 3. Minimum organic matter content of 74.5%.
 4. Interlocking fibre content of 5%.
 5. Minimum moisture content of 10.5%.
 6. Water absorption potential; 1500%.

HYDRAULIC SEEDING

7. Tackifier: non-toxic, water dilutable, liquid dispersion, mulch binder free of growth or germination inhibiting factors.

5. Inoculants: inoculant containers to be tagged with expiry date.

2.2 GRASS SEED MIXTURE

1. Turf Grass Seed mixture:

1. Turfgrass seed to be 30% Kentucky Blue, 30% Fescue, 40% Perennial Rye

2. Meadow Grass Seed mixture:

3. Meadow grass seed mixture to be 'Premier Coastal Reclamation Mix' as supplied by Premier Pacific Seeds Ltd. or approved equivalent.

4. Substitutions to specified seed species and variety require approval of Consultant before sowing. Contractor shall submit documentation from seed supplier verifying unavailability of any specified seed specie and variety with recommendations.

5. Consultant may adjust specified seed mixture after topsoil test analysis results are received, with no change in Contract Price.

3 – EXECUTION

3.1 WORKMANSHIP

1. Do not spray onto structures, signs, fences, plant material, utilities and other than surfaces intended.
2. Clean up immediately, any material sprayed where not intended, to satisfaction of Consultant.
3. Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
4. Hydro seed only when conditions are favourable for successful seed germination.
5. Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

1. Prepare soil to receive hydraulic seeding in accordance with Section 32 01 90.33.01 - Topsoil Preservation.
2. Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
3. Cultivated areas identified by the Consultant as requiring cultivation to depth of 25 mm.
4. Ensure areas to be seeded are moist to depth of 100 mm before seeding.
5. Obtain Consultant's approval of grade and topsoil depth before starting to seed.

3.3 FERTILIZING

1. Apply fertilizer only after final grade has been approved by Consultant.

HYDRAULIC SEEDING

2. Apply 12-51-0 fertilizer at 3kg/100 m² evenly with calibrated mechanical distributor. Adjust fertilizer analysis to meet agrologist's recommendations as specified under Section 32 01 90.33.01 - Topsoil Preservation.
 1. Fertilizer application may be combined with hydro seeding operations.
3. Mix thoroughly into upper 50mm of topsoil.

3.4 PREPARATION OF SLURRY

1. Measure quantities of materials by weight or weight calibrated volume measurement in accordance with manufacturers written instructions. Supply equipment required for this work.
2. Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
3. After all other material is in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.5 SLURRY APPLICATION

1. Hydraulic seeding equipment:
 1. Slurry tank.
 2. Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and /or mechanical agitation method.
 3. Capable of seeding by 50 metre hand operated hoses and appropriate nozzles.
2. Slurry mixture application rates, generally:
 1. Seed: Grass mixture 3 kg/100m².
 2. Mulch: 3400 kg/ha.
 3. Tackifier: In accordance with growth medium manufacturer's written instructions.
 4. Water: In accordance with growth medium manufacturer's written instructions.
3. Apply seed and mulch using Two-Step Hydraulic seeding and mulching methods In accordance with growth medium manufacturer's written instructions.
4. Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
 1. Using correct nozzle for application.
 2. Using hoses for surfaces difficult to reach and to control application.
5. Using hydraulic hydro mulching equipment, mix grass seed, fertilizer, water and a small amount of fibre mulch in accordance with growth medium manufacturer's written instructions.
6. Apply fibre mulch immediately following seeding. Mix fibre mulch in water for minimum application of 3400 kg/ha and to form a uniform and strong moisture retaining mat.
7. Blend applications of seed and mulch 300 mm into adjacent grass areas to form uniform surfaces.

HYDRAULIC SEEDING

8. Agitate slurry mixes constantly during spraying to keep it homogeneous and avoid blockage to pipes.
9. Re apply where application is not uniform.
10. Remove slurry from items and areas not designated to be sprayed.
11. Area seeded and mulched shall not exceed area which can be mulched on same day.
12. Clean and remove mulch sprayed where not intended.

3.6 PROTECTION OF SEEDED AREAS - GENERAL

1. Immediately after seeding, provide protection satisfactory to Consultant against erosion, pedestrian and vehicular traffic damages.
2. Remove protection after seed areas become when directed by Consultant.

3.7 MAINTENANCE

1. Apply water in sufficient quantities to maintain optimum soil moisture level for germination and continued healthy growth of grass. Control watering to prevent washouts. Promptly repair and reseed any damage that occurs through washout of soil.
2. Areas with no irrigation system: supply labour, hoses and attachments necessary to provide adequate watering to prevent grass and underlying soil from drying out.
3. Provide clean water and water hauling vehicle with proper attachments to provide efficient and adequate watering of seeded areas when necessary.
4. Cut native grass at regular intervals and maintain minimum height of 80 to 100 mm or as directed by Consultant. Do not cut more than 30% of blade at any one mowing. Remove clippings that will smother grass.
5. Provide weed control in newly seeded areas by mowing when required or directed by Consultant. Cut and maintain weed growth to height of 100 mm. Remove weed clippings.
6. Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
7. Re seed areas which show root growth failure, deterioration, bare or thin spots, or which have been damaged by any means or cause, including replacement operations. Overseed areas that show inadequate or improper sowing of seed with brillion or other methods.
8. Fertilize seeded areas during establishment period, minimum six weeks after seeding, with 27 14 0 fertilizer or as directed by Consultant. Spread evenly at rate of 3 kg/100 m², water in well.
9. Postpone fertilizing until spring if application falls after August 15th.
10. Maintain daily maintenance log throughout contract. Submit copy of log data to Consultant each week for verification. Record all maintenance activities performed on site.
11. Consultant may extend maintenance period at no additional cost when Contractor fails to: maintain an accurate log; submit log when required; or when unsatisfactory and inadequate maintenance occurs.

3.8 ACCEPTANCE

1. Seeded areas will be accepted by Consultant at end of maintenance period provided:

HYDRAULIC SEEDING

1. Seeded areas are properly, uniformly and well established.
2. Turf is free of bare and dead spots and weeds.
3. Minimal surface soil is visible when grass cut to height of 80 mm.
4. Required applications of fertilizer have been completed.
5. All submittals, installation and maintenance requirements have been provided.
6. Satisfactory seed test results have been received from seed testing laboratory, if seed tests were performed.

3.9 CLEAN UP

1. Clean up immediately any soil and debris spilled onto pavement or concrete.
2. Broom clean pavement and sidewalks. Clear soil and rubble from underground or surface storm sewer lids.
3. Leave site in neat and clean condition free of all litter. Remove and dispose of grass clippings, weeds, debris, and excess materials at approved disposal site.

END OF SECTION

TREES, SHRUBS, AND ORNAMENTALS

1 – GENERAL

1.1 RELATED SECTIONS

1. Section 32 91 21 — Topsoil and Finish Grading
2. Section 32 93 53 — Exterior Maintenance

1.2 DEFINITIONS

1. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated on Drawings; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.
2. Balled and Potted Stock: Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated on Drawings.

1.3 REFERENCES

1. American National Standards Institute (ANSI): ANSI Z60.1-1996, Nursery Stock
2. BCNTA Guide Specifications for Nursery Stock
3. BCNTA Guide Specifications for Landscape Construction
4. BC Landscape Standard-Current Edition

1.4 SUBMITTALS

1. Provide submittals prior to starting any work.
2. Submit product data for each type of product indicated.
3. Submit planting schedule indicating anticipated planting dates for each type of planting.

1.5 QUALITY ASSURANCE

1. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants, and now is a member of BC Landscaping & Nursery Association.
2. Installer's Field Supervision: Require Installer to maintain an experienced full time supervisor on Project site when exterior planting is in progress, and who holds a current CHT Certificate.
3. Provide quality, size, genus, species, and variety of exterior plants indicated, using ANSI Z60.1 terminology and methods of measurement.
4. Selection of exterior plants will be made by Consultant, who will tag plants at their place of growth before they are prepared for transplanting.
5. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position:
 1. Take caliper measurements 150mm above ground for trees up to 100 mm caliper size, and 305mm above ground for larger sizes.
 2. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

TREES, SHRUBS, AND ORNAMENTALS

6. Do not prune to obtain required sizes.
7. Observation: Consultant will observe trees and shrubs for compliance with requirements for genus, species, variety, size, and quality as follows:
 1. Consultant retains right to review trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work.
 2. Remove rejected trees or shrubs immediately from Project site.
 3. Notify Consultant of sources of planting materials seven (7) days in advance of delivery to site.
8. The Consultant will review trees and shrubs at the following stages to verify conformance with specified requirements:
 1. Trees and shrubs at source within 50 km of the site; supplier shall provide transportation where distance exceeds 50 km.
 2. Installed trees and shrubs before commencement of maintenance period.
 3. At end of maintenance period.
9. Pre-installation Conference: Conduct conference at Project site to address quality of materials, inspection schedule and samples including, but not limited to, the following:
 1. Materials, mulch, landscape edging, and root barriers.
 2. Proposed landscape maintenance schedule.
 3. Arrangements for nursery visits.
 4. Layout and staking of trees, shrubs and planting materials.

1.6 SUBSTITUTIONS

1. Substitute plants only with prior approval of Consultant.
2. Submit proof that plant species and sizes specified are unobtainable prior to making substitutions.
3. Substitutions shall be of nearest similar species and size specified.
4. Substitution of plants larger than specified shall be permitted with no increase in Contract Price.

1.7 DELIVERY, STORAGE, AND HANDLING

1. Deliver exterior plants freshly dug.
2. Do not prune trees and shrubs before delivery, except as accepted by Consultant:
 1. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage.
 2. Do not bend or bind tie trees or shrubs in such a manner as to destroy their natural shape.
 3. Provide protective covering of exterior plants during delivery.

TREES, SHRUBS, AND ORNAMENTALS

4. Do not drop exterior plants during delivery.
3. Handle planting stock by root ball.
4. Deliver exterior plants after preparations for planting have been completed and install immediately; set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist if planting is delayed more than six (6) hours after delivery, and as follows:
5. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
6. Do not remove container grown stock from containers before time of planting.
7. Water root systems of exterior plants stored on-site with a fine mist spray.
8. Water as often as necessary to maintain root systems in a moist condition.

1.8 COORDINATION

1. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.
2. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Consultant.

1.9 WARRANTY

1. Special Warranty: Warrant the exterior plants against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Trade Contractor's control:
 1. Warranty Period for Trees and Shrubs: One (1) year from date of Substantial Performance.
 2. Warranty Period for Ground Cover and Plants: One (1) year from date of Substantial Performance.
2. Remove dead exterior plants immediately; replace immediately unless required to plant in the succeeding planting season.
3. Replace exterior plants that are more than 25% dead or in an unhealthy condition at end of warranty period.
4. A limit of one replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.

2 – PRODUCTS

2.1 TREES AND WOODY PLANTS

1. Furnish nursery grown plants with healthy root systems developed by transplanting or root pruning, grown in nurseries in the same agricultural climate zone as the site.
2. Provide well shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
3. Provide plants of sizes complying with ANSI Z60.1 for types required; plants of a larger size may be used if acceptable to Consultant, with a proportionate increase in size of roots or balls.
4. Label at least one plant of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

TREES, SHRUBS, AND ORNAMENTALS

5. Select stock for uniform height and spread, and number label to assure symmetry in planting.
6. Minimum ball sizes for nursery grown deciduous trees:

Caliper (mm)	Min. Ball Diameter (m)
35	.60
50	.70
60	.80
70	.90
80	1.00
90	1.10
100	1.10
125	1.20
150	1.30
175	1.40
200	1.60

7. Minimum ball sizes for nursery grown coniferous trees:

Height Range (m)	Min. Ball Diameter (m)
1.8 – 2.4	0.86
2.4 – 3.0	1.00
3.0 – 3.6	1.22
3.6 – 4.5	1.52

8. Minimum ball sizes for transplanted trees: Size of root ball shall be 12 times the tree caliper measured at 305mm above grade. For all trees to be transplanted that are greater than 100mm caliper, measurement shall be taken at 1530mm above finish grade.
9. Adjust ball size according to growing habits of trees.
10. All ball sizes shall be sufficiently large to contain at least 75% of fibrous root system with a ball depth not less than 50% of ball diameter.
11. Move trees with large solid soil ball wrapped in burlap in accordance with BC Landscape Standard.

TREES, SHRUBS, AND ORNAMENTALS

2.2 SHADE AND FLOWERING TREES

1. Shade Trees: Single stem trees with straight trunk, well balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required, and as follows:
 1. Provide balled and burlapped trees.
 2. Branching Height: One-third to one-half of tree height.
2. Small Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 1. Stem Form: Single stem.
 2. Provide balled and burlapped trees.
3. Multi-stem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 1. Stem Form: Clump.
 2. Provide balled and burlapped trees.

2.3 DECIDUOUS SHRUBS

1. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
2. Provide balled and burlapped or balled and potted shrubs.

2.4 CONIFERS

1. Form and Size: Specimen quality, exceptionally heavy, tightly knit, symmetrically shaped coniferous evergreens:
 1. Provide trees balled and burlapped
 2. Provide balled and burlapped or potted shrubs.

2.5 VINES

1. Provide vines of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1 and the following requirements:
 1. Pot Size: As identified on planting schedule.
 2. Age: Two year minimum plant, well branched tops, with a vigorous well developed root system.

2.6 PERENNIALS AND ORNAMENTAL GRASSES

1. Provide perennials and ornamental grasses of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1 and the following requirements:
 1. Pot Size: As identified on planting schedule.
 2. Age: Two year minimum plant, well branched tops, with a vigorous well developed root system.

TREES, SHRUBS, AND ORNAMENTALS

3. Grown Condition: Perennials and grasses grown in pots or other containers of adequate size and acclimated to outside conditions will be acceptable.

2.7 PLANTING MEDIUM

1. Materials: as specified under Section 32 91 21.47 - Topsoil and Finish Grading.
2. Planting medium mix: As per BC Landscape Standard.

2.8 MULCHES

1. Shrub Beds and Tree Saucers; Organic Mulch: Screened and partially composted bark and wood derived from processing Spruce, Pine, and Fir logs, with 30% by mass of material passing a 10mm screen. Free from live seeds and deleterious materials and suitable as a top dressing of trees and shrubs.
2. Perennial and Ornamental Grass Beds; Fine Garden Mulch: screened and partially composted bark, Cleanit Greenit NatureCover, passing a 10mm screen.

2.9 STAKES AND GUYS

1. Guy Posts: Steel T bar stakes, 2.1 m long, scaled and painted.
 1. Paint Finish: one coat, zinc rich paint to CGSB 1-GP-1816. Colour: Black.
2. Guy Stakes: Rough sawn, sound, new hardwood, redwood, or pressure preservative treated softwood, free of knots, holes, cross grain, and other defects, 38mm x 38mm by length indicated, pointed at one end.
3. Guy and Tie Wire: in accordance with ASTM A641, Class 1, galvanized steel wire
 1. Small sized trees: single strand 2mm in diameter
 2. Tall or large sized trees: 5 strand cable 5 mm diameter, galvanized steel cable, with zinc coated turnbuckles, a minimum of 76mm long, with two 10mm galvanized eyebolts.
4. Hose Chafing Guard: Reinforced rubber or plastic hose at least 13mm in diameter, black, cut to lengths required to protect tree trunks from damage.
5. Flags: Standard surveyor's plastic flagging tape, white, 150mm long.

2.10 MISCELLANEOUS PRODUCTS

1. Anti-desiccant: Water insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs.
2. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
3. Trunk Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 100mm wide minimum, with stretch factor of 33%.

3 – EXECUTION

3.1 EXAMINATION

1. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

TREES, SHRUBS, AND ORNAMENTALS

3.2 PREPARATION

1. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
2. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.
3. Lay out individual tree and shrub locations and areas for multiple exterior plantings; stake locations, outline areas, adjust locations when requested, and obtain Consultant's acceptance of layout before planting; make minor adjustments as required.
4. Apply anti-desiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation; spray with anti-desiccant at nursery before moving and again two weeks after planting if deciduous trees or shrubs are moved in full leaf.

3.3 PLANTING BED ESTABLISHMENT

1. Loosen subgrade of planting beds to a minimum depth of 150mm.
2. Remove stones larger than 25mm in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
3. Apply fertilizer directly to subgrade before loosening.
4. Thoroughly blend and spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix:
 1. Mix lime with dry soil before mixing fertilizer.
 2. Spread planting soil mix to a depth of 300mm minimum, but not less than required to meet finish grades after natural settlement.
 3. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
5. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
6. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
7. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.4 EXCAVATION

1. Pits and Trenches:
 1. Excavate circular pits with sides sloped inward.
 2. Trim base leaving center area raised slightly to support root ball and assist in drainage.
 3. Do not further disturb base.
 4. Scarify sides of plant pit and trenches.
 5. Excavate approximately three times as wide as ball diameter for balled and burlapped or balled and potted stock.

TREES, SHRUBS, AND ORNAMENTALS

6. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.
2. Subsoil removed from excavations may be used as backfill if found acceptable for use, otherwise remove from site and replace with suitable material.
3. Obstructions: Notify Consultant if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
4. Drainage: Notify Consultant if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

3.5 PLANTING

1. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades, and as follows:
 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls; remove pallets, if any, before setting; do not use planting stock if root ball is cracked or broken before or during planting operation.
 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets; when pit is approximately one half backfilled, water thoroughly before placing remainder of backfill; repeat watering until no more water is absorbed; water again after placing and tamping final layer of planting soil mix.
2. Set balled and potted stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades, and as follows:
 1. Carefully remove root ball from container without damaging root ball or plant.
 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets; when pit is approximately one half backfilled, water thoroughly before placing remainder of backfill; repeat watering until no more water is absorbed; water again after placing and tamping final layer of planting soil mix.
 3. Do not install any trees closer than 1000mm to edge of walkways, driveways or building foundations.
 4. Vertically slice rootball of container stock with sharp blade, minimum four cuts per rootball.
 5. Organic Mulching: Apply 76mm average thickness of organic mulch extending 305mm beyond edge of planting pit or trench; do not place mulch within 76mm of trunks or stems.
 6. Wrap trees of 50mm caliper and larger with trunk wrap tape, as follows:
 1. Start at base of trunk and spiral cover trunk to height of first branches.
 2. Overlap wrap, exposing half the width, and securely attach without causing girdling.
 3. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping.

3.6 PRUNING

1. Prune, thin, and shape trees and shrubs according to standard horticultural practice.
2. Prune trees to retain required height and spread; do not cut tree leaders; remove only injured or dead branches.

TREES, SHRUBS, AND ORNAMENTALS

3. Prune shrubs and vines to retain natural character; sizes indicated are sizes after pruning.

3.7 GUYING AND STAKING

1. Upright Staking and Tying:
 1. Stake trees of 50mm and greater caliper.
 2. Stake trees of less than 50mm caliper only as required to prevent wind tip out.
 3. Tree staking or guying shall not be required for trees located within steel tree grates.
2. Use a minimum of 2 stakes of length required to penetrate at least 450mm below bottom of backfilled excavation and to extend at least 1830mm above grade.
3. Set vertical stakes and space to avoid penetrating root balls or root masses.
4. Support trees with two strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 CLEANUP AND PROTECTION

1. During exterior planting, keep adjacent paving and construction clean and work area in an orderly condition.
2. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.9 DISPOSAL

1. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

MANHOLES AND CATCHBASIN STRUCTURES

PART 1 GENERAL

1.1 Related Sections

- .1 Section 31 23 10-Excavating, Trenching and Backfilling.
- .2 Section 33 31 13-Public Sanitary Utility Sewerage Piping.
- .3 Section 33 41 00-Storm utility Drainage Piping.

1.2 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 48/A 48M, Standard Specification for Gray Iron Castings.
 - .2 ASTM C 117, Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM C 139, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
 - .5 ASTM C 478M, Standard Specification for Precast Reinforced Concrete Manhole Sections [Metric].
 - .6 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
 - .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A23.1/A23.2-[04], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001, Cementitious Materials for Use in Concrete.
 - .2 CSA-A3002, Masonry and Mortar Cement.
 - .3 CAN/CSA-A165 Series, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
 - .4 CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement.
 - .5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 Delivery, Storage And Handling

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

PART 2 PRODUCTS

2.1 Materials

- .1 Cast-in-place concrete:

MANHOLES AND CATCHBASIN STRUCTURES

- .1 Cement: to CAN/CSA-A3001, Type GU 50.
- .2 Concrete mix design to produce 30 MPa minimum compressive strength at 28 days and containing 25mm maximum size coarse aggregate, with water/cement ratio to CAN/CSA-A23.1.
 - .1 Air entrainment to CAN/CSA-A23.1.
- .2 Precast manhole units: to ASTM C 478M, circular or oval.
 - .1 Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installation.
- .3 Precast catch basin sections: to ASTM C478M.
- .4 Joints: made watertight using rubber rings to ASTM C443 or cement mortar.
- .5 Mortar:
 - .1 Aggregate: to CSA A82.56.
 - .2 Masonry Cement: to CAN/CSA-A8.
- .6 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164.
 - .1 Rungs to be safety pattern (drop step type).
- .7 Adjusting rings: to ASTM C 478.
- .8 Concrete Brick: to CAN3-A165 Series.
- .9 Drop manhole pipe: same as sewer pipe.
- .10 Galvanized iron sheet: approximately 2 mm thick.
- .11 Steel gratings, I-beams and fasteners: as indicated.
- .12 Frames, gratings, covers to dimensions as indicated and following requirements:
 - .1 Metal gratings and covers to bear evenly on frames.
 - .1 Frame with grating or cover to constitute one unit.
 - .2 Assemble and mark unit components before shipment.
 - .2 Cast iron manhole & catchbasin frames and covers must conform to ASTM A48 and be designed to withstand H2O loading.
 - .1 Must bear manufacturer identification on castings.
- .13 Granular bedding and backfill: in accordance with Section 31 05 16 - Aggregate Materials.
- .14 Unshrinkable fill: in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Excavation And Backfill

- .1 Excavate and backfill in accordance with Section 31 23 10 - Excavating Trenching and Backfilling and as indicated.

3.3 Installation

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

MANHOLES AND CATCHBASIN STRUCTURES

- .2 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.
- .3 Set precast concrete base on 100 mm minimum of granular bedding compacted to 95% Modified proctor density in compliance with ASTM D1557.
- .4 Precast units:
 - .1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.
 - .2 Make each successive joint watertight with Departmental Representative's approval rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.
 - .3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
 - .4 Plug lifting holes with concrete plugs set in cement mortar or mastic compound.
- .5 For sewers:
 - .1 Place stub outlets and bulkheads at elevations and in positions indicated.
 - .2 Bench to provide smooth U-shaped channel.
 - .1 Side height of channel to be 0.75 times diameter of sewer.
 - .2 Slope adjacent floor at 1 in 20.
 - .3 Curve channels smoothly.
 - .4 Slope invert to establish sewer grade.
- .6 Compact granular backfill to 95% Modified Proctor Density.
- .7 Place unshrinkable backfill in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.
- .8 Installing units in existing systems:
 - .1 Where new unit is installed in existing run of pipe, ensure full support of existing pipe during installation, and carefully remove that portion of existing pipe to dimensions required and install new unit as specified.
 - .2 Make joints watertight between new unit and existing pipe.
 - .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready for operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.
- .9 Set frame and cover to required elevation on no more than three courses of brick.
 - .1 Make brick joints and join brick to frame with cement mortar.
 - .2 Parge and make smooth and watertight.
- .10 Clean units of debris and foreign materials.
 - .1 Remove fins and sharp projections.
 - .2 Prevent debris from entering system.
- .11 Install safety platforms in manholes having depth of 6 m or greater, as indicated.

3.4 Adjusting Tops Of Existing Units

- .1 Remove existing gratings, frames and store for re-use at locations designated by Departmental

MANHOLES AND CATCHBASIN STRUCTURES

Representative.

- .2 Sectional units:
 - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
 - .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.
 - .1 When amount of raise is less than 300mm use standard manhole brick, modoloc or grade rings.
- .3 Monolithic units:
 - .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation with mortared brick course for 150 mm or less alteration.
 - .2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.
 - .3 When monolithic units with tapered upper section are lowered more than 150 mm, remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.
 - .4 Install additional manhole ladder rungs in adjusted portion of units as required.
 - .5 Re-use existing gratings, frames and I-beams.

3.5 Sealing Over Existing Units

- .1 Fill with material approved by Departmental Representative.

3.6 Field Quality Control

- .1 Leakage Test:
- .2 Install watertight plugs or seals on inlets and outlets of each new sanitary sewer manhole and fill manhole with water.
- .3 Leakage not to exceed 0.3% per hour of volume of manhole.
- .4 If permissible leakage is exceeded, correct defects.
- .5 Repeat until approved by Departmental Representative.
- .6 Departmental Representative will issue Test Certificate for each manhole passing test.

3.7 Cleaning

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

END OF SECTION

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PART 1 – GENERAL

1.1 SECTION INCLUDES

- .1 Materials and installation for water mains, hydrants, valves, valve boxes, and valve chambers, including service connections.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures].
- .2 Section 01 78 00 - Closeout Submittals.
- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .4 Section 03 20 00 - Concrete Reinforcing.
- .5 Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCES

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA B300-[99], Hypochlorites.
 - .2 ANSI/AWWA C153/A21.53-11, Ductile-Iron Compact Fittings for Water Service.
 - .3 ANSI/AWWA C500-09, Metal-Seated Gate Valves for Water Supply Service
 - .4 ANSI/AWWA C651-14, Disinfecting Water Mains.
 - .5 ANSI/AWWA C800-12, Underground Service Line Valves and Fittings
 - .6 ANSI/AWWA C900-16, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 Inch through 60 Inch (100 mm - 1200 mm
- .2 American Society for Testing and Materials International, (ASTM)
- .3 American Water Works Association (AWWA)/Manual of Practice
 - .1 AWWA M17-2006, Installation, Field Testing, and Maintenance of Fire Hydrants.
- .4 Canadian General Standards Board (CGSB)
- .5 Canadian Standards Association (CSA International)

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit complete construction schedule for water mains. Include method for installation of water main.

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- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Contractor to provide to the Department Representative for approval 1 week prior to start of laying pipe the results of a sieve analysis of the proposed bedding materials.
- .5 Submit manufacturer's pipe certification
- .6 Pipe certification to be on pipe.

1.5 CLOSEOUT
SUBMITTALS

- .1 Provide record drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of air and vacuum release valves, hydrant details, maintenance and operating instructions in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Include top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

1.6 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Handle and dispose of hazardous materials in accordance with the Canadian Environmental Protection Act (CEPA), Transportation of Dangerous Good Act (TDGA), Regional and Municipal regulations.
- .4 Ensure emptied containers are sealed and stored safely.
- .5 Divert unused materials from landfill to metal recycling facility.
- .6 Divert unused concrete materials from landfill to local facility.
- .7 Divert unused aggregate materials from landfill to facility for reuse.
- .8 Dispose of unused disinfection material at official hazardous material collections site.
- .9 Do not dispose of unused disinfection material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.
- .10 Fold up metal banding, flatten and place in designated area for recycling.

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1.7 SCHEDULING OF WORK

- .1 Schedule Work to minimize interruptions to existing services.
- .2 Submit schedule of expected interruptions to Department Representative for approval and adhere to interruption schedule as approved by Department Representative.
- .3 Notify Department Representative a minimum of 48 h in advance of interruption in service.
- .4 Do not interrupt water service for more than 4 hours.
- .5 Notify fire department of any planned or accidental interruption of water supply to hydrants.
- .6 Provide "Out of Service" sign on hydrant not in use.
- .7 Advise local police department of anticipated interference with movement of traffic.

PART 2 - PRODUCTS

2.1 PIPE, JOINTS AND FITTINGS

- .1 Polyvinyl chloride pressure pipe: to ANSI/AWWA C900, pressure class 150, DR 18, 1 MPa gasket bell end
 - .1 CSA-B137.3, PVC series 160, 1.1 MPa elastomeric gasket [coupling].
 - .2 Ductile Iron fittings: to ANSI/AWWA C153/A21.53-06.

2.2 VALVES AND VALVE BOXES

- .1 Valves to open counter clockwise.
- .2 Gate valves: to ANSI/AWWA C500, standard iron body, bronze mounted valves with non-rising stems, suitable for 1 Pa with mechanical, flanged, push-on, grooved type joints.
- .3 Air and vacuum release valves: heavy duty combination air release valves employing direct acting kinetic principle.
 - .1 Fabricate valves of cast iron body and cover, with bronze trim, stainless steel floats with shock-proof synthetic seat suitable for [2] MPa working pressure.
 - .2 Valves to expel air at high rate during filling, at low rate during operation, and to admit air while line is being drained.
 - .3 Valve complete with surge check unit.
 - .4 Ends to be flanged to ANSI/AWWA.

2.3 TRACER WIRE

- .1 Direct Burial #12 AWG Solid (.0808" diameter), steel core hard drawn extra high strength tracer wire, 1150# average tensile break load, 45 mil high molecular weight-high density polyethylene jacket complying with ASTM-D-1248, 30 volt

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rating.

- .2 Tracer Box shall include:
 - .1 Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements.
 - .2 Lid material shall be of cast iron or ductile iron. Tensile strength or ductility of such material shall be equal or superior to hi-tensile cast iron ASTM A126-B requirements.
 - .3 Lid-locking bolt material shall be made of aluminum material equal or superior to ASTM B253.
 - .4 Lid-locking mechanism material shall be made of plastic to meet or exceed ASTM A126-B requirements.
 - .5 Box shall be designed to be easily detected by magnetic and electronic locators even when box is covered by a minimum of 100mm of soil, sod and / or paving material.
 - .6 A magnet shall be securely attached at the top of the upper tube of the box for locating purposes.

2.4 VALVE CHAMBERS

- .1 Concrete and reinforcing steel to Section 03 30 00 - Cast-in-Place Concrete and Section 03 20 00 - Concrete Reinforcing.
- .2 Precast concrete sections to ASTM C478M. Cast ladder rungs integral with unit; field installation not permitted.
- .3 Valve chamber frames and covers:
 - .1 Design and dimensions as indicated.
 - .2 Cover to be marked "WATER"/"EAU" .
- .5 Ladder rungs for valve chambers: 20 mm diameter deformed rail steel bars to CAN/CSA-G30.18, hot-dipped galvanized after fabrication to CAN/CSA-G164. Rungs to be safety pattern.

2.5 SERVICE CONNECTIONS

- .1 Copper tubing: to ASTM B 88M type K, annealed.
- .2 Polyethylene pressure pipe:
 - .1 To CSA-B137.1, type PE, series 160, ASTM F714, Type PE, series DR 11.
 - .2 90 mm to 1600 mm: to CGSB 41-GP-25M, type PE, series 250.
- .3 Copper tubing joints: compression type suitable for 1 MPa working pressure.
- .4 Polyethylene pipe joints: thermal butt fusion welded
- .5 Brass corporation stops: compression type having threads to ANSI/AWWA C800.
- .6 Brass inverted key-type curb stops: compression type with

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drains.

.1 Curb stops to have adjustable bituminous coated cast iron service box with stem to suit depth of bury.

.2 Top of cast iron box marked "WATER"/"EAU".

.7 Polyethylene tapping tees or multi-saddle tees: for Polyethylene pipe. Tees to be socket fused to pipe.

.8 Service connections for PVC pipe:

.1 Service connections less than 100 mm: Corporation stop, tapped to main using AWWA threads, complete with stainless service saddle. Service saddle to consist of circumferential band type complete with side bars and fingers, keeper bar, stud bolts, nuts, washers and gaskets.

.2 Service connections 100 mm and over: Use tee fitting or tapping valve and sleeve.

.9 Bronze type service clamps: for PVC pipe service connections.

.1 Service clamps to be of strap-type, with confined "O" ring seal cemented in place.

.2 Clamps to be tapped with threads to ANSI/AWWA C800.

.10 Tee connections: for services 100mm diameter and above. Tee connections to be fabricated of same material and to same standards as specified pipe fittings and to have ends matching pipe to which they are joined.

2.6 YARD HYDRANTS

.1 Yard Hydrants: Terminal City self-draining stand pipe, factory assembled unit:

.1 Hydrants to open threads to local standard, Provide metal caps and chains.

.2 Yard Hydrant to be manufactured with bronze operating and draining components.

.3 The stuffing box and draining mechanism to have "O" ring rubber gaskets for sealing purposes.

.4 Polyurethane anti-score seating material is used for the valve disc facing.

.5 Provide key operated gate valve located 1m from hydrant.

.6 Depth of bury 1.2 m.

.2 Hydrant paint: exterior enamel to CAN/CGSB-1.88,MPI #96.

2.6 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material to: Section 31 05 16 - Aggregate Materials and following requirements:

.1 Crushed or screened stone, gravel or sand.

.2 Table

Sieve Designation	Percent Passing	
	Type 1*	Type 2*
25.0mm	100	100

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19.0mm	90-100	90-100
12.5mm	65-85	70-100
9.5mm	50-75	-
4.75mm	25-50	40-70
2.36mm	10-35	25-52
1.18mm	6-26	15-38
0.600mm	3-17	6-27
0.300mm	-	3-20
0.075mm	0-5	0-8
*Type 1: Standard Gradation *Type 2: To be used only in dry trench conditions and with prior approval of Department Representative.		

2.7 BACKFILL MATERIAL .1 In accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.8 PIPE DISINFECTION .1 Sodium hypochlorite to ANSI/AWWA B300 to disinfect water mains.
 .2 Undertake disinfection of water mains in accordance with ANSI/AWWA C651.

PART 3 - EXECUTION

3.1 PREPARATION .1 Clean pipes, fittings, valves, hydrants, and appurtenances of accumulated debris and water before installation.
 .1 Inspect materials for defects to approval of the Department Representative.
 .2 Remove defective materials from site as directed by Department Representative.

3.2 TRENCHING .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.
 .2 Trench depth to provide cover over pipe of not less than 1.2 m from finished grade or as indicated.
 .3 Trench alignment and depth require Department Representative approval prior to placing bedding material and pipe.

3.3 CONCRETE BEDDING AND ENCASEMENT .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
 .2 Place concrete to details as indicated.
 .3 Do not backfill over concrete within 24 hours after placing.

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3.4 GRANULAR BEDDING

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth of 150mm below bottom of pipe.
- .2 Do not place material in frozen condition.
- .3 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .4 Shape transverse depressions in bedding as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% modified proctor density to ASTM D1557.
- .6 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.

3.5 PIPE INSTALLATION

- .1 Lay pipes to manufacturer's standard instructions and specifications. Do not use blocks except as specified.
- .2 Join pipes in accordance with manufacturer's recommendations.
- .3 Bevel or taper ends of PVC pipe to match fittings.
- .4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .5 Lay pipes on prepared bed, true to line and grade.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
 - .2 Take up and replace defective pipe.
 - .3 Correct pipe which is not in true alignment or grade or pipe which shows differential settlement after installation greater than 10 mm in 3 m.
- .6 Face socket ends of pipe in direction of laying. For mains on grade of 2% or greater, face socket ends up-grade.
- .7 Do not exceed one half of permissible deflection at joints as recommended by pipe manufacturer.
- .8 Keep jointing materials and installed pipe free of dirt and water and other foreign materials.
 - .1 Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent

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- entry of foreign materials.
- .9 Position and join pipes with equipment and methods approved by Department Representative.
 - .10 Cut pipes in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
 - .11 Align pipes before jointing.
 - .12 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .13 Avoid displacing gasket or contaminating with dirt or other foreign material.
 - .1 Remove disturbed or contaminated gaskets.
 - .2 Clean, lubricate and replace before jointing is attempted again.
 - .14 Complete each joint before laying next length of pipe.
 - .15 Minimize deflection after joint has been made.
 - .16 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
 - .17 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by the Department Representative.
 - .18 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
 - .19 Recheck plastic pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
 - .20 Install tracer wire along entire length of watermain with Test boxes located at maximum 1000m separation.
 - .21 Do not lay pipe on frozen bedding.
 - .22 Do hydrostatic and leakage test and have results approved by the Department Representative before surrounding and covering joints and fittings with granular material.
 - .23 Backfill remainder of trench.

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3.6 VALVE
INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.

3.7 VALVE CHAMBERS

- .1 Use precast units as approved by the Department Representative.
- .2 Construct units as indicated, plumb and centered over valve nut, true to alignment and grade, and not resting on pipe.
- .3 Clean surplus mortar and joint compounds from interior surface of valve chamber as work progresses.
- .4 Plug lifting holes with precast concrete plugs set in cement mortar.
- .5 Place frame and cover on top section to elevation indicated. If adjustment is required use concrete ring.
- .6 Clean valve chambers of debris and foreign materials; remove fins and sharp projections.

3.8 SERVICE
CONNECTIONS

- .1 Terminate building water service 1 m outside building wall or as indicated opposite point of connection to main. Locate point of connection in advance and advise Department Representative.
 - .2 Cap or seal end of pipe and place temporary marker to locate pipe end.
- .2 Do not install service connections until satisfactory completion of hydrostatic and leakage tests of water main.
- .3 Construct service connections at right angles to water main unless otherwise directed.
- .4 Tappings on ductile iron mains 2000mm or greater in diameter may be threaded with service clamps provided specified pipe wall thickness is sufficient to confirm to ANSI/ASME B1.20.1 for at least 3 threads as shown in Appendix A to AWWA C151.
- .5 Tappings in ductile iron mains smaller in diameter than 200mm; or ductile iron mains with wall thickness which will not allow at least 3 full threads; or tap size beyond those shown in the following table are to be made using double strap saddles

Pipe Diameter (mm)	Maximum Tap Without Clamp (mm)	Maximum Tap With Clamp (mm)
100	19	25
150	25	32

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200	25	50
250	25	50
300	32	75

- .5 Tappings in PVC mains to AWWA C900 pipe to be with services saddles. Nuts on service saddle stapes to be tightened to torque range specified by manufacturer and in no case in excess of that torque. Use core-out type bit, provide coupons to Departmental Representative.
- .6 Tappings on PVC pipe to be either PVC valve tees or bronze type service clamps, strap type with "O" ring seal cemented in place.
- .7 Tappings for PE pipe: PE tapping tees or multi-saddle tees.
- .8 Employ only competent persons equipped with suitable tools to carry out tapping of mains, cutting and flaring of pipes.
- .9 Install single and multiple tap service connections on top half of main, between 45 degrees and 90 degrees measured from apex of pipe.
- .10 Install multiple corporation stops, 30 degrees apart around circumference of pipe and minimum of 500mm apart along pipe.
- .11 Tap main at 2:00 o'clock or 10:00 o'clock position only; not closer to joint nor closer to adjacent service connections than recommended by manufacturer, or 1 m, whichever is greater.
- .12 Leave corporation stop valves fully open.
- .13 In order to relieve strain on connections, install service pipe in "Goose Neck" form "laid over" into horizontal position.
- .14 Install rigid stainless steel liners in small diameter plastic pipes with compression fittings.
- .15 Install curb stop with corporation box on services NPS 2 or less in diameter.
 - .1 Equip larger services with gate valve and cast iron box.
 - .2 Set box plumb over stop and adjust top flush with final grade elevation.
 - .3 Leave curb stop valves fully closed.
- .16 Place temporary location marker at ends of plugged or capped unconnected water lines.
 - .1 Each marker to consist of 38 x 89 mm stake extending from pipe end at pipe level to 600 mm above grade.
 - .2 Paint exposed portion of stake red with designation "WATER SERVICE LINE" in black.

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3.9 HYDRANTS

- .1 Install hydrants at locations as indicated.
- .2 Install hydrant assemblies in accordance with AWWA M17 and in accordance with standard details on the drawings.
- .3 Set hydrants plumb, with hose outlets parallel with edge of pavement with outlet facing roadway. Flange set at elevation of 50 to 150mm above finish grade
- .4 Place concrete thrust blocks as indicated and specified ensuring that drain holes are unobstructed.
- .5 To provide proper draining for each hydrant, excavate pit measuring not less than 1 x 1 x 0.5 m deep and backfill with coarse gravel or crushed stone to level 150 mm above drain holes.
- .4 Place appropriate sign on installed hydrants indicating whether or not they are in service during construction.

3.10 THRUST BLOCKS
AND RESTRAINED
JOINTS

- .1 For thrust blocks: do concrete Work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Place concrete thrust blocks between valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings and undisturbed ground as indicated or as directed by Department Representative.
- .3 Keep joints and couplings free of concrete.
- .4 Do not backfill over concrete within 24 hours after placing.
- .5 For restrained joints: only use restrained joints approved by Department Representative

3.11 HYDROSTATIC
AND LEAKAGE TESTING

- .1 Do tests in accordance with ANSI/AWWA C600.
- .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .3 Notify Department Representative at least 24 hours in advance of proposed tests.
 - .1 Perform tests in presence of Department Representative.
- .4 Where section of system is provided with concrete thrust blocks, conduct tests at least 5 days after placing concrete or 2 days if high early strength concrete is used.

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- .5 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by the Department Representative.
- .6 Upon completion of pipe laying and after Department Representative has inspected Work in place, surround and cover pipes between joints with approved granular material placed as directed by Department Representative.
- .7 Leave hydrants, valves, joints and fittings exposed.
- .8 When testing is done during freezing weather, protect hydrants, valves, joints and fittings from freezing.
- .9 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
- .10 Open valves.
- .11 Expel air from main by slowly filling main with potable water.
 - .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
 - .2 Remove stops after satisfactory completion of test and seal holes with plugs.
- .12 Thoroughly examine exposed parts and correct for leakage as necessary.
- .13 Apply hydrostatic test pressure of 1035 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 1 hours.
- .14 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
- .15 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
- .16 Repeat hydrostatic test until defects have been corrected.
- .17 Define leakage as amount of water supplied in order to maintain test pressure for 2 hours.
- .18 Locate and repair defects if leakage is greater than amount specified.
- .19 Repeat test until leakage is within specified allowance for full length of water main.

3.12 PIPE SURROUND

- .1 Upon completion of pipe laying and after Department

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Representative has inspected Work in place, surround and cover pipes as indicated.

- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D 698.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 95% maximum density to ASTM D 698.

3.13 BACKFILL

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .2 Do not place backfill in frozen condition.
- .3 Under roadways and pathways, compact backfill to at least 95% maximum density to ASTM D 698.

3.14 PAINTING OF HYDRANTS

- .1 After installation, paint hydrants red.
- .2 After hydrant flow tests, paint caps and ports to meet colour selections approved by authority having jurisdiction.

3.15 FLUSHING AND DISINFECTING

- .1 Flushing and disinfecting operations: witnessed by Department Representative.
 - .1 Notify Department Representative at least 4 days in advance of proposed date when disinfecting operations will begin.
- .2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear. The contractor shall supply all water for flushing and testing.
- .3 Flushing flows as follows:

Pipe Diameter	Flow (L/s) Minimum
150mm and below	38
200mm	75
250mm	115
<u>300mm</u>	<u>150</u>

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- .4 Provide connections and pumps for flushing as required.
 - .5 Open and close valves, hydrants and service connections to ensure thorough flushing.
 - .6 When flushing has been completed to Department Representative approval, introduce strong solution of chlorine as approved by Department Representative into water main and ensure that it is distributed throughout entire system.
 - .8 Rate of chlorine application to be proportional to rate of water entering pipe.
 - .9 Chlorine application to be close to point of filling water main and to occur at same time.
 - .10 Operate valves, hydrants and appurtenances while main contains chlorine solution.
 - .11 Flush line to remove chlorine solution after 24 hours.
 - .12 Measure chlorine residuals at extreme end of pipe-line being tested.
 - .13 Perform bacteriological tests on water main, after chlorine solution has been flushed out.
 - .1 Take samples daily for minimum of two days.
 - .2 Should contamination remain or recur during this period, repeat disinfecting procedure.
 - .3 Specialist contractor to submit certified copy of test results.
 - .14 Take water samples at hydrants and service connections, in suitable sequence, to test for chlorine residual.
 - .15 After adequate chlorine residual not less than 50 ppm has been obtained leave system charged with chlorine solution for 24 hours.
 - .1 After 24 hours, take further samples to ensure that there is still not less than 10 ppm of chlorine residual remaining throughout system.
- 3.16 SURFACE RESTORATION
- .1 After installing and backfilling over water mains, restore surface to original condition as approved by the Department Representative.

-----END OF SECTION-----

SANITARY SEWER PIPING

PART 1 GENERAL

1.1 Section Includes

- .1 Materials and installation for gravity sewers.

1.2 Related Sections

- .1 Section 31 05 16-Aggregate Materials.
- .2 Section 31 23 10-Excavating, Trenching and Backfilling.
- .3 Section 33 05 13-Manholes and Catch Basin Structures.

1.3 References

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C111/A21.11-00, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 14M-99, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
 - .2 ASTM C 76M-02, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .3 ASTM C 117-95, Standard Test Method for Material Finer Than 75 MU m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C 136-01, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C 443M-02, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
 - .6 ASTM C 700-02, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - .7 ASTM C 828-01, Standard Test Method for Low-pressure Air Test of Vitrified Clay Pipe Lines.
 - .8 ASTM D 698-00a, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
 - .9 ASTM D 2680-01, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
 - .10 ASTM D 3034-00, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - .11 ASTM D 3350-02, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-98, Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
 - .1 CAN/CSA-A5-F98, Portland Cement.
 - .2 CAN/CSA-A257 Series-M92(R1998, Standards for Concrete Pipe.

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- .3 CSA-B70-02, Cast Iron Soil Pipe, Fittings, and Means of Joining.
- .4 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
 - .1 CSA B182.1-02, Plastic Drain and Sewer Pipe and Pipe Fittings.
 - .2 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
 - .3 CSA B182.6-02, Profile Polyethylene Sewer Pipe and Fittings for Leak-Proof Sewer Applications.
 - .4 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

1.4 Definitions

- .1 Pipe section is defined as length of pipe between successive manholes and/or between manhole and any other structure which is part of sewer system.

1.5 Submittals

- .1 Certification to be marked on pipe.

1.6 Delivery, Storage and Handling

- .1 Deliver, store and handle materials in accordance with manufactures recommendations.

1.7 Waste Management and Disposal

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
- .3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .5 Dispose of unused asbestos cement pipe in accordance with regulations governing the disposal of hazardous materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.8 Scheduling

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

PART 2 - PRODUCTS

2.1 Concrete Pipe

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- .1 Non-reinforced circular concrete pipe and fittings: to ASTM C 14M as indicated, designed for flexible rubber gasket joints to ASTM C 443M.
- .2 Reinforced circular concrete pipe and fittings: to ASTM C 76M as indicated, designed for flexible rubber gasket joints to ASTM C 443M.
- .3 Lifting holes:
 - .1 Pipe 900mm and less diameter: no lift holes.
 - .2 Pipe greater than 900mm diameter: lift holes not to exceed two in piece of pipe.
 - .3 Provide pre-fabricated plugs to effectively seal lift holes water tight after installation of pipe.

2.2 Plastic Pipe

- .1 Polyvinyl chloride pipe up to 675mm in diameter, DR35. Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5.0% deflection, ASTM D2412. Pipe to be manufactured to specification for pipe size ranges as follows:
 - .1 100mm dia. – 375mm dia. to ASTM D3034
 - .2 450mm dia. – 1200mm dia. to ASTM F679.
- .2 Pipes to be certified by Canadian Standards Association to standards for pipe size ranges below.
 - .1 100mm dia. – 1200mm dia. to CSA B182.2
- .3 Joint: Pipe to include integral bell and spigot ends with stiffened wall section and formed groove for a rubber gasket; joints to conform to ASTM D3212, gaskets to ASTM F477.
- .4 Normal pipe length joint to joint to be 4m.
- .5 Maximum installed deflection not to exceed 7.5% of the base inside diameter.

2.3 Service Connections

- .1 Sanitary sewer service connections to be 100mm minimum diameter; maximum diameter as specified on Contract Drawings.
- .2 Sanitary sewer service connections 100mm and 150mm diameter to be PVC type DR28 sewer pipe.
- .3 100mm and 150mm DR28 PVC sanitary service connection pipe to have a minimum pipe stiffness of 625kPa. Pipe to be manufactured to ASTM D3034 and certified by Canadian Standards Association to CSA B182.2
- .4 Sanitary sewer service connections greater than 150mm diameter to be of size and material specified on Contract Drawings and to conform to applicable specifications for mainline pipe.
- .5 Manufactured connections to non-reinforced or reinforced concrete mainline pipe to be made using sanded PVC pipe male end stub with integral bell by either:
 - .1 Stub grouted into neatly chipped hole in pipe wall by concrete pipe manufacturer. Grout to be Portland cement based grout.
 - .2 Stub epoxy resin cemented into neatly cored hole in pipe wall by concrete pipe manufacturer.
- .6 Stub and bell orientation to be 45° to centerline of mainline pipe (wyes) for concrete pipe less than 1050mm diameter. Orientation may be 90° to centerline of mainline pipe (tees) for

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- concrete pipe 1050mm diameter or larger. No section of service stubs to protrude past inside of concrete pipe wall.
- .7 Manufactured wye connections to PVC mainline pipe to be made with extrusion moulded PVC or fabricated PVC fittings manufactured to ASTM D3034 and CSA B182.2
 - .8 Field installed tees and wyes:
 - .1 In-situ installation of tees and wyes into concrete or PVC mainline pipe shall be made with approved PVC swaddle installed to the manufacturers specifications into a neatly cored hole in the pipe wall.
 - .2 Connections to ribbed PVC pipe to be made with a preformed tee and wye fitting when connection is up to two sizes smaller than mainline pipe. For these pipes, in-situ installation of tees or wyes involving cutting across pipe ribs not permitted. For connections more than two sizes smaller than mainline pipe, an insertable tee for ribbed PVC pipe is permitted. When an insertable is used, hole cut into mainline pipe to cut as few ribs as possible.
 - .9 PVC service connection pipe and fitting joints: push-on type comprised of integral bell with single elastomeric gasket to ASTM D3212 and ASTM F477. Normal pipe laying length joint to joint to be 4.0m.
 - .10 Pipe and fitting joints for service connection pipe materials other than PVC type PSM sewer pipe to be as specified for applicable mainline pipe.

2.4 Cement Mortar

- .1 Portland cement: to CAN/CSA-A5.
- .2 Mix mortar one part by volume of cement to two parts of clean, sharp sand mixed dry.
 - .1 Add only sufficient water after mixing to give optimum consistency for placement.
 - .2 Do not use additives.

2.5 Pipe Bedding And Surround Material

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials
- .2 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Cast-in-Place Concrete.

2.6 Backfill Material

- .1 As indicated.
- .2 In accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 Preparation

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.
- .2 Obtain Departmental Representative approval of pipes and fittings prior to installation.

3.2 Trenching

- .1 Do trenching Work in accordance with Section 31 23 10 - Excavating, Trenching and

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Backfilling.

- .2 Do not allow contents of sewer or sewer connection to flow into trench.
- .3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

3.3 Concrete Bedding And Encasement

- .1 Do concrete Work in accordance with Cast-in-Place Concrete. Place concrete to details as indicated.
- .2 Position pipe on concrete blocks to facilitate placing of concrete.
 - .1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.
- .3 Do not backfill over concrete within 24 h after placing.

3.4 Granular Bedding

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layer[s] not exceeding 150mm 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 pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% Modified Proctor Density in compliance with ASTM D1557.
- .6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material.

3.5 Installation

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Handle pipe using methods approved by Departmental Representative.
 - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Lay corrugated steel pipe:
 - .1 With outside circumferential laps facing upgrade and longitudinal laps or seams at side or quarter points.

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- .2 With longitudinal centre line of paved invert coinciding with flow line.
- .6 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .7 Keep jointing materials and installed pipe free of dirt, water and other foreign materials. Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .9 Install plastic pipe and fittings in accordance with CSA B182.11.
- .10 Joints:
 - .1 Install gaskets as recommended by manufacturer.
 - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .3 Align pipes before joining.
 - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
 - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
 - .6 Complete each joint before laying next length of pipe.
 - .7 Minimize joint deflection after joint has been made to avoid joint damage.
 - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .11 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative, to prevent "creep" during down time.
- .12 Plug lifting holes with Departmental Representative approved prefabricated plugs, set in shrinkage compensating grout.
- .13 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .14 Make watertight connections to manholes.
 - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .15 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
 - .1 Joint to be structurally sound and watertight.
- .16 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.6 Pipe Surround

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
 - .1 Leave joints and fittings exposed until field testing is completed.
- .3 Hand place surround material in uniform layers not exceeding 150mm compacted thickness as

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indicated.

- .1 Do not dump material within 1 m of pipe.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to underside of backfill to minimum 95% Modified Proctor Density.
- .6 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.7 Backfill

- .1 Place backfill in accordance with Section 31 23 10 – Excavating, Trenching and Backfilling.
- .2 Compaction: place backfill and compact to following Modified Proctor densities in compliance with ASTM D1557. (all following references to density imply compliance with ASTM D1557)
 - .1 Boulevards and easements to minimum 90%
 - .2 Roads, driveways, shoulders, re-shaped ditches and sidewalks to minimum 95%.
 - .3 Use caution in pipe zone to ensure no damage to pipe.

3.8 Service Connections

- .1 Install pipe to CSA B182.11 and manufacturer's instructions and specifications.
- .2 Maintain grade for services as indicated on Contract Drawings unless directed otherwise by Departmental Representative.
- .3 Service connections to main sewer: Wye fittings or Departmental Representative approved saddles.
 - .1 Do not use break-in and mortar patch-type joints.
- .4 Service connection pipe: not to extend into interior of main sewer.
- .5 Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of four pipe diameters.
 - .1 Use long sweep bends where applicable.
- .6 Plug service laterals with water tight caps or plugs as approved by Departmental Representative.
- .7 Install inspection chamber at specified location set plumb and to specified elevation. If inspection chamber located in driveway, lane or paved surface install cover or lid as shown on Contract Drawings.
- .8 Place location marker at ends of plugged or capped unconnected sewer lines.
 - .1 Each marker: 40 x 90 mm stake extending from pipe end at pipe level to 0.6 m above grade.
 - .2 Paint exposed portion of stake red with designation SAN SWR LINE in black.

3.9 Field Testing

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of

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50mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

- .3 Remove foreign material from sewers and related appurtenances by flushing with water.
- .4 Upon completion of cleaning and flushing of each section carry out leakage testing. Tests may include one or more of the following:
 - .1 Low Pressure Air Test
 - .2 Exfiltration test – using water
 - .3 Infiltration test

Testing to be completed as soon as practicable after jointing and bedding are complete, and service connections have been installed. All tests shall be performed in the presence of a Department Representative.

- .5 Carry out tests on each section of sewer between successive manholes including service connections.
- .6 Install watertight bulkheads in suitable manner to isolate test section from rest of pipeline.
- .7 Low Pressure Air Test:
 - .1 Low pressure air test to include testing of sewer main and service connections in each section. Test manholes by either exfiltration test utilizing water or by low pressure air as specified.
 - .2 Wet inside perimeter of concrete pipes in test section then increase pressure in test section prior to conducting air tests. Then increase pressure in test section to 24 kPa above average groundwater pressure and observe rate of pressure drop.
 - .3 Maintain 25 kPa above average ground water pressure for at least 5.0 minutes before commencing internal air pressure test. Regulate air pressure to prevent pressure inside test section from exceeding 35 kPa above average ground water pressure.
 - .4 Commence test period when pressure decreases to 24.0 kPa above average groundwater pressure and end when pressure decreases to 20.5 kPa above average groundwater pressure. Do not add air to test section during test period. If test period is less than:
 - 2 minutes and 32 seconds for 100mm pipe
 - 3 minutes and 50 seconds for 150mm pipe
 - 5 minutes and 6 seconds for 200mm pipe
 - 6 minutes and 22 seconds for 250mm pipe
 - 7 minutes and 39 seconds for 300mm pipe

Sewer shall be deemed to have failed test. Retest upon completion of repair to any leaks.

- .5 Department Representative reserves right to withdraw permission to use this test procedure at any time and to require Contractor to carry out exfiltration test utilizing water.
- .8 Exfiltration test:
 - .1 Fill test section with water to displace air in line. Maintain under nominal head for 24 hours to ensure absorption in pipe wall is complete before test measurements are begun.
 - .2 Immediately prior to test period add water to pipeline until there is head of 1.2 m over interior crown of pipe measured at highest point of test section or water in manhole is 1.2 m above static ground water level, whichever is greater.
 - .3 Duration of exfiltration test: 3 hours.
 - .4 Water loss at end of test period: not to exceed maximum allowable exfiltration over any section of pipe between manholes.
- .9 Infiltration test:
 - .1 Conduct infiltration test in lieu of exfiltration test where static ground water level is 750 mm or more above top of pipe measured at highest point in line to be used.

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- .2 Do not interpolate a head greater than 750 mm to obtain an increase in allowable infiltration rate.
 - .3 Install watertight plug at upstream end of pipeline test section.
 - .4 Discontinue pumping operations for at least 3 days before test measurements are to begin and during this time, keep thoroughly wet at least one third of pipe invert perimeter.
 - .5 Prevent damage to pipe and bedding material due to flotation and erosion.
 - .6 Place 90 degrees V-notch weir, or other measuring device approved by Departmental Representative in invert of sewer at each manhole.
 - .7 Measure rate of flow over minimum of 1 hour, with recorded flows for each 5 min interval.
- .10 Exfiltration allowable leakage from pipe will be calculated using following formula:
- $$\text{Allowable Leakage (L)} = \frac{H \times D \times L}{K}$$
- Where: H = duration of test in hours,
D = pipe diameter in millimeters
L = length of test section in metres
K = 840
- .11 Where service connections exist along test section allowable leakage from service connections to be calculated by use of above formula and added to that of main sewer leakage to arrive at total allowable leakage. No additional leakage allowance to be made for manholes in test section.
 - .12 Infiltration allowable leakage to be same as that calculated for exfiltration less 10% if external head is 600mm or less. Above infiltration limits to constitute maximum total allowable infiltration for section.
 - .13 Repair and retest sewer line as required, until test results are within limits specified.
 - .14 Repair visible leaks regardless of test results.
 - .15 Television and photographic inspections:
 - .1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.
 - .2 Provide means of access to permit Departmental Representative to do inspections.
 - .3 Payment for inspection services in accordance with payment procedures in PART 1.

END OF SECTION

STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 Section Includes

- .1 Materials and installation for storm sewer.

1.2 Related Sections

- .1 Section 31 05 16-Aggregate Materials.
- .2 Section 31 23 10-Excavating, Trenching and Backfilling.
- .3 Section 33 05 13-Manholes and Catch Basin Structures.

1.3 Measurement Procedures

- .1 All work included in this section shall be included in the lump sum bid for all materials, equipment and labour for the scope of work shown on the plans and specifications.

1.4 References

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 14M, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
 - .2 ASTM C 76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .3 ASTM C 117, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C 136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C 443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
 - .6 ASTM C 506M, Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
 - .7 ASTM C 507M, Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe (Metric).
 - .8 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .9 ASTM D 1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - .10 ASTM D 2680, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
 - .11 ASTM D 3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - .12 ASTM F 405, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
 - .13 ASTM F 667, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.
 - .14 ASTM F 794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

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- .3 CAN/CGSB-34.9, Asbestos-Cement Sewer Pipe.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
 - .1 CAN/CSA-A5, Portland Cement.
 - .2 CAN/CSA-A257 Series-[M92(R1998)], Standards for Concrete Pipe.
 - .3 CSA B1800-[02], Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
 - .1 CSA B182.2, PVC Sewer Pipe and Fittings (PSM Type).
 - .2 CSA B182.4, Profile PVC Sewer Pipe and Fittings.
 - .3 CSA B182.11, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.
 - .4 CSA-G401, Corrugated Steel Pipe Products.
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .5 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA)

1.5 Definitions

- .1 A pipe section is defined as length of pipe between successive catchbasins and/or manholes.

1.6 Submittals

- .1 Certification to be marked on pipe.

1.7 Waste Management and Disposal

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
- .3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .5 Dispose of unused asbestos cement pipe in accordance with regulations governing the disposal of hazardous materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.8 Scheduling

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

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PART 2 PRODUCTS

2.1 Concrete Pipe

- .1 Non-reinforced circular concrete pipe and fittings: to ASTM C 14M as indicated, designed for flexible rubber gasket joints to ASTM C 443M.
- .2 Reinforced circular concrete pipe and fittings: to ASTM C 76M as indicated, designed for flexible rubber gasket joints to ASTM C 443M.
- .3 Reinforced concrete arch pipe: to ASTM C 506M.
- .4 Reinforced concrete elliptical pipe: to ASTM C 507M.
- .5 Lifting holes:
 - .1 Pipe 900mm and less diameter: no lift holes.
 - .2 Pipe greater than 900mm diameter: lift holes not to exceed two in piece of pipe.
 - .3 Provide pre-fabricated plugs to effectively seal lift holes after installation of pipe.

2.2 Plastic Pipe

- .1 Type PSM Poly Vinyl Chloride (PVC): to ASTM D 3034 CSA-B182.2.
 - .1 Standard Dimensional Ratio (SDR): 35.
 - .2 Separate gasket and integral bell system.
 - .3 Nominal lengths: 4 m.
- .2 Large diameter, ribbed PVC sewer pipe and fittings: to CSA B182.4 ASTM F 794.

2.3 Pipe Bedding and Surround Material

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials
- .2 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Cast-in-Place Concrete.

2.4 Backfill Material

- .1 As indicated.

2.5 Joint Mortar

- .1 Portland cement: to CAN/CSA-A5.
- .2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

PART 3 EXECUTION

3.1 Preparation

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 Trenching

- .1 Do trenching Work in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.
- .2 Do not allow contents of sewer or sewer connection to flow into trench.
- .3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

3.3 Concrete Bedding and Encasement

- .1 Do concrete work in accordance with Cast-in-Place Concrete. Place concrete to details as

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indicated.

- .2 Position pipe on concrete blocks to facilitate placing of concrete.
 - .1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.
- .3 Do not backfill over concrete within 24 h after placing.

3.4 Granular Bedding

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layer[s] not exceeding 150mm 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 pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% Modified Proctor Density in compliance with ASTM D1557.
- .6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

3.5 Installation

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Handle pipe using methods approved by Departmental Representative.
 - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
 - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .7 Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .8 Install plastic pipe and fittings in accordance with CSA B182.11.
- .9 Joints:
 - 1 Install gaskets as recommended by manufacturer.
 - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
 - .3 Align pipes before joining.
 - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material.
 - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove

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- disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted.
- .6 Complete each joint before laying next length of pipe.
- .7 Minimize joint deflection after joint has been made to avoid joint damage.
- .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .10 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative, to prevent "creep" during down time.
- .11 Plug lifting holes with Departmental Representative approved prefabricated plugs, set in shrinkage compensating grout.
- .12 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .13 Make watertight connections to manholes and catch basins.
 - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .14 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
 - .1 Joint to be structurally sound and watertight
- .15 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.6 Pipe Surround

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
 - .1 Leave joints and fittings exposed until field testing is completed.
- .3 Hand place surround material in uniform layers not exceeding 150mm compacted thickness as indicated.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95% Modified Proctor Density.
- .6 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.7 Backfill

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 150mm compacted thickness up to grades as indicated.
- .3 Under paving and walks, compact backfill to at least 95% Modified Proctor Density.

3.9 Field Testing

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
- .3 Remove foreign material from sewers and related appurtenances by flushing with water.

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- .4 Television and photographic inspections:
 - .1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means.
 - .2 Provide means of access to permit Departmental Representative to do inspections.

END OF SECTION

REGIONAL DISTRICT OF NANAIMO
JACK BAGLEY PARK REDEVELOPMENT

NANAIMO, BC

Construction Specifications



Issued for Tender

2021.10.05

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	WORK SCHEDULE	
1.	Reach Substantial Performance of the Work as per Construction Manager's schedule.	
2.	Reach Final Completion of the Work of this project as per Construction Manager's schedule.	
2.	SUMMARY OF WORK	
1.	Work of this project includes construction of the Jack Bagley Park Washroom Pavilion and related site work as indicated in the Drawings and Project Manual.	
2.	Work specified in Specifications is divided into Divisions and Sections for reference purposes only. Except as may be otherwise specified in Bid Document, division of work among Contractor, Subcontractors, Sub-subcontractors and suppliers is Bidders' responsibility	

3. WORK RESTRICTIONS

1. Access and Egress.
 1. Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
2. Use of Site and Facilities
 1. Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate work as stated.
 2. Maintain existing services to building and provide for personnel and vehicle access.
 3. Where security is reduced by work provide temporary means to maintain security.
 4. Closures: protect work temporarily until permanent enclosures are completed.
3. Existing Services
 1. Notify, Consultant and utility companies of intended interruption of services and obtain required permission.
 2. Where Work involves breaking into or connecting to existing services, give Consultant 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
 3. Provide for personnel, pedestrian and vehicular traffic.
 4. Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
4. Special Requirements
 1. Carry out noise generating Work in accordance with Regional District of Nanaimo Bylaws.
 2. Keep within limits of work and avenues of ingress and egress.
 3. Delivery and removal of material shall be restricted to times in accordance with Regional District of Nanaimo Bylaws.
5. Building Smoking Restrictions
 1. Smoking is not allowed anywhere on the property.

4. PAYMENT PROCEDURES FOR TESTING

1. Related Requirements Specified Elsewhere:
 1. Particular requirements for inspection and testing to be carried out by testing laboratory designated by Consultant are specified under various sections.
2. Appointment and Payment:
 1. Owner will appoint and pay for services of testing laboratory except follows:
 1. Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

2. Inspection and testing performed exclusively for Contractor's convenience.
 3. Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 4. Mill tests and certificates of compliance.
 5. Tests specified to be carried out by Contractor under the supervision of Consultant.
2. Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant to verify acceptability of corrected work.
3. Contractor's Responsibilities
1. Provide labour, equipment and facilities to:
 1. Provide access to Work for inspection and testing.
 2. Facilitate inspections and tests.
 3. Make good Work disturbed by inspection and test.
 4. Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
 2. Notify Consultant sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
 3. Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
 4. Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Consultant.

5. PROJECT MEETINGS

1. Pre-construction Meeting:
 1. Within 30 days after award of Contract, hold a 1/2 day meeting to discuss construction strategies and procedure.
 2. Representatives of Owner, Consultant, Contractor, major Subcontractors, suppliers listed in bid form, field inspectors and supervisors must be in attendance.
 3. Coordinate time and location of meeting and notify parties concerned minimum 5 days before meeting.
 4. Agenda to include:
 1. Appointment of official representative of participants in the Work.
 2. Schedule of Work: in accordance with Construction Schedule.
 3. Schedule of submission of shop drawings, samples, colour chips.
 4. Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Construction Facilities.
 5. Delivery schedule of specified equipment.
 6. Site security in accordance with Temporary Barriers and Enclosures.
 7. Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 8. Owner provided products and salvaged items as indicated on drawings.

9. Record drawings.
 10. Maintenance manuals in accordance with Closeout Submittals.
 11. Take-over procedures, acceptance, warranties in accordance with Closeout Submittals.
 12. Monthly progress claims, administrative procedures, photographs, hold backs.
 13. Appointment of inspection and testing agencies or firms.
 14. Insurances, transcript of policies.
2. Progress Meetings:
1. During course of Work schedule progress meetings as required.
 2. Contractor, major Subcontractors involved in Work and Consultant and Owner are to be in attendance.
 3. Notify parties minimum 5 days prior to meetings.
 4. Contractor to record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
 5. Agenda to include the following:
 1. Review, approval of minutes of previous meeting.
 2. Review critical information required to maintain the Project Schedule.
 3. Review of Work progress since previous meeting.
 4. Field observations, problems, conflicts.
 5. Problems which impede construction schedule.
 6. Review of off-site fabrication delivery schedules.
 7. Corrective measures and procedures to regain projected schedule.
 8. Revision to construction schedule.
 9. Progress schedule, during succeeding work period.
 10. Review submittal schedules: expedite as required.
 11. Maintenance of quality standards.
 12. Review proposed changes for affect on construction schedule and on completion date.
 13. Other business.

6. CONSTRUCTION SCHEDULE

1. Definitions:
 1. Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
 2. Bar Chart (GANTT Chart): graphic display of schedulerelated information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as dateplaced horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
 3. Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

4. Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
 5. Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
 6. Master Plan: summary-level schedule that identifies major activities and key milestones.
 7. Milestone: significant event in project, usually completion of major deliverable.
 8. Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
 9. Project Planning, Monitoring and Control System: overall system operated by Consultant to enable monitoring of project work in relation to established milestones.
2. Requirements:
 1. Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
 2. Plan to complete Work in accordance with prescribed milestones and time frame.
 3. Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
 4. Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
 3. Submittals:
 1. Provide submittals in accordance with SUBMITTAL PROCEDURES.
 2. Submit to Consultant within 15 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
 4. Project Schedule:
 1. Develop detailed Project Schedule derived from Master Plan.
 2. Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 1. Award.
 2. Shop Drawings, Samples.
 3. Permits.
 4. Mobilization.
 5. Removal of demolition work.
 6. Excavation.
 7. Backfill.
 8. Building footings.
 9. Slab on grade.

10. Structural Steel.
 11. Siding and Roofing.
 12. Interior Architecture (Walls, Floors and Ceiling).
 13. Exterior Painting.
 14. Landscaping.
 15. Plumbing.
 16. Lighting.
 17. Electrical.
 18. Piping.
 19. Controls.
 20. Heating, Ventilating, and Air Conditioning.
 21. Millwork.
 22. Fire Systems.
 23. Testing and Commissioning.
 24. Building Flush-out (IAQ)
 25. Supplied equipment long delivery items.
 26. Engineer supplied equipment required dates.
5. Project Schedule Reporting:
 1. Update Project Schedule every two weeks reflecting activity changes and completions, as well as activities in progress.
 2. Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
 6. Project Meetings:
 1. Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
 2. Weather related delays with their remedial measures will be discussed and negotiated.
- 7. SUBMITTAL PROCEDURES**
1. Administrative:
 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 and no claim for extension by reason of such default will be allowed.
 2. Do not proceed with Work affected by submittal until review is complete.
 3. Present shop drawings, product data, samples and mockups in metric units.
 4. Where items or information is not produced in metric units, converted values are acceptable.

5. 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 coordinated 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.
 6. Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 7. Verify field measurements and affected adjacent Work are co-ordinated.
 8. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.
 9. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
2. Shop Drawings and Product Data:
1. The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
 2. As may be required in specification Sections submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of British Columbia, Canada.
 3. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
 4. Allow 10 full working days for Consultant's review of each submission.
 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.
 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.
 7. Accompany submissions with transmittal letter, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Specification sections and indication of partial or complete submittal for stated section
 5. Other pertinent data.
 8. Submissions include:
 1. Date and revision dates.
 2. Project title and number.
 3. Name and address of:
 1. Subcontractor.
 2. Supplier.
 3. Manufacturer.

4. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
5. Details of appropriate portions of Work as applicable:
 1. Fabrication.
 2. Layout, showing dimensions, including identified field dimensions, and clearances.
 3. Setting or erection details.
 4. Capacities.
 5. Performance characteristics.
 6. Standards.
 7. Operating weight.
 8. Wiring diagrams.
 9. Single line and schematic diagrams.
 10. Relationship to adjacent work.
9. After Consultant's review, distribute copies.
10. Submit electronic copy of shop drawings for each requirement requested, except where hand drawn copies are produced or colours have to be chosen or confirmed, in specification Sections and as Consultant may reasonably request.
11. Submit electronic copies of product data sheets or 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.
12. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 1. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 2. Testing must have been within 3 years of date of contract award for project.
13. Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.
 1. Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 2. Certificates must be dated after award of project contract complete with project name.
14. Submit electronic copies of manufacturer's instructions for requirements requested in specification Sections and as requested by Consultant.
 1. Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
15. Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

1. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
16. Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.
17. Delete information not applicable to project.
18. Supplement standard information to provide details applicable to project.
19. 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.
20. The review of shop drawings is for sole purpose of ascertaining conformance with general concept.
 1. This review shall not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 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 co-ordination of Work of sub-trades.
3. Samples/brochures for colour or texture:
 1. Submit for review samples in duplicate or as required in respective specification Sections. Label samples with origin and intended use.
 2. Deliver samples prepaid to Consultant's business address.
 3. Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
 4. Where colour, pattern or texture is criterion, submit full range of samples.
 5. Adjustments made on samples by 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.
 6. Make changes in samples which Consultant may require, consistent with Contract Documents.
 7. Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.
4. Photographs: Digital Format:
 1. Progress Photographs:
 1. Sizes: between 5 and 10 mega pixel image file size, jpeg image file.
 2. Format: USB flash drive (*.jpg) or e-mail.
 3. Viewpoints: A minimum of four (4) photographs from three (3) different viewpoints will be required up to a maximum of 10 per day.

4. Identification: referenced to photo file with name, location, purpose, and number of project and date of exposure.
 5. Frequency: before concealment and at completion of each discrete phase of construction to owner, consultants and inspectors as needed for their review and acceptance.
5. Certificates and Transcripts:
1. Immediately after award of Contract, submit Workers' Compensation Board status.
 2. Submit transcription of insurance immediately after award of Contract.

8. HEALTH AND SAFETY

1. Responsibility for Work Site Safety This Contractor Is "Prime Contractor":
 1. The Contractor shall, for the purposes of the Occupational Health and Safety Act (British Columbia), and for the duration of the Work of this Contract:
 1. Be the "Prime Contractor" for the "Work Site", and
 2. Meet all requirements of the Occupational Health and Safety Act and Regulations, Workers Compensation Board legislation, the Fire Code legislation and all other applicable laws that govern work place safety.
 2. The Contractor shall direct all Subcontractors, subsubcontractors, Other Contractors, employees, suppliers, workers and any other persons at the "Work Site" on safety related matters, to the extent required to fulfill its "Prime Contractor" responsibilities pursuant to the Act, regardless of:
 1. Whether or not any contractual relationship exists between the Contractor and any of these entities, and
 2. Whether or not such entities have been specifically identified in this Contract.
 3. Safety Certification: Safety certification is a condition of contract award; Contractor is required to maintain a valid Certificate of Recognition (COR) for the duration of the Work of this Contract.
2. References:
 1. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
 2. Province of British Columbia
 1. Occupational Health and Safety Regulation.
3. Submittals:
 1. Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 1. Results of site specific safety hazard assessment.
 2. Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 2. Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant and authority having jurisdiction, weekly.

3. Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.
4. Submit copies of incident and accident reports.
5. Submit WHMIS MSDS - Material Safety Data Sheets.
4. Filing of Notice:
 1. File Notice of Project with Provincial authorities prior to beginning of Work.
5. Safety Assessment:
 1. Perform site specific safety hazard assessment related to project.
6. Meetings:
 1. Schedule and administer Health and Safety meeting with Consultant prior to commencement of Work.
7. Regulatory Requirements:
 1. Do Work in accordance with REGULATORY REQUIREMENTS.
8. General Requirements:
 1. Consultant may respond in writing, where deficiencies or concerns are noted and may request resubmission with correction of deficiencies or concerns.
9. Responsibility:
 1. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
 2. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
10. Unforeseen Hazards:
 1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.
11. Health and Safety Coordinator:
 1. Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 1. Have site-related working experience specific to activities.
 2. Have working knowledge of occupational safety and health regulations.
 3. Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 4. Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

5. Be on site during execution of Work and report directly to and be under direction of site supervisor.
12. Posting of Documents:
 1. Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Consultant.
13. Correction of Non-Compliance:
 1. Immediately address health and safety noncompliance issues identified by authority having jurisdiction or by Consultant.
 2. Provide Consultant with written report of action taken to correct noncompliance of health and safety issues identified.
 3. Owner may stop Work if noncompliance of health and safety regulations is not corrected.
14. Powder Actuated Devices:
 1. Use powder actuated devices only after receipt of written permission from Consultant.
15. Work Stoppage:
 1. Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

9. ENVIRONMENTAL PROCEDURES

1. Definitions:
 1. Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
 2. Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
2. Submittals:
 1. Submittals: in accordance with Submittal Procedures.
 2. Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Consultant. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
 3. Address topics at level of detail commensurate with environmental issue and required construction tasks.
 4. Environmental protection plan, include:
 1. Names of persons responsible for ensuring adherence to Environmental Protection Plan.

2. Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 3. Names and qualifications of persons responsible for training site personnel.
 4. Descriptions of environmental protection personnel training program.
 5. Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 6. Drawings showing locations of proposed material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
 8. Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 9. Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 10. Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
 11. Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
 12. Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 13. Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, disinfection water, hydrostatic test water, and water used in flushing of lines.
 14. Pesticide treatment plan: to be included and updated, as required.
3. Fires:
1. Fires and burning of rubbish on site not permitted.
4. Drainage:

1. Provide sediment control plan that identifies type and location of sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with sediment control plan, Federal, Provincial, and Municipal laws and regulations.
2. Do not dump water containing suspended materials into drainage systems.
3. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
5. Site Clearing and Plant Protection:
 1. Protect trees and plants on site and adjacent properties where indicated on Drawings and in Specifications.
 2. Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
 3. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
 4. Minimize stripping of topsoil and vegetation.
 5. Restrict tree removal to areas indicated or designated by Consultant.
6. Pollution Control:
 1. Maintain temporary erosion and pollution control features installed under this contract.
 2. Control emissions from equipment and plant to local authorities' emission requirements.
 3. Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
 4. Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
7. Notification:
 1. Consultant will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
 2. Contractor: after receipt of such notice, inform Consultant of proposed corrective action and take such action for approval by Consultant.
 3. Consultant will issue stop order of work until satisfactory corrective action has been taken.
 4. No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

10. REGULATORY REQUIREMENTS

1. References and Codes:
 1. Perform Work in accordance with BC Building Code (2018) including amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

2. Meet or exceed requirements of:
 1. Contract documents.
 2. Specified standards, codes and referenced documents.
2. Municipalities:
 1. Perform Work in accordance with the by-laws and ordinances of the Municipality in the jurisdiction of the Work and to the direction of the Authorities Having Jurisdiction.

11. **QUALITY CONTROL**

1. Inspection:
 1. Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
 2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
 3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
 4. Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Consultant shall pay cost of examination and replacement.
2. Independent Inspection Agencies:
 1. Independent Inspection/Testing Agencies will be selected by Consultant for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.
 2. Provide equipment required for executing inspection and testing by appointed agencies.
 3. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
 4. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner, Pay costs for retesting and re-inspection.
3. Access to Work:
 1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
 2. Cooperate to provide reasonable facilities for such access.

4. Procedures:
 1. Notify appropriate agency in advance of requirement for tests, in order that attendance arrangements can be made.
 2. Submit samples or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
 3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
5. Rejected Work:
 1. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
 2. Make good other Contractor's work damaged by such removals or replacements promptly.
 3. If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Consultant.
6. Reports:
 1. Submit electronic copies of inspection and test reports to Consultant.
 2. Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.
7. Tests and Mix Designs:
 1. Furnish test results and mix designs as requested.
 2. Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.
8. Mock-Ups:
 1. Prepare mockups for Work specifically requested in specifications. Include for Work of Sections required to provide mockups.
 2. Construct in locations acceptable to Consultant or as specified in specific Section.
 3. Prepare mockups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
 4. Failure to prepare mockups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
 5. If requested, Consultant will assist in preparing schedule fixing dates for preparation.
 6. Specification section identifies whether mockup may remain as part of Work or if it is to be removed and when.
9. Mill Tests:
 1. Submit mill test certificates as requested or required of specification Sections.

10. Equipment and Systems:
 1. Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

12. TEMPORARY UTILITIES

1. References:
 1. BC Building Code
 1. Part 8 – Safety Measures and Construction and Demolition Sites
 2. Fire Bylaw
 1. Section 5.6
 3. Canadian Standards Association (CSA International)
 1. CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
2. Installation and Removal:
 1. Provide temporary utilities controls in order to execute work expeditiously.
 2. Remove from site all such work after use.
3. Dewatering:
 1. Provide temporary drainage and pumping facilities to keep site free from standing water.
 2. Dispose of dewatering effluent in accordance with Provincial and City regulations.
4. Water Supply:
 1. Provide continuous supply of potable water for construction use.
 2. Pay for utility charges at prevailing rates.
 3. Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
5. Temporary Heating and Ventilation (New Construction):
 1. Provide and pay for temporary heating required during construction period, including attendance, maintenance and fuel.
 2. Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
 3. Provide temporary heat and ventilation in enclosed areas as required to:
 1. Facilitate progress of Work.
 2. Protect Work and products against dampness and cold.
 3. Prevent moisture condensation on surfaces.
 4. Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 5. Provide adequate ventilation to meet health regulations for safe working environment.
 4. Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
 5. Ventilating:
 1. Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

2. Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
3. Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
4. Ventilate storage spaces containing hazardous or volatile materials.
5. Ventilate temporary sanitary facilities.
6. Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
6. Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 1. Conform with applicable codes and standards.
 2. Enforce safe practices.
 3. Prevent abuse of services.
 4. Prevent damage to finishes.
 5. Vent direct-fired combustion units to outside.
7. Permanent heating system of building, not to be used when available. Be responsible for damage to heating system if use is permitted. Temporary heating and power to be part of Construction Manager's General Conditions.
8. On completion of Work for which permanent heating system is used, replace filters and replace bearing. Thoroughly clean permanent equipment used during construction.
9. Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Owner.
10. Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.
6. Temporary Power and Light:
 1. Provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
 2. Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
 3. Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
 4. Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
 5. Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Owner provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.
7. Temporary Communication Facilities:
 1. Provide and pay for temporary telephone, fax, and data hook up lines and equipment as required.

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

13. CONSTRUCTION FACILITIES

1. Installation and Removal:
 1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
 2. Identify areas which have to be gravelled to prevent tracking of mud.
 3. Indicate use of supplemental or other staging area.
 4. Provide construction facilities in order to execute work expeditiously.
 5. Remove from site all such work after use.
2. Scaffolding:
 1. Scaffolding in accordance with CAN/CSA-S269.2.
 2. Provide and maintain scaffolding, ramps, ladders, platforms, temporary stairs.
3. Hoisting:
 1. Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
 2. Hoists and cranes to be operated by qualified operator.
4. Elevators:
 1. Permanent elevator not to be used by construction personnel and transporting of materials. Coordinate use with Owner.
 2. Provide protective coverings for finish surfaces of cars and entrances.
5. Site Storage/Loading:
 1. Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
 2. Do not load or permit to load any part of Work with weight or force that will endanger Work.
6. Construction Parking:
 1. Conform to Regional District of Nanaimo Bylaws regarding street use.
 2. Provide and maintain adequate access to project site.
7. Security:
 1. Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.
 2. Provide fencing and additional security as deemed necessary.
8. Offices:
 1. Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing lay-down table.

2. Provide marked and fully stocked first-aid case in a readily available location.
 3. Subcontractors to provide their own offices as necessary. Direct location of these offices.
 4. The area of Work is available at Contractor's option for project administrative use.
9. Equipment, Tool and Materials Storage:
1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
 2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.
10. Sanitary Facilities:
1. Provide temporary sanitary facilities for work force in accordance with governing regulations and ordinances.
 2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
 3. When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Owner.
11. Construction Signage:
1. Submit Shop Drawing of sign for approval prior to ordering.
 2. Provide and erect project sign, within three weeks of signing Contract, in a location designated by Consultant.
 3. Indicate on sign, name of Consultant and Contractor and Subcontractor of design style established by Consultant.
 4. No other signs or advertisements, other than warning signs, are permitted on site.
12. Protection and Maintenance of Traffic:
1. Provide access as necessary to maintain freely moving public traffic.
 2. Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Consultant.
 3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
 4. Protect travelling public from damage to person and property.
 5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
 6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
 7. Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
 8. Dust control: adequate to ensure safe operation at all times.
 9. Provide snow removal during period of Work.
13. Clean-up:

1. Remove construction debris, waste materials, packaging material from work site daily.
 2. Clean dirt or mud tracked onto paved or surfaced roadways.
 3. Store materials resulting from demolition activities that are salvageable.
 4. Stack stored new or salvaged material not in construction facilities.
14. Temporary Erosion and Sedimentation Control:
1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, sediment and erosion control drawings and sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

14. TEMPORARY BARRIERS AND ENCLOSURES

1. Installation and Removal:
 1. Provide temporary controls in order to execute Work expeditiously.
 2. Remove from site all such work after use.
2. Hoarding:
 1. Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm centres and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.
 1. Apply plywood panels vertically flush and butt jointed.
 2. Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
 2. Erect temporary site enclosure using purpose made, prefabricated interlocking metal fence panels 2.1 m high.
 3. Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
 4. Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
 5. Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
3. Guard Rails and Barricades:
 1. Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
 2. Provide as required by governing authorities.
4. Weather Enclosures:
 1. Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

2. Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
3. Design enclosures to withstand wind pressure and snow loading.
5. Dust Tight Screens:
 1. Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
 2. Maintain and relocate protection until such work is complete.
6. Access to Site:
 1. Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
7. Public Traffic Flow:
 1. Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.
8. Fire Routes and Exits:
 1. Maintain access to property including overhead clearances for use by emergency response vehicles.
9. Protection of Off-Site and Public Property:
 1. Protect surrounding private and public property from damage during performance of Work.
 2. Be responsible for damage incurred.
10. Protection of Building Finishes:
 1. Provide protection for finished and partially finished building finishes and equipment during performance of Work.
 2. Provide necessary screens, covers, and hoardings.
 3. Be responsible for damage incurred due to lack of or improper protection.

15. COMMON PRODUCT REQUIREMENTS

1. References:
 1. Canadian Construction Documents Committee (CCDC)
 1. CCDC 5B – 2010, Construction Management Contract – for Services and Construction
 2. Within text of each specifications section, reference may be made to reference standards.
 3. Conform to these reference standards, in whole or in part as specifically requested in specifications.
 4. If there is question as to whether products or systems are in conformance with applicable standards, Consultant reserves right to have such products or systems tested or to receive test data.
 5. Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of nonconformance.
2. Quality:
 1. Refer to CCDC 5B.

2. Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
 3. Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
 4. Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
 5. Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.
 6. Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
 7. Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
3. Availability:
1. Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be reviewed for possible authorization in ample time to prevent delay in performance of Work.
 2. In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.
4. Storage, Handling and Protection:
1. Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
 2. Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
 3. Store products subject to damage from weather in weatherproof enclosures.
 4. Store cementitious products clear of earth or concrete floors, and away from walls.
 5. Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
 6. Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
 7. Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

8. Remove and replace damaged products at own expense and to satisfaction of Consultant.
9. Touchup damaged factory finished surfaces to Consultant's satisfaction. Use touchup materials to match original. Do not paint over name plates.
5. Transportation:
 1. Pay costs of transportation of products required in performance of Work.
6. Manufacturer's Instructions:
 1. Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
 2. Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions.
7. Quality of Work:
 1. Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.
 2. Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.
 3. Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.
8. Coordination:
 1. Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
 2. Be responsible for coordination and placement of openings, sleeves and accessories.
9. Concealment:
 1. In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
 2. Before installation inform Consultant if there is interference. Install as directed by Consultant.
10. Remedial Work:
 1. Refer to CCDC 5B and Execution.
 2. Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
 3. Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.
11. Location of Fixtures:
 1. Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
 2. Inform Consultant of conflicting installation. Install as directed.
12. Fastenings:

1. Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
 2. Prevent electrolytic action between dissimilar metals and materials.
 3. Use noncorrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
 4. Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
 5. Keep exposed fastenings to a minimum, space evenly and install neatly.
 6. Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
13. Fastenings – Equipment:
1. Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
 2. Use heavy hexagon heads, semifinished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
 3. Bolts may not project more than one diameter beyond nuts.
 4. Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
14. Protection of Work in Progress:
1. Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant.
15. Existing Utilities:
1. When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work.
 2. Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

16. PRODUCT OPTIONS AND SUBSTITUTIONS

1. Definitions:
 1. Acceptable Materials: The term Acceptable Materials is used to specify products by trade name, manufacturer, catalogue number, model number, or similar reference, and is used within the Project Manual as follows:
 1. Acceptable Materials listings are based on Consultant's determination that materials meet specified requirements and opinion of applicability to the project requirements.
 2. Acceptable Materials listings are deemed to establish the standard of acceptance that Consultant will consider appropriate for the Work.
 3. Any product listed in the Acceptable Materials listing may be used to establish the Bid Price.

2. Basis-of-Design Materials: The term Basis-of-Design Materials is used to specify a specific material name, manufacturer, catalogue number, model number or similar reference and is used as follows:
 1. Basis-of-Design Materials are used to establish Consultant's preference for a single source product listing based on performance, appearance or configuration.
 2. Use the Basis-of-Design Material to establish the Bid Price, unless an Addendum is issued adding additional Acceptable Materials.
 3. Basis-of-Design Materials designation does not limit the Contractor's ability to submit Proposed Substitutions in accordance with Substitutions requirements of this Section and specific performance requirements listed in Technical Specification Sections.
3. Non-proprietary specification means a specification which includes descriptive, reference standard or performance requirements, or any combination thereof, but does not include proprietary names of products or manufacturers.
4. Substitution means a proposal from a Contractor to provide a product, material, or item of equipment not specified in the Contract documents but functionally equivalent and readily exchangeable to a specified item; for consideration by Consultant and Owner.
2. Submittals:
 1. When requested by Consultant, submit complete data substantiating compliance of a product with requirements of Contract Documents. Include the following:
 2. Product identification, including manufacturer's name and address.
 3. Written verification that the substitute products can be obtained, meet the performance required for the project, and meet requirements of the BC Building Code.
 4. Manufacturer's literature providing product description, applicable reference standards, and performance and test data.
 5. Samples, as applicable.
 6. Name and address of projects on which product has been used and date of each installation.
 7. For substitutions and requests for changes to accepted products, include in addition to the above, the following:
 1. Itemized comparison of substitution with named product(s). List significant variations.
 2. Designation of availability of maintenance services and sources of replacement materials.
3. Product Options:
 1. For products specified by non-proprietary specification:
 1. Select any product, assembly or material that meets or exceeds the specified standards for products specified only by referenced standards and performance criteria.
 2. Acceptable Materials: Select any named product, assembly or material contained in the listing of Acceptable Materials.

3. Basis-of-Design Materials: Use the named product contained in the Basis-of-Design Material listing, unless an addendum is issued indicating acceptance of additional Acceptable Materials.
4. Substitutions:
 1. Contractor will assemble requests for substitutions requested by subcontractors and submit to Consultant for review.
 2. Consultant will review proposed substitute products for acceptability only when submitted by Contractor; Consultant will not review requests submitted independently by subcontractors.
 3. No substitutions will be permitted without Consultant's written acceptance; Contractor will be required to remove products and replace with specified materials or provide a credit to the value of the contract at Consultant's discretion where substitutions are found in the Work that have not been formally accepted by Consultant and Owner.
 4. Consultant is not obliged to accept any Proposed Substitution offered by Contractor, and reserves the right to dismiss any item with no further explanation.
 5. Substitute Products: Where substitute products are permitted, unnamed products may be accepted by Consultant, subject to the following:
 1. Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.
 6. Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers may be accepted by Consultant, subject to the following:
 1. Substitute manufacturers shall have capabilities comparable to those of the named manufacturer(s). Substitutions shall not require revisions to Contract Documents nor to work of Other Contractors.
 7. In making a proposal for substitution the Contractor represents:
 1. That they have personally investigated the proposal and (unless the proposal explicitly states otherwise) determined that it performs in a similar way or is superior to the product or method specified.
 2. That the same guaranty will be furnished as for the originally specified product or construction method.
 3. That they will coordinate installation of the accepted substitute into the Work, making such changes in the Work as may be required to accommodate the change.
 4. That they will bear costs and waives claims for additional compensation for costs and time that subsequently become apparent arising out of the substitution.

17. EXAMINATION AND PREPARATION

1. References:
 1. Canadian Construction Documents Committee (CCDC)
 1. CCDC 5B – 2010, Construction Management Contract – for Services and Construction

2. Owner's identification of existing survey control points and property limits.
2. Qualifications of Surveyor:
 1. Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Consultant.
3. Survey Reference Points:
 1. Existing base horizontal and vertical control points are designated on drawings.
 2. Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
 3. Make no changes or relocations without prior written notice to Consultant.
 4. Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 5. Require surveyor to replace control points in accordance with original survey control.
4. Survey Requirements:
 1. Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
 2. Establish lines and levels, locate and lay out, by instrumentation.
 3. Stake for grading, fill and topsoil placement and landscaping features.
 4. Stake slopes and berms.
 5. Establish pipe invert elevations.
 6. Stake batter boards for foundations.
 7. Establish foundation column locations and floor elevations.
 8. Establish lines and levels for mechanical and electrical work.
5. Existing Services:
 1. Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.
 2. Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cutoff points as directed by Consultant.
6. Location of Equipment and Fixtures:
 1. Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
 2. Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
 3. Inform Consultant of impending installation and obtain approval for actual location.
 4. Submit field drawings to indicate relative position of various services and equipment when required by Consultant.
7. Records:
 1. Record locations of maintained, rerouted and abandoned service lines.
8. Submittals:
 1. Submit name and address of Surveyor to Consultant.

2. On request of Consultant, submit documentation to verify accuracy of field engineering work.
3. Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.
9. Subsurface Conditions:
 1. Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
 2. After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

18. EXECUTION

1. Submittals:
 1. Submit written request in advance of cutting or alteration which affects:
 1. Structural integrity of elements of project.
 2. Integrity of weather-exposed or moisture-resistant elements.
 3. Efficiency, maintenance, or safety of operational elements.
 4. Visual qualities of sight-exposed elements.
 5. Work of Owner or separate contractor.
 6. Tenants of occupied portions of building.
 2. Include in request:
 1. Identification of project.
 2. Location and description of affected Work.
 3. Statement on necessity for cutting or alteration.
 4. Description of proposed Work, and products to be used.
 5. Alternatives to cutting and patching.
 6. Effect on Work of Owner or separate contractor or tenants.
 7. Written permission of affected separate contractor.
 8. Date and time work will be executed.
2. Materials:
 1. Required for original installation.
 2. Change in Materials: Submit request for substitution in accordance with Submittal Procedures.
3. Preparation:
 1. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
 2. After uncovering, inspect conditions affecting performance of Work.
 3. Beginning of cutting or patching means acceptance of existing conditions.
 4. Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
 5. Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.
4. Execution:

1. Execute cutting, fitting, and patching including excavation and fill, to complete Work.
2. Fit several parts together, to integrate with other Work.
3. Uncover Work to install ill-timed Work.
4. Remove and replace defective and nonconforming Work.
5. Remove samples of installed Work for testing.
6. Provide openings in nonstructural elements of Work for penetrations of mechanical and electrical Work.
7. Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
8. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
9. Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
10. Restore work with new products in accordance with requirements of Contract Documents.
11. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
12. At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with fire-stopping material in accordance with Section 07 84 00 – Fire-stopping, full thickness of the construction element.
13. Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
14. Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

19. CLEANING

1. References:
 1. Canadian Construction Documents Committee (CCDC)
 1. CCDC 5B – 2010, Construction Management Contract – for Services and Construction
2. Project Cleanliness:
 1. Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
 2. Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
 3. Clear snow and ice from access to building, bank/pile snow in designated areas only.
 4. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 5. Provide onsite containers for collection of waste materials and debris.
 6. Provide and use marked separate bins for recycling. Refer to WASTE MANAGEMENT AND DISPOSAL.
 7. Dispose of waste materials and debris off site.
 8. Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

9. Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 10. Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
 11. Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
 12. Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
3. Final Cleaning:
1. Clean work prior to final review by Consultant.
 2. When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
 3. Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
 4. Prior to final review remove surplus products, tools, construction machinery and equipment.
 5. Remove waste products and debris including that caused by Owner or other Contractors.
 6. Remove waste materials from site in accordance with WASTE MANAGEMENT AND DISPOSAL.
 7. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 8. Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and horizontal hard surfaces.
 9. Clean lighting reflectors, lenses, and other lighting surfaces.
 10. Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
 11. Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
 12. Remove dirt and other disfiguration from exterior surfaces.
 13. Sweep and wash clean paved areas.
 14. Clean drainage systems.
 15. Remove debris and surplus materials from accessible concealed spaces.

20. WASTE MANAGEMENT AND DISPOSAL

1. Waste Management Goals:
 1. Prior to start of Work conduct meeting with Consultant to review and discuss Waste Management Plan and Goals.
 2. Waste Management Goal is to divert construction and demolition materials considered recyclable from landfill sites.
 3. Accomplish maximum control of solid construction and demolition waste.
 4. Preserve environment and prevent pollution and environment damage.
2. Definitions:

1. Recyclable: ability of product or material to be recovered at end of its life cycle and remanufactured into new product for reuse.
 2. Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
 3. Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
 4. Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 1. Returning reusable items including pallets or unused products to vendors.
 5. Salvage: removal of structural and nonstructural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
 6. Separate Condition: refers to waste sorted into individual types.
 7. Source Separation: acts of keeping different types of waste materials separate beginning from first time they became waste.
3. Materials Source Separation Program (MSSP):
1. Prepare MSSP and have ready for use prior to project startup.
 2. Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Consultant.
 3. Provide onsite facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
 4. Provide containers to deposit reusable and recyclable materials.
 5. Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
 6. Locate separated materials in areas which minimize material damage.
 7. Collect, handle, store onsite, and transport offsite, salvaged materials in combined condition.
 1. Transport to approved and authorized recycling facility.
 2. Ship materials to site operating under Certificate of Approval.
 3. Materials must be immediately separated into required categories for reuse or recycling.
4. Storage, Handling and Protection:
1. Store, materials to be reused, recycled and salvaged in locations as directed by Consultant.
 2. Unless specified otherwise, materials for removal become Contractor's property.
 3. Protect, stockpile, store and catalogue salvaged items.
 4. Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
 5. Protect structural components not removed for demolition from movement or damage.
 6. Support affected structures. If safety of building is endangered, cease operations and immediately notify Consultant.
 7. Protect surface drainage, mechanical and electrical from damage and blockage.

8. Separate and store materials produced during dismantling of structures in designated areas.
9. Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 1. Onsite source separation is recommended.
 2. Remove co-mingled materials to offsite processing facility for separation.
5. Disposal of Waste:
 1. Do not bury rubbish or waste materials.
 2. Burning rubbish and construction waste materials is not permitted on site.
 3. Do not dispose of waste, volatile materials, mineral spirits, oil, and paint thinner into waterways, storm, or sanitary sewers.
 4. Keep records of construction waste including:
 1. Number and size of bins.
 2. Waste type of each bin.
 3. Reused or recycled waste destination.
 5. Remove materials from deconstruction as deconstruction/disassembly Work progresses.

21. CLOSEOUT PROCEDURES

1. References:
 1. Canadian Construction Documents Committee (CCDC)
 1. CCDC 5B – 2010, Construction Management Contract – for Services and Construction
2. Inspection and Declaration:
 1. Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 1. Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 2. Request Consultant's Field Review.
 3. Consultant's Field Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.
 2. Completion: submit written certificate that following have been performed:
 1. Work has been completed and inspected for compliance with Contract Documents.
 2. Defects have been corrected and deficiencies have been completed.
 3. Equipment and systems have been tested, adjusted and balanced and are fully operational.
 4. Certificates required by Boiler Inspection Branch, Fire Commissioner, and Utility companies have been submitted.
 5. Operation of systems have been demonstrated to Owner's personnel.
 6. Work is complete and ready for final inspection.

3. Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant, and Contractor. If Work is deemed incomplete by Owner and Consultant complete outstanding items and request re-inspection.
 4. Declaration of Substantial Performance: when Owner and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 5B, General Conditions Article for specifics to application.
 5. Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
 6. Final Payment: when Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 5B. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.
 7. Payment of Holdback: after issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 5B.
3. Exiting Signage:
 1. Provide computer generated signage for emergency passage exiting of building. Provide minimum 305 x 305 mm size signs to include at locations as required by Authority having Jurisdiction for building exiting.
 4. Cleaning:
 1. In accordance with CLEANING.
 2. Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with WASTE MANAGEMENT AND DISPOSAL.

22. CLOSEOUT SUBMITTALS

1. Submittals in accordance with Submittal Procedures:
 1. Ensure final submittals to include digital copies of all manuals, warranties and record drawings.
 2. Prepare instructions and data using personnel experienced in maintenance and operation of described products.
 3. Copy will be returned after final inspection, with Consultant's comments.
 4. Revise content of documents as required prior to final submittal.
 5. Two weeks prior to Substantial Performance of the Work, submit to the Consultant, two final copies and one digital version of Operating and Maintenance manuals in English.
 6. Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
 7. Furnish evidence, if requested, for type, source and quality of products provided.
 8. Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

9. Pay costs of transportation.
 10. Submit `redline` marked up construction drawings to the Consultant within 30 days of Substantial Performance and prior to final completion.
 11. Prepare fire safety plan in accordance with Fire Code and local fire bylaw unless specified otherwise by the Owner.
2. Operations and Maintenance Manual Format:
 1. Organize data as instructional manual.
 2. Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
 3. When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
 4. Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
 5. Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.
 6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 7. Text: manufacturer's printed data, or typewritten data.
 8. Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
 9. Provide 1:1 scaled CAD files in dwg format on CD.
 3. Contents – Each Volume:
 1. Table of Contents: provide title of project;
 1. Date of submission; names.
 2. Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 3. Schedule of products and systems, indexed to content of volume.
 2. For each product or system:
 1. List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 3. Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
 4. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
 5. Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
 4. As-Built Drawings and Samples:
 1. Maintain, in addition to requirements in General Conditions, at site for Consultant one record copy of:
 1. Contract Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to Contract.
 5. Reviewed shop drawings, product data, and samples.

6. Field test records.
7. Inspection certificates.
8. Manufacturer's certificates.
2. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
3. Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
4. Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
5. Keep record documents and samples available for inspection by Consultant.
5. Recording Actual Site Conditions:
 1. Record information on set of drawings, and in copy of Project Manual, provided by Consultant.
 2. Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
 3. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
 4. Contract Drawings and shop drawings: mark each item to record actual construction, including:
 1. Measured depths of elements of foundation in relation to finish first floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 4. Field changes of dimension and detail.
 5. Changes made by change orders.
 6. Details not on original Contract Drawings.
 7. References to related shop drawings and modifications.
 5. Specifications: mark each item to record actual construction, including:
 1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 2. Changes made by Addenda and change orders.
 6. Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.
6. Final Survey:
 1. Submit Grading Certificate to Regional District of Nanaimo requirements.
 2. Submit final site survey certificate in accordance with Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or nonconformance with Contract Documents.
7. Real Property Certificate

1. Supply to the Consultant, as soon as construction of foundations and basic ground floor levels are completed, a survey plan from a registered British Columbia Land Surveyor.
 2. Plan shall show dimensioned building plan at ground level, distance from property lines, and elevation of the floor used as datum.
 3. This includes all buildings in Contract.
8. Equipment and Systems:
1. Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 2. Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 3. Include installed colour coded wiring diagrams.
 4. Operating Procedures: include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.
 5. Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 6. Provide servicing and lubrication schedule, and list of lubricants required.
 7. Include manufacturer's printed operation and maintenance instructions.
 8. Include sequence of operation by controls manufacturer.
 9. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 10. Provide installed control diagrams by controls manufacturer.
 11. Provide Contractors co-ordination drawings, with installed colour coded piping diagrams.
 12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 13. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
 14. Include tests as specified in QUALITY CONTROL.
 15. Additional requirements: as specified in individual specification sections.
9. Materials and Finishes:
1. Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for reordering custom manufactured products.
 2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
 3. MoistureProtection and WeatherExposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

4. Additional Requirements: as specified in individual specification sections.
10. Spare Parts:
 1. Provide spare parts, in quantities specified in individual specification sections.
 2. Provide items of same manufacture and quality as items in Work.
 3. Deliver to site, location as directed; place and store.
 4. Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
 5. Obtain receipt for delivered products and submit prior to final payment.
11. Maintenance Materials:
 1. Provide maintenance and extra materials, in quantities specified in individual specification sections.
 2. Provide items of same manufacture and quality as items in Work.
 3. Deliver to site, location as directed; place and store.
 4. Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Operating and Maintenance Manual.
 5. Obtain receipt for delivered products and submit prior to final payment.
12. Special Tools:
 1. Provide special tools, in quantities specified in individual specification section.
 2. Provide items with tags identifying their associated function and equipment.
 3. Deliver to site, location as directed; place and store.
 4. Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Operating and Maintenance Manual.
13. Storage, Handling and Protection:
 1. Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
 2. Store in original and undamaged condition with manufacturer's seal and labels intact.
 3. Store components subject to damage from weather in weatherproof enclosures.
 4. Store paints and freezable materials in a heated and ventilated room.
 5. Remove and replace damaged products at own expense and to satisfaction of Consultant.
14. Warranties and Bonds:
 1. Develop warranty management plan to contain information relevant to Warranties.
 2. Submit warranty management plan, 30 days before planned pre-warranty conference, to Consultant approval.
 3. Warranty management plan to include required actions and documents to assure that Owner receives warranties to which it is entitled.
 4. Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

5. Submit, warranty information made available during construction phase, to Consultant for approval prior to each monthly pay estimate.
6. Assemble approved information in binder and submit upon acceptance of work. Organize binder as follows:
 1. Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 2. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 3. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 4. Verify that documents are in proper form, contain full information, and are notarized.
 5. Co-execute submittals when required.
 6. Retain warranties and bonds until time specified for submittal.
7. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
8. Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Consultant.
9. Include information contained in warranty management plan as follows:
 1. Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 2. Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, pumps, motors, transformers.
 3. Provide list for each warranted equipment, item, feature of construction or system indicating:
 1. Name of item.
 2. Model and serial numbers.
 3. Location where installed.
 4. Name and phone numbers of manufacturers or suppliers.
 5. Names, addresses and telephone numbers of sources of spare parts.
 6. Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 7. Cross-reference to warranty certificates as applicable.
 8. Starting point and duration of warranty period.
 9. Summary of maintenance procedures required to continue warranty in force.
 10. Cross-Reference to specific pertinent Operation and Maintenance manuals.
 11. Organization, names and phone numbers of persons to call for warranty service.
 12. Typical response time and repair time expected for various warranted equipment.

4. Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
5. Procedure and status of tagging of equipment covered by extended warranties.
6. Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
10. Respond in a timely manner to oral or written notification of required construction warranty repair work.
11. Written verification will follow oral instructions. Failure to respond will be cause for the Consultant to proceed with action against Contractor.
15. Pre-Warranty Conference:
 1. Meet with Consultant, to develop understanding of requirements of this section. Schedule meeting prior to contract completion, and at time designated by Consultant.
 2. Consultant will establish communication procedures for:
 1. Notification of construction warranty defects.
 2. Determine priorities for type of defect.
 3. Determine reasonable time for response.
 3. Provide name, telephone number and address of licensed and bonded company that is authorized to initiate and pursue construction warranty work action.
 4. Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.
16. Warranty Tags:
 1. Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Consultant.
 2. Attach tags with copper wire and spray with waterproof silicone coating.
 3. Leave date of acceptance until project is accepted for occupancy.
 4. Indicate following information on tag:
 1. Type of product/material.
 2. Model number.
 3. Serial number.
 4. Contract number.
 5. Warranty period.
 6. Inspector's signature.
 7. Construction Contractor.

23. DEMONSTRATION AND TRAINING

1. Description:
 1. Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of Substantial Performance.
 2. Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.
2. Quality Control:

1. When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.
3. Submittals in accordance with Submittal Procedures:
 1. Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Consultant's approval.
 2. Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
 3. Give time and date of each demonstration, with list of persons present.
4. Conditions for Demonstrations:
 1. Testing, adjusting, and balancing has been performed in accordance with Mechanical and Electrical conditions of the Work and equipment and systems are fully operational.
 2. Provide copies of completed Operation and Maintenance manuals for use in demonstrations and instructions.
5. Preparation:
 1. Verify that conditions for demonstration and instructions comply with requirements.
 2. Verify that designated personnel are present.
6. Demonstration and Instructions:
 1. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
 2. Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 3. Review contents of manual in detail to explain aspects of operation and maintenance.
 4. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.
7. Time Allocated for Instructions:
 1. Ensure amount of time required for instruction of each item of equipment or system as follows:
 1. HVAC and Associated Controls: 16 hours of instruction
 2. Electrical and Associated Controls: 12 hours of instruction
 3. Plumbing: 4 hours of instruction
 4. Control System: 8 hours of instruction.
 5. Fire Alarm System: 4 hours
 6. Provide additional instruction as necessary and as indicated in technical Sections.

24. GENERAL COMMISSIONING (CX) REQUIREMENTS

1. Summary:
 1. Section Includes:

1. General requirements relating to commissioning of project's components and systems, specifying general requirements to Performance Verification (PV) of components, equipment, sub-systems, systems, and integrated systems.
2. Acronyms:
 1. AFD – Alternate Forms of Delivery, service provider.
 2. BMM – Building Management Manual.
 3. Cx – Commissioning.
 4. EMCS – Energy Monitoring and Control Systems.
 5. IST – Integrated Systems Testing.
 6. O&M – Operation and Maintenance.
 7. PI – Product Information.
 8. PV – Performance Verification.
 9. TAB – Testing, Adjusting and Balancing.
2. General:
 1. Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:
 1. Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 2. Ensure appropriate documentation is compiled into the BMM.
 3. Effectively train O&M staff.
 2. Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.
 1. Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
 2. During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.
 3. Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.
3. Commissioning Overview:
 1. Cx to be a line item of Contractor's cost breakdown.
 2. Cx activities supplement field quality and testing procedures described in relevant technical sections.
 3. Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
 4. Consultant will issue Interim Acceptance Certificate when:

1. Completed Cx documentation has been received, reviewed for suitability and approved by Consultant.
2. Equipment, components and systems have been commissioned.
3. O&M training has been completed.
4. Non-Conformance to Performance Verification Requirements:
 1. Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the un-functional system, including related systems as deemed required by Consultant, to ensure effective performance.
 2. Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.
5. Pre-Cx Review:
 1. Before Construction:
 1. Review contract documents, confirm by writing to Consultant.
 1. Adequacy of provisions for Cx.
 2. Aspects of design and installation pertinent to success of Cx.
 2. During Construction:
 1. Co-ordinate provision, location and installation of provisions for Cx.
 3. Before Start of Cx:
 1. Have completed Cx Plan up-to-date.
 2. Ensure installation of related components, equipment, sub-systems, systems is complete.
 3. Fully understand Cx requirements and procedures.
 4. Have Cx documentation shelf-ready.
 5. Understand completely design criteria and intent and special features.
 6. Submit complete start-up documentation to Consultant.
 7. Have Cx schedules up-to-date.
 8. Ensure systems have been cleaned thoroughly.
 9. Complete TAB procedures on systems, submit TAB reports to Consultant for review and approval.
 10. Ensure "As-Built" system schematics are available.
 4. Inform Consultant in writing of discrepancies and deficiencies on finished works.
6. Conflicts:
 1. Report conflicts between requirements of this section and other sections to Consultant before start-up and obtain clarification.
 2. Failure to report conflict and obtain clarification will result in application of most stringent requirement.
7. Submittals in accordance with Submittal Procedures:
 1. Submit no later than 4 weeks after award of Contract:

1. Name of Contractor's Cx agent.
2. Draft Cx documentation.
3. Preliminary Cx schedule.
2. Request in writing to Consultant for changes to submittals and obtain written approval at least 8 weeks prior to start of Cx.
3. Submit proposed Cx procedures to Consultant where not specified and obtain written approval at least 8 weeks prior to start of Cx.
4. Provide additional documentation relating to Cx process required by Consultant.
8. Commissioning Documentation:
 1. Refer to Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.
 2. Consultant to review and approve Cx documentation.
 3. Provide completed and approved Cx documentation to Consultant.
9. Commissioning Schedule:
 1. Provide detailed Cx schedule as part of construction schedule in accordance with Construction Schedule.
 2. Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:
 1. Approval of Cx reports.
 2. Verification of reported results.
 3. Repairs, retesting, re-commissioning, re-verification.
 4. Training.
10. Commissioning Meetings:
 1. Convene Cx meetings following project meetings, in accordance with Construction Schedule and as specified herein.
 2. Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.
 3. Continue Cx meetings on regular basis until commissioning deliverables have been addressed.
 4. At 60% construction completion stage, Consultant to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:
 1. Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
 2. Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.
 5. Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.
 6. Meetings will be chaired by [Consultant] [Contractor] [Cx Agent], who will record and distribute minutes.
 7. Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.
11. Starting and Testing:

1. Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.
12. Witnessing of Starting and Testing:
 1. Provide 14 days notice prior to commencement.
 2. Consultant to witness start-up and testing.
 3. Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.
13. Manufacturer's Involvement:
 1. Factory testing: manufacturer to:
 1. Coordinate time and location of testing.
 2. Provide testing documentation for approval by Consultant.
 3. Arrange for Consultant to witness tests.
 4. Obtain written approval of test results and documentation from Consultant before delivery to site.
 2. Obtain manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Consultant.
 1. Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 2. Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.
 3. Integrity of Warranties:
 1. Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
 2. Verify with manufacturer that testing as specified will not void warranties.
 4. Qualifications of Manufacturer's Personnel:
 1. Experienced in design, installation and operation of equipment and systems.
 2. Ability to interpret test results accurately.
 3. To report results in clear, concise, logical manner.
14. Procedures:
 1. Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
 2. Conduct start-up and testing in following distinct phases:
 1. Included in delivery and installation:
 1. Verification of conformity to specification, approved shop drawings and completion of PI report forms.
 2. Visual inspection of quality of installation.
 2. Start-up: follow accepted start-up procedures.
 3. Operational testing: document equipment performance.
 4. System PV: include repetition of tests after correcting deficiencies.
 5. Post-substantial performance verification: to include fine-tuning.

3. Correct deficiencies and obtain approval from Consultant after distinct phases have been completed and before commencing next phase.
 4. Document required tests on approved PV forms.
 5. Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Consultant. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:
 1. Minor equipment/systems: implement corrective measures approved by Consultant.
 2. Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Consultant.
 3. If evaluation report concludes that major damage has occurred, Consultant shall reject equipment.
 1. Rejected equipment to be removed from site and replaced with new.
 2. Subject new equipment/systems to specified start-up procedures.
15. Start-Up Documentation:
1. Assemble start-up documentation and submit to Consultant for approval before commencement of commissioning.
 2. Start-up documentation to include:
 1. Factory and on-site test certificates for specified equipment.
 2. Pre-start-up inspection reports.
 3. Signed installation/start-up check lists.
 4. Start-up reports,
 5. Step-by-step description of complete start-up procedures, to permit Consultant to repeat start-up at any time.
16. Operation and Maintenance of Equipment and Systems:
1. After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
 2. With assistance of manufacturer develop written maintenance program and submit Consultant for approval before implementation.
 3. Operate and maintain systems for length of time required for commissioning to be completed.
 4. After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.
17. Test Results:
1. If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
 2. Provide manpower and materials, assume costs for re-commissioning.
18. Start of Commissioning:
1. Notify Consultant at least 21 days prior to start of Cx.
 2. Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

19. Instruments / Equipment:
 1. Submit to Consultant for review and approval:
 1. Complete list of instruments proposed to be used.
 2. Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.
 2. Provide the following equipment as required:
 1. 2-way radios.
 2. Ladders.
 3. Equipment as required to complete work.
20. Commissioning Performance Verification:
 1. Carry out Cx:
 1. Under [actual] [accepted simulated] operating conditions, over entire operating range, in all modes.
 2. On independent systems and interacting systems.
 2. Cx procedures to be repeatable and reported results are to be verifiable.
 3. Follow equipment manufacturer's operating instructions.
 4. EMCS trending to be available as supporting documentation for performance verification.
21. Witnessing Commissioning:
 1. Consultant to witness activities and verify results.
22. Authorities Having Jurisdiction:
 1. Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.
 2. Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.
 3. Provide copies to Consultant within 5 days of test and with Cx report.
23. Commissioning Constraints:
 1. Since access into secure or sensitive areas will be very difficult after occupancy it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.
24. Extrapolation of Results:
 1. Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Consultant in accordance with equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.
25. Extent of Verification:
 1. Laboratory Areas:
 1. Provide manpower and instrumentation to verify up to 100% of reported results.

2. Elsewhere:
 1. Provide manpower and instrumentation to verify up to 30% of reported results, unless specified otherwise in other sections.
 3. Number and location to be at discretion of Consultant.
 4. Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
 5. Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
 6. Perform additional commissioning until results are acceptable to Consultant.
26. Repeat Verifications:
1. Assume costs incurred by Consultant for third and subsequent verifications where:
 1. Verification of reported results fail to receive Consultant's approval.
 2. Repetition of second verification again fails to receive approval.
 3. Consultant deems Contractor's request for second verification was premature.
27. Sundry Checks and Adjustment:
1. Make adjustments and changes which become apparent as Cx proceeds.
 2. Perform static and operational checks as applicable and as required.
28. Deficiencies, Faults, Defects:
1. Correct deficiencies found during start-up and Cx to satisfaction of Consultant.
 2. Report problems, faults or defects affecting Cx to Consultant in writing. Stop Cx until problems are rectified. Proceed with written approval from Consultant.
29. Completion of Commissioning:
1. Upon completion of Cx leave systems in normal operating mode.
 2. Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
 3. Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Consultant.
30. Activities Upon Completion of Commissioning:
1. When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.
31. Training:
1. In accordance with Commissioning (Cx) – Training.
32. Maintenance Materials, Spare Parts, Special Tools:
1. Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.
33. Occupancy:

1. Cooperate fully with Consultant during stages of acceptance and occupancy of facility.
34. Installed Instrumentation:
 1. Use instruments installed under Contract for TAB and PV if:
 1. Accuracy complies with these specifications.
 2. Calibration certificates have been deposited with Consultant.
 2. Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.
35. Performance Verification Tolerances:
 1. Application tolerances:
 1. Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.
 2. Instrument accuracy tolerances:
 1. To be of higher order of magnitude than equipment or system being tested.
 3. Measurement tolerances during verification:
 1. Unless otherwise specified actual values to be within +/- 2% of recorded values.
36. Owner's Performance Testing:
 1. Performance testing of equipment or system by Consultant will not relieve Contractor from compliance with specified start-up and testing procedures.

25. COMMISSIONING (CX) PLAN

1. Summary:
 1. Section includes description of overall structure of Cx Plan and roles and responsibilities of Cx team.
2. General:
 1. Provide a fully functional facility.
 1. Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
 2. Facility user and O&M personnel have been fully trained in aspects of installed systems.
 3. Optimized life cycle costs.
 4. Complete documentation relating to installed equipment and systems.
 2. Term "Cx" in this section means "Commissioning".
 3. Use this Cx Plan as master planning document for Cx:
 1. Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
 2. Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.

3. Sets out deliverables relating to O&M, process and administration of Cx.
4. Describes process of verification of how built works meet Owner/Investor's requirements.
5. Produces a complete functional system prior to issuance of Certificate of Occupancy.
6. Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
 1. Overview of Cx.
 2. General description of elements that make up Cx Plan.
 3. Process and methodology for successful Cx.
4. Acronyms:
 1. Cx - Commissioning.
 2. BMM - Building Management Manual.
 3. EMCS - Energy Monitoring and Control Systems.
 4. IST – Integrated Systems Testing
 5. MSDS - Material Safety Data Sheets.
 6. PI - Product Information.
 7. PV - Performance Verification.
 8. TAB - Testing, Adjusting and Balancing.
 9. WHMIS - Workplace Hazardous Materials Information System.
5. Commissioning terms used in this Section:
 1. Bumping: short term start-up to prove ability to start and prove correct rotation.
 2. Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.
3. Development Of 100% Cx Plan:
 1. Cx Plan to be 95% completed before added into Project Specifications.
 2. Cx Plan to be 100% completed within 8 weeks of award of contract to take into account:
 1. Approved shop drawings and product data.
 2. Approved changes to contract.
 3. Contractor's project schedule.
 4. Cx schedule.
 5. Contractor's, sub-contractor's, suppliers' requirements.
 6. Project construction team's and Cx team's requirements.
 3. Submit completed Cx Plan to Consultant and obtain written approval.
4. Refinement Of Cx Plan:
 1. During construction phase, revise, refine and update Cx Plan to include:
 1. Changes resulting from Client program modifications.
 2. Approved design and construction changes.
 2. Revise, refine and update every 6 months during construction phase. At each revision, indicate revision number and date.
 3. Submit each revised Cx Plan to Consultant for review and obtain written approval.

4. Include testing parameters at full range of operating conditions and check responses of equipment and systems.
5. Composition, Roles And Responsibilities Of Cx Team:
 1. Consultant to maintain overall responsibility for project and is sole point of contact between members of commissioning team.
 2. Project Manager will select Cx Team consisting of following members:
 1. Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
 2. Quality Assurance Commissioning Manager: ensures Cx activities are carried out to ensure delivery of a fully operational project including:
 1. Review of Cx documentation from operational perspective.
 2. Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
 3. Protection of health, safety and comfort of occupants and O&M personnel.
 4. Monitoring of Cx activities, training, development of Cx documentation.
 5. Work closely with members of Cx Team.
 3. Consultant is responsible for:
 1. Organizing Cx.
 2. Monitoring operations Cx activities.
 3. Witnessing, certifying accuracy of reported results.
 4. Witnessing and certifying TAB and other tests.
 5. Developing BMM.
 6. Ensuring implementation of final Cx Plan.
 7. Performing verification of performance of installed systems and equipment.
 8. Implementation of Training Plan.
 4. Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
 1. Testing.
 2. TAB.
 3. Performance of Cx activities.
 4. Delivery of training and Cx documentation.
 5. Assigning one person as point of contact with Consultant and Cx Manager for administrative and coordination purposes.
 5. Contractor's Cx agent implements specified Cx activities including:
 1. Demonstrations.
 2. Training.
 3. Testing.
 4. Preparation, submission of test reports.
 6. Property Manager: represents lead role in Operation Phase and onwards and is responsible for:

1. Receiving facility.
 2. Day-To-Day operation and maintenance of facility.
6. Cx Participants:
1. Employ the following Cx participants to verify performance of equipment and systems:
 1. Installation contractor/subcontractor:
 1. Equipment and systems except as noted.
 2. Equipment manufacturer: equipment specified to be installed and started by manufacturer:
 1. To include performance verification.
 3. Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.
 4. Specialist Cx agency:
 1. Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or expertise of Cx specialists on this project.
 5. Client: responsible for intrusion and access security systems.
 6. Ensure that Cx participant:
 1. Could complete work within scheduled time frame.
 2. Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
 1. Modify ventilation rates to meet changes in off-gassing.
 2. Changes to heating or cooling loads beyond scope of EMCS.
 3. Changes to EMCS control strategies beyond level of training provided to O&M personnel.
 4. Redistribution of electrical services.
 5. Modifications of fire alarm systems.
 6. Modifications to voice communications systems.
 7. Provide names of participants to Consultant and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.
7. Extent of Cx:
1. Cx Structural and Architectural Systems.
 2. Commission mechanical systems and associated equipment:
 1. Plumbing systems.
 2. HVAC and exhaust systems.
 3. Fire and life safety systems.
 4. Noise and vibration control systems for mechanical systems.
 5. Seismic restraint and control measures.
 6. IAQ environmental control systems.
 7. EMCS.
 8. Energy metering systems for [steam] [hot water] [chilled water] [electricity][_____].
 3. Commission electrical systems and equipment:

1. High voltage.
 2. Low voltage below 750 V.
 3. Emergency power generation systems.
 4. Lighting systems.
 5. Fire alarm systems, equipment.
 6. Other systems and equipment.
8. Deliverables Relating To O&M Perspectives:
1. General requirements:
 1. Compile [English] [and] [French] documentation.
 2. Documentation to be computer-compatible format ready for inputting for data management.
 2. Provide deliverables:
 1. Warranties.
 2. Project record documentation.
 3. Inventory of spare parts, special tools and maintenance materials.
 4. Maintenance Management System (MMS) identification system used.
 5. WHMIS information.
 6. MSDS data sheets.
 7. Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.
9. Deliverables Relating To The Cx Process:
1. General:
 1. Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.
 2. Definitions:
 1. Cx as used in this section includes:
 1. Cx of components, equipment, systems, subsystems, and integrated systems.
 2. Factory inspections and performance verification tests.
 3. Deliverables: provide:
 1. Cx Specifications.
 2. Startup, pre-Cx activities and documentation for systems, and equipment.
 3. Completed installation checklists (ICL).
 4. Completed product information (PI) report forms.
 5. Completed performance verification (PV) report forms.
 6. Results of Performance Verification Tests and Inspections.
 7. Description of Cx activities and documentation.
 8. Description of Cx of integrated systems and documentation.
 9. Tests witnessed by Design Quality Review Team.
 10. Tests performed by [Owner/User] [____].
 11. Training Plans.

12. Cx Reports.
13. Prescribed activities during warranty period.
4. Consultant to witness and certify tests and reports of results provided to Consultant.
5. Consultant to participate.
10. Pre-Cx Activities And Related Documentation:
 1. Items listed in this Cx Plan include the following:
 1. Pre-Start-Up inspections: by Consultant prior to permission to start up and rectification of deficiencies to Consultant's satisfaction.
 2. Consultant to use approved check lists.
 3. Consultant will monitor[some] [all] of these pre-start-up inspections.
 4. Include completed documentation with Cx report.
 5. Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Consultant and does not form part of Cx specifications.
 6. Consultant will monitor some of these inspections and tests.
 7. Include completed documentation in Cx report.
11. Start-Up:
 1. Start up components, equipment and systems.
 2. Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction, following equipment, systems:
 1. [].
 3. Consultant to monitor [some][all] of these start-up activities.
 1. Rectify start-up deficiencies to satisfaction of Consultant.
 4. Performance Verification (PV):
 1. Approved Cx Agent to perform.
 1. Repeat when necessary until results are acceptable to Consultant.
 2. Use procedures modified generic procedures to suit project requirements.
 3. Consultant to witness and certify reported results using approved PI and PV forms.
 4. Consultant to approve completed PV reports and provide to Consultant.
 5. Consultant [reserves right to] [will] verify up to 30% of reported results at random.
 6. Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.
12. Cx Activities And Related Documentation:
 1. Perform Cx by specified Cx agency using procedures developed by Consultant and approved by Consultant.
 2. Consultant to monitor Cx activities.

3. Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.
 4. Consultant to witness, certify reported results of, Cx activities and forward to Consultant.
 5. Consultant reserves right to verify a percentage of reported results at no cost to contract.
13. Cx Of Integrated Systems And Related Documentation:
1. Cx of integrated systems shall be implemented to bring systems from a state of individual substantial completion to full dynamic operation. During the testing process, unexpected, conflicting and incorrect system operations shall be identified, recorded and corrected. The completion of testing shall result in expected and reliable functioning of all complementary systems, in all modes and demand loading.
 2. Cx to be performed by specified Cx specialist, using procedures developed by Consultant and approved by Consultant.
 3. Tests to be witnessed by Consultant, and documented on approved report forms.
 4. Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Consultant and submitted to Consultant for review.
 5. Consultant reserves right to verify percentage of reported results.
 6. Integrated systems to include:
 1. HVAC and associated systems forming part of integrated HVAC systems: [].
 2. Smoke control systems: [].
 3. Stair shaft pressurization systems: [].
 4. Indoor air quality: [].
 5. Environmental space conditions: [].
 6. Fire alarm systems: [].
 7. Fire pumps and controllers: [].
 8. Fire protection and life safety systems: [].
 9. Voice communications systems: [].
 10. Emergency power generator: [].
 11. Transfer switch and controllers: [].
 12. Emergency lighting systems: [].
 13. [].
 7. Identification:
 1. In later stages of Cx, before hand-over and acceptance Consultant, Contractor, Project Manager and Cx Manager to co-operate to complete inventory data sheets and provide assistance to Owner in full implementation of MMS identification system of components, equipment, sub-systems, systems.
14. Installation Check Lists (ICL):
1. Refer to Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.
15. Product Information (PI) Report Forms:
1. Refer to Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

16. Performance Verification (Pv) Report:
 1. Refer to Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.
17. Deliverables Relating To Administration Of Cx:
 1. General:
 1. Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.
18. Cx Schedules:
 1. Prepare detailed critical path Cx Schedule and submit to Consultant for review and approval same time as project Construction Schedule.
Include:
 1. Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
 1. Design criteria, design intents.
 2. Pre-TAB review: 28 days after contract award, and before construction starts.
 3. Cx agents' credentials: 60 days before start of Cx.
 4. Cx procedures: 3 months after award of contract.
 5. Cx Report format: 3 months after contract award.
 6. Discussion of heating/cooling loads for Cx: 3 months before start-up.
 7. Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
 8. Notification of intention to start TAB: 21 days before start of TAB.
 9. TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
 10. Notification of intention to start Cx: 14 days before start of Cx.
 11. Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
 12. Identification of deferred Cx.
 13. Implementation of training plans.
 14. Cx of smoke management/control systems: after Cx of related systems is completed and 7 days before proposed date of Cx these systems.
 15. Cx stair shaft pressurization systems: [before issuance of occupancy certificate] [at same time as emergency evacuation exercises].
 16. Cx reports: immediately upon successful completion of Cx.
 17. Emergency evacuation exercises: after 80% occupancy [and at same time as Cx of stair shaft pressurization systems].

2. Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.
 3. 6 months in Cx schedule for verification of performance in all seasons and wear conditions.
2. After approval, incorporate Cx Schedule into Construction Schedule.
 3. Consultant, Contractor, Contractor's Cx agent, and Consultant will monitor progress of Cx against this schedule.
19. Cx Reports:
 1. Submit reports of tests, witnessed and certified by Consultant to Consultant who will verify reported results.
 2. Include completed and certified PV reports in properly formatted Cx Reports.
 3. Before reports are accepted, reported results to be subject to verification by Consultant.
20. Preliminary and Final Cx:
 1. [].
21. Activities During Warranty Period:
 1. Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
 1. Fine tuning of HVAC systems.
 2. Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.
 3. Full-scale emergency evacuation exercises.
22. Tests To Be Performed By Owner/User:
 1. None is anticipated on this project.
23. Training Plans:
 1. Refer to Commissioning (Cx) – Training.
24. Final Settings:
 1. Upon completion of Cx to satisfaction of Consultant lock control devices in their final positions, indelibly mark settings marked and include in Cx Reports.
25. Payments for Cx:
 1. [].

END OF SECTION

1. General

1.1. RELATED SECTIONS

1. Structural – Cast in Place Concrete.

1.2. REFERENCES

1. American Concrete Institute (ACI):
 1. ACI 117/117M10 (R2015), ACI Manual of Practice: Specifications for Tolerances for Concrete Construction and Materials, (ACI 117-10) and Commentary.
 2. ACI 301-16, Specification for Structural Concrete.
 3. ACI 302.1R15, ACI Manual of Practice: Guide for Floor and Slab Construction.
2. American Society for Testing and Materials International (ASTM)
 1. ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 2. ASTM D1752-18, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
 3. ASTM D2047-17, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine
3. Canadian General Standards Board (CGSB)
 1. CAN/CGSB25.2095, Surface Sealer for Floors.
4. Canadian Standards Association (CSA)
 1. CSAA23.1 19/A23.2-19, Concrete Materials and Methods of Concrete Construction/Testing Methods and Standard Practices for Concrete, Includes Update No. 1 (2015).
5. International Concrete Repair Institute (ICRI)
 1. ICRI 310.2R2013, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays and Concrete Repair – Guide Only
6. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule 1113-16, Architectural Coatings.

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
 2. Submit WHMIS MSDS Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.
 3. Include application instructions for concrete floor treatments.
2. Submit closeout data in accordance with Section 01 11 00 – General Requirements, Closeout Submittals.

1. Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.

1.4. QUALITY ASSURANCE

1. Performance Requirements
 1. Product quality and quality of work in accordance with Section 01 11 00 – General Requirements, Common Product Requirements.
 2. Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.5. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.6. ENVIRONMENTAL REQUIREMENTS

1. Temporary lighting:
 1. Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.
2. Electrical power:
 1. Provide sufficient electrical power to operate equipment normally used during construction.
3. Work area:
 1. Make the work area water tight protected against rain and detrimental weather conditions.
4. Temperature:
 1. Maintain ambient temperature of not less than 10 degree 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.
5. Moisture:
 1. Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
6. Safety:
 1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
7. Ventilation:
 1. Ventilate enclosed spaces in accordance with Section 01 11 00 – General Requirements, Temporary Utilities and in accordance with Occupational Health and Safety (OHS) Regulations.
 2. Provide continuous ventilation during and after coating application.

2. Products

2.1. PERFORMANCE/DESIGN CRITERIA

1. Refer to Structural Drawings for Slab Cambers as these numbers will rule over the items below.
 1. F1-Finishing: Floors having a straightedge value of ± 8 mm over 3050 mm; similar to CSA A23.1 Class A Slab Finishing.
 2. F3-Finishing: Floors having a straightedge value of ± 5 mm over 3050 mm; similar to CSA A23.1 Class C Slab Finishing.
 3. F4-Finishing: Floors having a straightedge value of ± 3 mm over 3050 mm; similar to CSA A23.1 Class D Slab Finishing.

2.2. LEVELLING MATERIALS

1. Underlayment: Cementitious, self levelling, single component, polymer modified underlayment and manufacturer's low VOC recommended primer, for application thicknesses to a minimum feather edge to 13 mm.
 1. Acceptable Materials:
 1. CustomTech TechLevel100, Custom Building Products
 2. Eucofloor SL160, Euclid Chemical.
 3. Sure-Flo ST, Gemite.
 4. NXT Level, Laticrete
 5. Novoplan 2 Plus, MAPEI Inc.
 6. Sikafloor Level 125, Sika Canada Ltd.
 2. Overlayment: Cementitious, self levelling, single component, polymer modified overlayment, for application thicknesses to a minimum of 13 mm to 25 mm.
 1. Acceptable Materials:
 1. CustomTech TechLevel150, Custom Building Products
 2. Sure-Flo FT 100, Gemite.
 3. NXT Level, Laticrete
 4. Ultraplan 1 Plus, MAPEI Inc.
 5. Sikafloor Level 25, Sika Canada Ltd.
 3. Patching and Flash Patching Materials: Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion with manufacturer's recommended primer and surface profile; for application in thicknesses to a minimum of 4 mm to 25 mm, and as follows:
 1. Acceptable Materials:
 1. SD-P, Ardex
 2. CustomTech TechPatchMP, Custom Building Products
 3. NXT Patch, Laticrete
 4. Planitop 18 ES, MAPEI Inc.
 5. SikaQuick 1000, Sika
 6. Sealtight MeadowCrete H, W.R. Meadows

2.3. CRACK REPAIR MATERIALS

1. Crack repair and filler: two-component, nonshrink, 100% solids, moisture-insensitive, VOC free, and meeting the requirements of ASTM C881.
 1. Basis of Design Materials:
 1. Planibond EBA, MAPEI Canada Inc.

2.4. HARDENERS

1. Type: 1, Sodium silicate, permanent penetrating sealer and hardener
 1. Liquid applied, water based, chemically reactive.
 2. Non-toxic, non-flammable, and anti-dusting have low or no VOC.
 3. Colour: colourless
 4. Acceptable Materials:
 1. Protech III, Cornerstone Coatings
 2. Ashford Formula, Curecrete
 3. Pentra-Hard, Dayton Superior Corporation
 4. Euco Diamond Hard, Euclid Chemical Company
 5. Seal Hard, L&M Construction Company
 6. Mapecrete Hard SB, Mapei Inc.
 7. Sikafloor 3S, Sika Canada
 8. Sealtight Liqui-Hard, W.R. Meadows
2. Water: potable.

2.5. SEALING COMPOUNDS

1. Surface sealer: to CAN/CGSB25.20, Type 2 water based, clear.
 1. Surface sealers manufactured or formulated with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, hexavalent chromium and their compounds are not acceptable.
 2. Surface sealer shall be compatible with the hardener and shall be manufactured by hardener manufacturer.
 3. Surface sealer shall have less than 100g/l of VOC in accordance with SCAQMD Rule #1113.
2. Wax: acrylic carnuba wax.

2.6. CURING COMPOUNDS

1. Select low VOC, waterbased, organicsolvent free curing compounds.
 1. Concrete Curing Compounds: maximum VOC limit 100 g/L in accordance with SCAQMD Rule #1113.

2.7. MIXES

1. Mixing, ratios and application in accordance with manufacturers instructions.

2.8. ACCESSORIES

1. Joint Filler Strips:
 1. Floor Isolation Joints: ASTM D1751, bituminous impregnated fibreboard, or ASTM D1752, cork or self-expanding cork, 13 mm thick minimum.

2. Edge Joint Filler: ASTM D1751, bituminous impregnated fibreboard, 13 mm thick minimum.
2. Control Joint Filler:
 1. Two component, epoxy-urethane, load bearing, self levelling sealant.
 1. Acceptable Materials:
 1. Euco Qwikjoint UVR, Euclid Chemical
 2. Planiseal Rapid Joint 15, MAPEI Inc.
 3. Loadflex, Sika Canada
 4. Rezi-Weld Flex, WR Meadows
 3. Stair Nosing Strips: extruded aluminum alloy 6063-T6, filled with virgin aluminum oxide and silicon carbide abrasive granules in epoxy binder.
 1. Colour: As directed by Consultant.
 2. Size: 75 mm wide x 6 mm thick x length of tread.
 3. Acceptable Materials:
 1. Style 3511, American Safety Tread Co. Inc.
 2. Bold Step straight edge anchor, Surefoot

3. Execution

3.1. EXAMINATION

1. Prepare floor surface in accordance with CSA A23.1.
2. Verify that slab surfaces are ready to receive work and elevations are as instructed by manufacturer.

3.2. REPAIRS

1. Inspect surfaces for defects immediately after removal of forms. Repair or patch defects within 48 hours of removal of forms with cure repairs same as new concrete with Consultants permission.
2. Defective Areas: where patches are allowed, repair and patch areas to match surrounding areas in texture and colour.

3.3. FINISHING FORMED SURFACES

1. Requirements listed below apply to normal structural concrete; refer to Section 03 30 00 for additional requirements for formed exposed architectural concrete.
2. Unspecified Finish: Provide following finishes as applicable when finish of formed surfaces is not specifically indicated:
 1. Unexposed Surfaces:
 1. Rough form finish for concrete not exposed to view.
 2. Smooth form finish for concrete to receive membrane waterproofing.
 2. Exposed Surfaces:
 1. Smooth form finish for concrete surfaces exposed to view.
3. Rough Form Finish: Leave surfaces with texture imparted by forms; patch tie holes and defects; remove fins longer than 6 mm high.

4. Smooth Form Finish: Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces with number of seams kept to a minimum, uniformly spaced in an orderly pattern; patch tie holes and defects; completely remove fins.
5. Sack Rubbed Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes; add white hydraulic cement in amounts determined by trial patches so colour of dry grout will match adjacent surfaces; rub surfaces with clean burlap and keep damp by fog spray for a minimum of 36 hours after grout whitens.
6. Related Unformed Finish: Strike-off concrete smooth and finish with using texture matching adjacent formed surfaces at tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces; continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces.
7. Penetrating Sealer Finish: Apply penetrating sealer to vertical and overhead surfaces after any patching, joint sealing or caulking is completed in accordance with manufacturer's written instructions.

3.4. FINISHING FLOORS AND SLABS

1. Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.
2. Scratch Finishing:
 1. Texture concrete surface that have been screeded and bullfloated or darbied while still plastic.
 2. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 6 mm in 1 direction.
 3. Apply scratch finishing to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.
3. Float (Initial) Finishing:
 1. Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power driven floats.
 2. Restraighten, cut down high spots, and fill low spots.
 3. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 4. Apply float finishing to surfaces indicated and receiving trowel finishing.
4. Trowel (Final) Finishing:
 1. Commence trowel finishing after all bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface.
 2. Apply first trowelling and consolidate concrete by hand or powerdriven trowel after applying float finishing; continue trowelling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance; repair or smooth any surface defects that would telegraph through applied coatings or floor covering.
 3. Apply a trowel finishing to surfaces indicated, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thinfilmfinish coating system.
 4. Finish surfaces to the tolerances indicated above.

5. Broom Finishing:
 1. Apply a broom finishing to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 2. Slightly roughen trafficked surface by brooming with fibre bristle broom perpendicular to main traffic route immediately after float finishing.
 3. Coordinate required final finishing with Consultant before application.
6. Slip Resistive Finishing:
 1. Apply slip resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps before final floating in accordance with manufacturer's written instructions and as follows:
 1. Uniformly spread manufacturer's recommended rate of dampened slipresistive aggregate over surface in 1 or 2 applications.
 2. Tamp aggregate flush with surface; do not force below surface.
 3. Apply float finishing after broadcasting and tamping.
 4. Lightly work surface with a steel wire brush or an abrasive stone and water to expose slipresistive aggregate after curing.

3.5. APPLICATION: GENERAL

1. After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant.
2. Apply floor treatment in accordance with Sealer manufacturer's written instructions.
3. Clean overspray. Clean sealant from adjacent surfaces.
4. Cure concrete in accordance with manufacturers recommended procedures.

3.6. APPLICATION: LIQUID APPLIED FLOOR HARDENER

1. Apply liquid floor hardener in accordance with manufacturer's written instructions after initial floating.
2. Cure concrete in accordance with manufacturer's recommended instructions.
3. Apply hardener to horizontal and vertical exposed concrete to remain unfinished.

3.7. PROTECTION

1. Protect finished installation in accordance with manufacturer's instructions.

3.8. MAINTENANCE

1. Provide training to Owner's representative based on written manufacturer's instructions as indicated in Section 01 11 00 – General Requirements, Closeout Submittals.

END OF SECTION

1. General

1.1. SUMMARY

1. This Section specifies the requirements for shop-applied powder coatings for metal fabrications, railings, and balustrades.

1.2. RELATED REQUIREMENTS

1. Section 09 91 00 – Painting

1.3. REFERENCES

1. American Architectural Manufacturers Association (AAMA)
 1. AAMA 2604-13, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
2. ASTM International (ASTM)
 1. ASTM B117-16, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 2. ASTM D1654-08 (2016)e1, Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
 3. ASTM D2244-16, Standard Practice for Calculation of Colour Tolerances and Colour Differences from Instrumentally Measured Colour Coordinates
 4. ASTM D2247-15, Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity.
 5. ASTM D3363-05(2011)e2, Standard Test Method for Film Hardness by Pencil Test.
 6. ASTM D4214-07 (2015), Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 7. ASTM D7091-13, Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
 8. ASTM E1980-11, Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
3. Canadian Institute of Steel Construction (CISC):
 1. CISC Code of Standard Practice, 8th Edition, 2016.
 2. CISC Code of Standard Practice, Appendix I, Architecturally Exposed Structural Steel (AESS).

1.4. ADMINISTRATIVE REQUIREMENTS

1. Coordinate submittal and selection procedures for items to receive shop-applied coatings. Where items are indicated to match coatings selected for other items, adjust formulations as required to achieve match. Submit samples for verification indicating compliance with matching requirements.

1.5. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Product Data:
 1. Submit powder coat cured physical properties for each type of application indicated.
 2. Submit transportation, storage, and handling requirements pertaining to powder coated Products.
 3. Submit coating maintenance and touch-up guidelines.
2. Submit Samples for Initial Selection: for each type of powder coat application indicated.
3. Submit Samples for Verification: For each type of powder coating application and in each colour and gloss indicated.
 1. Submit Samples on substrate materials specified, 200 mm square.
 2. Label each sample with Contract number and title, colour name and number, sheen name and gloss values, date, and name of manufacturer.
 3. Label each Sample for location and application area.
4. Submit Product List: for each substrate indicated, cross-reference products to powder coating finish colour and gloss, and locations of application. Use same designations indicated on Drawings and in schedules.
5. Quality Control Submittals:
 1. Certificates of Compliance: manufacturer's certification that finishes applied on Project components comply with referenced AAMA standards.
6. Submit qualifications for shop-applied coatings applicator.
7. Warranty: At completion of Contract, submit powder coating manufacturer's five year coating warranty.

1.6. QUALITY ASSURANCE

1. Applicator Qualifications: Coating manufacturer's approved and certified applicator who is equipped, trained and approved for application of coatings required for this project, and is approved to provide the warranty specified in this Section
2. Verify accuracy of components, quantities, and sizes prior to application of finishes.
3. Work shall be to AAMA 2604, which is the minimum standard of quality and performance acceptable for this project.

1.7. DELIVERY, STORAGE, AND HANDLING

1. Transport, handle, store, and protect products in accordance with the manufacturer's printed guidelines.
2. Store products off ground, and protected from direct sunlight.
3. Protect products from exposure to harmful weather conditions. Store at temperature and humidity conditions recommended by supplier.
4. Remove damaged or deteriorated Products from site.

1.8. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling and divert waste from landfill in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.9. SITE CONDITIONS

1. Ambient Conditions: Maintain area where Products are being installed at a uniform temperature and humidity for 24 hours prior to, during, and after installation in accordance with supplier's guidelines; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where work is being installed.

1.10. WARRANTY

1. Coating Warranty: coating applicator's warranty in which applicator agrees to repair finish or replace coated items that demonstrate deterioration of shopapplied finishes within warranty period indicated.
 1. Exposed coating: deterioration includes but is not limited to:
 1. Colour fading in excess of 5 Delta E Hunter units per ASTM D2244.
 2. Peeling, checking, or cracking of coating adhesion to metal.
 3. Chalking in excess of a No. 8 per ASTM D4214, when tested per Method D659.
 4. Corrosion of substrate in excess of a No. 6 on cut edges and a No. 8 on field surfaces, when measured per ASTM D1654.
 2. Warranty period: 5 years from date of Substantial Performance.

2. Products

2.1. MATERIALS

1. Powder Coating Materials:
 1. Super durable or modified polyester based coating (TGIC-Free), to AAMA 2604, three-coat system (primer, intermediate coat, and topcoat), colour and gloss to be selected from manufacturer's full range.
 1. Acceptable Materials:
 1. POWDURA® Super Durable TGIC-Free Polyester powder coating system, Sherwin-Williams
 2. Drylac® Series 58 TGIC-Free Super Durable Polyester powder coating system, TIGER
 2. Primer: as recommended by powder coating system manufacturer, suitable for substrates and exposures.
 3. Touch-up coating materials: as recommended by powder coating manufacturer for post-installation repairs and touch-ups.
 2. Finishing:
 1. Pre-treatment: mechanically clean and chemically pre-treat fabricated items in accordance with coating manufacturer's requirements and AAMA 2604 requirements for finish indicated.
 2. Application: apply primer and finish coats in accordance with coating manufacturer's requirements for finish indicated.

3. Concealed / backer finish: pre-treat substrate and apply coating applicator's standard polyester or epoxy finish in accordance with manufacturers' requirements.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Comply with the following:
 1. Powder coating manufacturer's guidelines and data sheets.
 2. AAMA 2604 guidelines.
 3. Applicable sections of CISC Code of Standard Practice.

3.2. EXAMINATION

1. Verify site conditions.
2. Examine substrates and conditions for compliance with requirements for conditions affecting performance of work.
3. Verify compatibility and suitability of substrates.
4. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
5. Coating application indicates acceptance of surfaces and conditions.

3.3. PREPARATION

1. Architecturally exposed steel at railings, stairs, and balustrades shall be fabricated to CISC Code of Standard Practice, AESS 4: Showcase Elements.
2. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.
3. Remove plates, machined surfaces, and similar items already in place that are not to be powder coated.
 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
4. Clean substrates of substances that could impair bond of powder coating, including dirt, oil, grease, and incompatible paints, primers, and encapsulants.
5. Prepare substrates to provide required finished appearance prior to powder coating and in accordance with the powder coating manufacturer's requirements.

3.4. APPLICATION

1. Shop-apply powder coating to achieve required finishes and performance criteria.
 1. Use powder coat formula and method suitable to substrate, location, and finish indicated.
 2. Powder coat thickness to be as required to meet powder formula cured physical properties from manufacturer's printed data sheets.
2. Apply powder coatings to produce a uniform and consistent surface coverage with no seams, layers, lines or other surface imperfections. Produce sharp lines and colour breaks.

3. To the extent practical, powder-coat fabrications, otherwise, fabricate using powder coated materials, to Section 05 50 00 – Metal Fabrications, Section 05 51 29 – Metal Stairs and Ladders, drawings, and as required to meet the design intent.

3.5. INSTALLATION

1. Prime and paint cut-outs, uncoated edges, ends, faces, undersides, and back sides with compatible coating system in accordance with powder coating manufacturer's guidelines.
2. Install products in accordance with the drawings. Refer to individual specification sections for installation requirements for items receiving shopapplied coatings.

3.6. REPAIR

1. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces using touch-up materials recommended by powder coating manufacturer.

3.7. CLEANING

1. Remove protective wrap (if used) from coated items at time of installation
2. Clean finished surfaces after installation in accordance with finish manufacturer's instructions.

3.8. PROTECTION

1. Protect finished Work.
2. Protect work of other trades against damage from Product installation and related site coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Consultant, and leave in an undamaged condition.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 07 27 19 – Sheet Membrane Air and Vapour Barrier
2. Section 07 52 00 – Modified Bituminous Membrane Roofing
3. Section 07 62 00 – Sheet Metal Flashing and Trim
4. Section 09 91 00 – Painting

1.2. REFERENCES

1. American Society for Testing and Materials International (ASTM)
 1. ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 2. ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 3. ASTM A653/A653M19a, Standard Specification for Steel Sheet, ZincCoated (Galvanized) or ZincIron AlloyCoated (Galvanealled) by the HotDip Process.
 4. ASTM C954-18, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 5. ASTM D176112, Standard Test Methods for Mechanical Fasteners in Wood.
 6. ASTM D505516, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood IJoists.
 7. ASTM D545618, Standard Specification for Evaluation of Structural Composite Lumber Products.
 8. ASTM E1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.
 9. ASTM F1482-15, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
 10. ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
2. American Wood Preservers Association (AWPA):
 1. AWPA Book of Standards, 2016
3. California Air Resources Board (CARB)
 1. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products (2007)
4. Canadian General Standards Board (CGSB)
 1. CAN/CGSB11.3M87, Hardboard. .(Withdrawn)
 2. CAN/CGSB51.32M77, Sheathing, Membrane, Breather Type. . (Withdrawn)
 3. CAN/CGSB51.34M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction. (Withdrawn)
 4. CAN-CGSB 71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems (Withdrawn)

5. Canadian Standards Association (CSA International)
 1. CSA A123.203 (R2013), Asphalt-Coated Roofing Sheets.
 2. CAN/CSAA247M86 (R1996), Insulating Fiberboard.
 3. CSA B1111974(R2003), Wire Nails, Spikes and Staples.
 4. CAN/CSAG16418, Hot Dip Galvanizing of Irregularly Shaped Articles.
 5. CAN/CSA O80 Series15, Wood Preservation
 6. CSA O112 SeriesM1977 (R2006), CSA Standards for Wood Adhesives.
 7. CSA O12117, Douglas Fir Plywood.
 8. CSA O12216, Structural GluedLaminated Timber.
 9. CSA O14105 (R2014), Softwood Lumber.
 10. CSA O15117, Canadian Softwood Plywood.
 11. CSA O15313 (R2017), Poplar Plywood.
 12. CAN/CSAO325-16, Construction Sheathing.
 13. CSA O437 Series93(R2011), Standards on OSB and Waferboard
 14. CSA T530-99, Commercial Building Standard for Telecommunications Pathways and Spaces (Adopted ANSI/TIA/EIA-569-A)
6. National Lumber Grading Association (NLGA):
 1. NLGA SPS22010, Special Products Standards on Machine StressRated Lumber.
 2. Standard Grading Rules for Canadian Lumber 2010.
7. South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 1. SCAQMD Rule 1113-16, Architectural Coatings.
 2. SCAQMD Rule 1168-05, Adhesive and Sealant Applications.
8. Truss Design and Procedures for Light Metal Connected Wood Trusses, Truss Plate Institute of Canada.
9. Underwriters' Laboratories of Canada (ULC)
 1. CAN/ULC S102.218, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 2. CAN/ULCS70111, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 3. CAN/ULC-S770-15, Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams.
10. Definitions
 1. For the purpose of this project the following definitions shall apply:
 1. Structural Light Framing: All horizontal and vertical load bearing framing including members indicated as "Studs" on the drawings shall be considered to be No. 2 Grade and better and shall be used throughout unless prior approval is provided by the Consultant.
 2. Stud Framing: Vertical framing members of non-load bearing wall systems may be considered as No. 3 or Stud Grade and may only be used where the consultant gives prior approval. Use of No. 3 and Stud Grade framing material will not be allowed for any horizontal applications.

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature, specifications and data sheets.
 2. Submit MSDS sheets or official manufacturer literature stating no urea-formaldehyde was used in the manufacturing of composite wood.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit 100 mm x 300 mm samples of cedar to receive finish, to the Consultant for review.
3. Quality Control Submittals: Prior to covering exterior sheathing and shear walls, request structural engineer to review nailing patterns and provide confirmation report to Consultant.

1.4. QUALITY ASSURANCE

1. Lumber shall be graded and stamped by an agency certified by Canadian Lumber Standards Accreditation Board.
2. Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5. DELIVERY, STORAGE, AND HANDLING

1. Deliver wood products bundled or crated to provide adequate protection during transit. Inspect wood products for damage upon delivery and remove and replace damaged materials.
2. Store materials a minimum of 150 mm off the ground on blocking. Keep materials under cover and dry. Provide for air circulation within and around stacks and under temporary coverings.
3. Protect sheet materials to prevent breaking of corners and damage to surfaces.

1.6. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

2. Products

2.1. LUMBER

1. Lumber: Stud Grade to CAN/CSA-O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:
 1. Moisture Content: maximum 19% at time of installation.
 2. Maximum moisture content when used for attachment of drywall: 16%.
 3. Meeting requirements of the Building Code.
2. Lumber: Structural Light Framing and Structural Joists and Planks to CAN/CSA-O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:

1. Moisture Content: maximum 19% at time of installation.
2. Maximum moisture content when used for attachment of drywall: 16%.
3. Grade: No. 2 or better.
4. Meeting requirements of the Building Code.

2.2. PANEL MATERIALS

1. Sheathing for structural shear wall and diaphragms:
 1. Plywood: Douglas Fir (DFP) or Canadian Softwood (CSP), Sheathing Grade, to CSA O121 or O151, thickness as indicated on Drawings.
2. Other sheathing:
 1. Fire Rated Plywood Panels to CSA O325, Class A fire retardant produced under Performance Standard PS-1, certified by the American Plywood Association.
 1. Basis of Design Materials:
 1. Purekor Fire Retardant Plywood.
 2. Exterior applications: marine-grade Douglas fir sheathing, Grade B-B; exposure durability rating shall be 'EXTERIOR', and the glue used shall be a fully waterproof structural adhesive
 3. Plywood panels to CSA O325, thickness as indicated on Drawings.
 4. Interior sheathing shall be ULC labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.
 5. All plywood used in sub-flooring assembly shall be T&G Unsanded Sheathing Grade Phenolic Bonded Douglas fir Plywood with staggered joints.
3. Underlayment:
 1. Plywood to CSA O325, thickness as indicated on Drawings, S1S, with no knot fillers detrimental to areas to receive finish floor products specified in Section 09 65 00 – Resilient Flooring meeting the requirements of ASTM F1482.

2.3. MISCELLANEOUS LUMBER

1. Provide lumber for support or attachment of other construction, including furring, blocking, nailing strips, ground, rough bucks, cants, curbs, fascia, backing sleepers, and similar members.
2. Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on drawings.
3. Moisture Content: 19% maximum for lumber items not specified to receive wood preservative treatment.
4. Grade: for dimension lumber sizes provide No. 2 or Standard grade lumber per NLGA. For board-sized lumber, provide sheathing grade, S2S.

2.4. WOOD PRESERVATIVE

1. Where lumber or plywood is indicated as preservative treated or is specified to be treated, treated in accordance with CAN/CSA O80.9M and AWPA.
2. Wood preservatives containing arsenic or chromium are not permitted.

3. Pressure treat above ground items with waterborne preservatives to minimum retention of 4.0 kg/m³. After treatment, kiln-dry lumber and plywood to maximum moisture content of 19% and 15% respectively. Treat indicated items and the following:
 1. Wood cants, nailing strips, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapour barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry and concrete.
 3. Wood framing members less than 460 mm above grade.
 4. Wood floor plates installed over concrete slabs directly in contact with earth.
4. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum of 6.4kg/m³
5. Fire-Retardant Treatment: to CAN/SCA O80.9M, CAN/CSA O80.20M and CAN/CSA O80.27M, pressure impregnated, and as follows:
 1. Flame Spread Classification: FSC 25 maximum.
 2. Smoke developed of not more than: 75.
6. Complete fabrication of treated items before treatment where possible. If cut after treatment apply field treatment to cut surfaces.
7. Wood Preservatives: Maximum allowable VOC limit 350 g/L in accordance with SCAQMD Rule #1113 - Architectural Coatings.

2.5. FASTENER FINISHES

1. Galvanizing: to CAN/CSAG164, use galvanized fasteners for exterior work, pressure preservative, and fire retardant treated lumber.
2. Bolts, lag screws, split rings and shear plates: No. 304 (18-8) stainless steel.

2.6. ACCESSORIES

1. Air seal: closed cell polyurethane or polyethylene.
2. Sealants: in accordance with Section 07 92 00 – Sealants.
 1. Maximum allowable VOC limit 250 g/L in accordance with SCAQMD Rule 1168.
3. Subflooring adhesive: to CGSB71.26, cartridge loaded.
 1. Maximum allowable VOC limit 50 g/L in accordance with SCAQMD Rule 1168.
4. General purpose adhesive: to CSA O112 Series.
 1. Maximum allowable VOC limit 70 g/L in accordance with SCAQMD Rule 1168.
5. Nails, spikes and staples: to CSA B111, hot dipped galvanized for exterior work and pressure preservative and fire retardant treated materials.
6. Surface Applied Wood Preservative:
 1. Containing minimum 5% clear pentachlorophenol in accordance with CAN/CSA O80 Series M89.

2. Apply minimum of 2 coats applied in accordance with manufacturers written instructions.
3. Basis of Design Materials:
 1. OsmosePentox Inc.
7. Rough Hardware (bolts, nuts, washers, etc.): Hot dip galvanized in conformity to CSA G164 or Grade A low carbon steel, conforming to ASTM A307.
8. Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.
9. Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.
10. Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.
11. Roof sheathing HClips: formed "H" shape, thickness to suit panel material, extruded 6063T6 aluminum alloy type approved by Consultant.
12. Expanding foam sealant:
 1. Acceptable Materials:
 1. GREAT STUFF PRO™ by Dow Canada
 2. Hilti (Canada) Ltd. CF Filler Foams.
 3. Approved alternates.

3. Execution

3.1. INSTALLATION

1. Comply with requirements of Building Code 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. Select exposed framing for appearance. Install lumber and panel materials so that grade marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
6. Install subflooring with panel end joints located on solid bearing, staggered at least 800 mm.
 1. In addition to mechanical fasteners, secure floor subflooring to floor joists using glue and screws. Place continuous adhesive bead in accordance with manufacturer's instructions, singlebead on each joist and doublebead on joists where panel ends butt.
7. Install blocking at locations indicated to support washroom accessories.
8. Install wall sheathing in accordance with manufacturer's printed instructions.
9. Install roof sheathing in accordance with local codes.
10. Install furring and blocking as required to space out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.

11. Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
 1. Align and plumb faces of furring and blocking to tolerance of 1:600.
12. Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
13. Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
14. Install sleepers as indicated.
15. Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.2. WOOD FRAME CONSTRUCTION

1. Space framing members as indicated otherwise on drawings. Construct members of continuous pieces of longest possible length.
2. Provide 38 x 89 mm blocking at 610 mm ^o/_c between engineered floor joists for lateral support of wall plates where walls run parallel to joists.
3. Make allowance for erection stresses. Securely brace members in place to maintain plumb and true until permanently fixed and held to structure.
4. Install fireblocking as detailed.
5. Fabricate wood frame construction to the requirements of the Building Code, Part 9, except where more stringent requirements are indicated on the drawings.
6. Minimum sizes and spacing of members, thickness of materials, allowable species and lumber grades, shall meet the requirements of the above noted standards, unless indicated or specified otherwise.
7. Minimize cutting of framing members for pipes, etc. by prior consultation with other trades. Cutting limitations in accordance with the Building Code.
8. Construct framing as necessary to accommodate the work of other trades.

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. POWER, TELECOMMUNICATIONS AND DATA PANEL BOARDS

1. Install 19 mm fir plywood boards on all walls in power, telephone, and data rooms receiving wiring and equipment; minimum 1220 mm x 2440 mm panels on periphery walls over 300 mm wide, mounted 150 mm off of finished floor; coordinate installation and locations with Electrical.
2. Paint panels with 2 coats of light coloured fire retardant intumescent paint finish; coat all sides of panels (back, front and sides) to meet the intent of fire rated panel requirements listed in CSA T530 and ANSI/TIA/EIA 569-A requirements.

END OF SECTION

1. General

1.1. INTENT

1. Materials of this section are to be Forest Stewardship Council graded wood.
2. The work of this section includes the supply, fabrication, and delivery to the job site finishing, and installation of site manufactured finish carpentry indicated on the drawings and as specified.
3. Finish carpentry work shall include all clear, kiln dried, dressed, or resawn material exposed to view in a finished building interior and exterior, including running and standing trim, wall bases, door frames, paneling, trim and other trim related products.

1.2. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 09 91 00 – Painting

1.3. REFERENCES

1. American National Standards Institute (ANSI)
 1. ANSI A208.12009, Particleboard.
 2. ANSI A208.22009, Medium Density Fibreboard (MDF) for Interior Applications.
 3. ANSI/HPVA HP-1-2009, Standard for Hardwood and Decorative Plywood.
2. American Society for Testing and Materials International (ASTM)
 1. ASTM D1037-12, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
 2. ASTM E133314, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
 3. ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
3. Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 1. North American Architectural Woodwork Standards(NAAWS), Most Recent Edition.
4. California Air Resources Board (CARB)
 1. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products (2007)
5. Canadian General Standards Board (CGSB)
 1. CAN/CGSB11.3M87, Hardboard.(Withdrawn)
6. Canadian Plywood Association (CanPly)
 1. The Plywood Handbook 2005.
7. Canadian Standards Association (CSA International)
 1. CAN/CSAG16418, Hot Dip Galvanizing of Irregularly Shaped Articles.
 1. CAN/CSA O80 Series15, Wood Preservation

2. CSA O12117, Douglas Fir Plywood
3. CAN/CSA O14105 (R2014), Softwood Lumber.
4. CSA O15117, Canadian Softwood Plywood.
5. CSA O15313 (R2017), Poplar Plywood.
6. CSA Z76094 (R2001), Life Cycle Assessment.
8. National Hardwood Lumber Association (NHLA)
 1. Rules for the Measurement and Inspection of Hardwood and Cypress 2011.
9. National Lumber Grades Authority (NLGA)
 1. Standard Grading Rules for Canadian Lumber 2007.
10. South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
 1. SCAQMD Rule 1113-16, Architectural Coatings.
 2. SCAQMD Rule 1168-05, Adhesive and Sealant Applications.
11. Underwriters Laboratories of Canada (ULC)
 1. CAN/ULCS10410, Standard Method for Fire Tests of Door Assemblies.
 2. CAN/ULC 105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104 (CAN/ULC-s105:2016).
12. Western Red Cedar Lumber Association (WRCLA)

1.4. ADMINISTRATION REQUIREMENTS

1. Coordination
 1. Coordinate provision of concealed blocking or supports.
 2. Ensure that back-priming of finish carpentry surfaces concealed after installation, has been performed as specified in Section 09 91 00 – Painting, prior to installation.

1.5. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittal Procedures
 1. Indicate details of construction, profiles, jointing, fastening and other related details.
 2. Indicate materials, thicknesses, finishes and hardware.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit samples, 300 mm x 300 mm of each wood species to receive finish, to the Consultant for review.
 2. Submit 250 mm long samples of each type of trim, moulding and handrail.
 3. Reviewed samples shall become the standard for the work.

1.6. CLOSEOUT SUBMITTALS

1. Provide operations and maintenance data in accordance with Section 01 11 00 – General Requirements, Closeout Submittals.

1.7. QUALITY ASSURANCE

1. Architectural Woodwork Standards (NAAWS) published by the Architectural Woodwork Manufacturers Association of Canada, together with authorized additions and amendments will be used as a reference standard and shall form part of this project specification. Where differences occur between the drawings and specifications requirements and the NAAWS, the more restrictive requirement shall prevail.
2. Any reference to Custom or Premium grade in this specification shall be as defined in the NAAWS.
3. Any item not given a specific quality grade shall be Custom grade as defined in the NAAWS.
4. A copy of the NAAWS shall be made readily available for reference purposes on the job site.
5. References in this specification to part and item numbers mean those parts and items contained within the NAAWS.
6. Materials and installation shall be in Metric measurements as specified.

1.8. DELIVERY, STORAGE AND HANDLING

1. The Architectural Woodwork Manufacturer and the Contractor shall be jointly responsible to make certain that architectural woodwork is not delivered until the building and storage areas are sufficiently dry so that the architectural woodwork will not be damaged by excessive changes in moisture content.
2. Architectural woodwork delivery, storage and handling shall be in accordance with Section 2 Care and Storage of the NAAWS.
3. Delivered materials which are damaged in any way or do not comply with these specifications will be rejected by the Consultant and shall be removed from the job site and replaced with acceptable materials.

1.9. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.10. SITE CONDITIONS

1. Environmental Conditions: Comply with the NAAWS Section 2 – Care & Storage for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized.

2. Products

2.1. LUMBER MATERIAL

1. Softwood lumber: unless specified otherwise, spruce-pine-fir species, S4S, average moisture content of 6% and maximum of 9% for interior work, an average moisture content of 12% and maximum of 15% for exterior work, in accordance with following standards:
 1. CAN/CSA0141.
 2. NLGA Standard Grading Rules for Canadian Lumber.

3. NAAWS custom grade, moisture content as specified.

2.2. PANEL MATERIAL

1. Medium density fibreboard (MDF): Meeting ASTM D1037 and ANSI A208.2, Custom Grade for interior use, minimum 750 kg/m³ density; formaldehyde emissions shall be 0.30 ppm or less per 0.424m²/m³ of room value.
 1. Urea-formaldehyde free.
 2. Acceptable Materials:
 1. Flakeboard Premier MDF, Arauco.
 2. Flakeboard Premier MDF FR, Arauco.
 3. PlumCreek SuperRefined MDF2, PlumCreek.
 4. Medex and Medite II MDF, Roseburg
 5. Medite MDF FR, Roseburg
 6. Ranger Premium MDF, West Fraser Mills Ltd.

2.3. BASEBOARDS AND DOOR FRAMES

1. Provide baseboards and interior door frames in accordance with NAAWS Section 6 and as follows:
 1. Width: 57 mm.
 2. Material: MDF
 3. Finish: Paint in accordance with Section 09 91 00.

2.4. WOOD STAIRS AND HANDRAILS

1. Provide interior wood stair and handrails in accordance with NAAWS Section 7 and as follows:
 1. Handrail Diameter: 32 mm.
 2. Species: Hardwood species as directed by Consultant.
 3. Finish: Clear stain in accordance with Section 09 91 00.
2. Brackets: Coordinate installation of wood tread and rails with Section 05 50 00 – Metal Fabrications.

2.5. SITE FABRICATION

1. Fabricate items rigid, plumb and square, as detailed, with tight, bevelled, hairline joints. Sand work smooth, set all nails and screws.
2. Countersink bolts and washers, fill holes with matching wood plugs.
3. Handrail Joints: Fabricate handrails to provide butt and dowel joints; confirm with Consultant prior to installation.

2.6. FINISHES

1. Finishes: in accordance with Section 09 91 00 – Painting.

2.7. ACCESSORIES

1. Fasteners: to suit size and nature of components being fastened.
2. Nails and staples: to ASTM F1667; stainless steel for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
3. Wood screws: steel, type and size to suit application.

4. Splines: wood.
5. Adhesive: recommended by manufacturer.
 1. Adhesives: maximum VOC limit 30 g/L in accordance with SCAQMD Rule 1168 - Adhesives and Sealants Applications.

3. Execution

3.1. EXAMINATION

1. Contractor, Owner, and Consultant to visit site at 80% completion and note state of Work and finishes in the various areas in which cabinet and millwork to be installed.
2. Ensure surfaces are ready to receive Work. All surfaces of other Work to be finished and painted before being built-over or covered in any way or millwork installed.

3.2. INSTALLATION

1. Do finish carpentry to Quality Standards of the NAAWS, except where specified otherwise.
2. Scribe and cut as required to fit abutting walls, and surfaces, to fit properly into recesses and to accommodate intersecting or penetrating objects; secure materials and components in place, rigid, plumb and square, with tight, hairline joints to locations indicated on Drawings and in accordance with NAAWS, and as follows:
 1. Form joints to conceal shrinkage
 2. Set finishing nails to receive filler
 3. Countersink screws in round cleanly cut hole and plug with wood plug matching material being secured
 4. Match wood pieces end to end for consistent colour and grain appearance; space and centre joints evenly in runs.

3.3. CONSTRUCTION

1. Fastening:
 1. Position items of finished carpentry work 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 smooth cut hole and plug with wood plug to match material being secured.
 4. Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
2. Standing and running trim:
 1. Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
 2. Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.

3. Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
4. Install door and window trim in single lengths without splicing.
3. Interior frames:
 1. Set frames with plumb sides, level heads and sills, and secure.
4. Stairs:
 1. Install stairs to location and details as indicated.
5. Handrails:
 1. Install handrails as indicated, anchoring securely with proper hardware.
 2. Make joints hair line, dowelled and glued.
 3. Support brackets provided under Section 05 50 00 for installation under this Section.
 4. Install brackets at ends and at on centre intermediate spacing to meet Code requirements and as detailed on Drawings.
 5. Install metal backing plates between studs at bracket locations to ensure proper support for brackets and bolts or selftapping screws.
 6. Secure using counter sunk screws plugged with matching wood plugs.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 13 – Modified Bituminous Air and Vapour Barrier
3. Section 07 27 19 – Sheet Membrane Air and Vapour Barrier
4. Section 09 21 16 – Gypsum Board Assemblies

1.2. REFERENCES

1. American Society for Testing and Materials International (ASTM)
 1. ASTM C167-15, Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.
 2. ASTM C423-17 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 3. ASTM C553-13, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
 4. ASTM C66517, Specification for MineralFiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 5. ASTM C132010 (2016), Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
 6. ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 7. ASTM E413-16 Classification for Rating Sound Insulation
 8. ASTM F1667-17, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
2. Canadian Gas Association (CGA)
 1. CAN/CSAB149.115, Natural Gas and Propane Installation Code, Includes Update No. 1 (2010).
 2. CAN/CGAB149.215, Propane Storage and Handling Code.
3. Underwriters Laboratories of Canada (ULC)
 1. CAN/ULC-S102-18, Standard Method of Test For Surface Burning Characteristics of Building Materials and Assemblies.
 2. CAN/ULC-S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
 3. CAN/ULCS604-2016, Standard for Factory Built Type A Chimneys.
 4. CAN/ULC-S702.2-15, Mineral Fibre Thermal Insulation for Buildings, Part 2: Application Guidelines.

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature, specifications and data sheet.
 2. Submit WHMIS MSDS Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for sealants. Indicate VOC content.

2. Manufacturer's Instructions:
 1. Submit manufacturer's installation instructions.

1.4. QUALITY ASSURANCE

1. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
2. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5. DELIVERY, STORAGE AND HANDLING

1. Deliver insulation and accessories in original unopened packaging or cartons bearing manufacturer's seals and labels.
2. Store materials under cover on raised platforms, away from moisture. Keep dry at all times.

1.6. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

2. Products

2.1. MANUFACTURERS

1. Acceptable Manufacturers: Subject to compliance with requirements specified in this section and as established by the Basis-of-Design materials, manufacturers offering similar products that may be incorporated into the Work include the following:
 1. CertainTeed Corporation
 2. Johns-Manville Corporation
 3. Knauf Insulation
 4. Owens-Corning Canada LP.
 5. Rockwool Inc.

2.2. BATT INSULATION

1. Fibrous Mineral Wool Insulation: non-combustible, stone wool batt insulation to CAN/ULC S702 and as follows:
 1. Type: 1
 2. Fire performance:
 1. Non-combustibility: To CAN/ULC S114.
 1. Flame spread: 0.
 2. Smoke developed: 5.
 2. Surface Burning Characteristics: To CAN/ULC S102.
 1. Flame spread: 0.
 2. Smoke developed: 0.
 3. Density: 32 kg/m³ to ASTM C167
 4. Thermal Resistance: nominal RSI of 0.71/25 mm

5. Thickness: as required to fill insulated spaces.
6. Basis of Design Materials:
 1. ComfortBatt, Rockwool Inc.
2. Refer to Section 09 21 16 – Gypsum Board Assemblies for insulation in interior partitions.

2.3. ACCESSORIES

1. Insulation clips:
 1. Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
2. Nails: galvanized steel, length to suit insulation plus 25 mm, to ASTM F1667.
3. Staples: 12 mm minimum leg.
4. Tape: as recommended by manufacturer.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2. PREPARATION

1. Verify all in wall construction is complete before beginning installation.
2. Install insulation after building substrate materials are dry.
3. Ensure substrate materials are properly installed and complete before beginning installation.

3.3. INSTALLATION

1. Install batts between framing members, structural components and other items snug and tight.
2. Cut and trim batts neatly to fit spaces. Use batts free from ripped or damaged back and edges.
3. Do not compress insulation to fit into spaces.
4. Install batt insulation where indicated with continuous vapour retarder on the warm side of the insulation in accordance with ASTM C1320.
5. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
6. Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULCS604 Type A chimneys and CAN/CGAB149.1 and CAN/CGAB149.2 Type B and L vents.
7. Fill stud space of exterior framed walls with insulation full depth of stud only where no insulation/vapour retardant indicated on exterior face of stud walls.
8. Hold insulation in position with clips, wires or as recommended by manufacturer when insulation is installed in horizontal locations.

9. Do not enclose insulation until it has been reviewed by Consultant.

3.4. CLEANING

1. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Structural – Cast-In-Place Concrete
2. Section 07 21 16 – Fibrous Insulation
3. Section 07 52 00 – Modified Bituminous Membrane Roofing
4. Section 07 92 00 – Sealants
5. Section 08 11 13 – Steel Doors and Frames
6. Section 09 21 16 – Gypsum Board Assemblies

1.2. REFERENCES

1. American Society for Testing of Materials (ASTM)
 1. ASTM D93-18, Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.
 2. ASTM D146/D146M-04 (2012) e1, Standard Test Methods for Sampling and Testing Bitumen Saturated Felts and Woven Fabrics for Roofing and Waterproofing.
 3. ASTM D41216, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
 4. ASTM D1970/D1970M-18, Standard Specification for Self Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 5. ASTM D5147/D5147M-18 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
 6. ASTM E96/E96M16, Standard Test Methods for Water Vapor Transmission of Materials.
 7. ASTM E283-04 (2012), Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 8. ASTM E2178-13, Standard Test Method for Air Permeance of Building Materials.
 9. ASTM E2357-18, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
2. Canadian Standards Association (CSA)
 1. CSA A123.23-15 Product Specification for Polymer-Modified Bitumen Sheet, Prefabricated and Reinforced
3. Canadian General Standards Board (CGSB)
 1. CAN/CGSB51.34M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

1.3. ADMINISTRATIVE REQUIREMENTS

1. Coordination:
 1. Select products to be compatible with adjoining membranes previously installed under related Sections
 2. Select products from a single manufacturer, or products which are compatible from different manufacturers.

3. Coordination between all installers of each component of vapour and air retarder system is essential to ensure continuity of system and that junctions between the various components are effectively sealed.
4. Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into air barrier elements including, but not limited to, various membranes, coating and sealants as well as continuity with roofing membrane.
2. Pre-installation Meeting:
 1. Convene one (1) week before commencing Work of this Section.
 2. Arrange for manufacturer's factory-trained agent to be on site at beginning of installation to provide training and supervision of personnel who will install membrane. Agent shall also provide frequent inspection visits thereafter to assure quality and competence of membrane installations.
3. Sequencing:
 1. Sequence work in accordance with Construction Progress Schedule.
 2. Sequence work to permit installation of materials in conjunction with related materials and seals.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit manufacturer's printed product literature, specifications and data sheet and include product characteristics, performance criteria, physical size, finish and limitations.
 2. Submit WHMIS MSDS Material Safety Data.
 3. Submit statement from manufacturer(s), indicating products supplied under this Section are compatible with one another and with products previously installed under the work of related Sections.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Provide duplicate 200 mm x 200 mm samples of membrane adhered to all project substrates, including adjoining membranes specified in other Sections.
3. Quality Assurance Submittals: submit following in accordance with Section 01 11 00 – General Requirements, Quality Control.
 1. Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Consultant.
 2. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 3. Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.5. QUALITY ASSURANCE

1. Applicator: company specializing in performing work of this section with minimum 3 years documented experience with installation of air/vapour barrier systems.
 1. Completed installation must be approved by the material manufacturer.

2. Single-Source Responsibility: obtain primary air and vapour materials from a single manufacturer regularly engaged in the manufacturing and supply of the specified products and meeting or exceeding the material properties and performance characteristics of the materials and manufacturers named in this Section.
3. Mock-ups
 1. Construct mockup in accordance with Section 01 11 00 – General Requirements, Quality Control.
 2. Construct typical exterior wall panel, 3 m long by 4 m wide, incorporating window and frame and sill, insulation, building corner condition, and junction with roof system; illustrating materials interface and seals.
 3. Locate where directed.
 4. Mockup may remain as part of finished work.
 5. Allow review of mockup by Consultant before proceeding with air/vapour barrier Work. Accepted mock-up will demonstrate minimum standard of quality required for this project.

1.6. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements.
2. Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.8. SITE CONDITIONS

1. Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
2. Ventilate enclosed spaces in accordance with Section 01 11 00 – General Requirements, Temporary Utilities.
3. Maintain temperature and humidity recommended by materials manufacturer before, during and after installation.
4. Apply air/vapour barrier membrane to gypsum board surfaces which are dry, when temperature is 4 degrees C or higher or as per manufacturer's recommendations.
5. Apply air/vapour barrier membrane to cast-in-place concrete, precast concrete, masonry (strike masonry joints flush) which are smooth, clean, dry, and in good condition. Moisture, grease, machine oil or other foreign material must be removed. Concrete must be cured, minimum 7 days, and dry before application, and when temperature is 5 degrees C or higher or as per manufacturer's recommendations.

1.9. WARRANTY

1. Manufacturer's Warranty: issue and written and signed warranty in the name of the Owner, certifying the product will meet the physical characteristics published by the manufacturer for a period of 5 years starting from the completion date of installation of membranes.

2. Installer's Warranty: Submit installers warranty stating that air and vapour membranes and accessories are installed in accordance with manufacturer's recommendation and that membrane, transitions and through-wall flashing membranes, primers, mastics, adhesives and sealants are sourced from one manufacturer.

2. Products

2.1. MANUFACTURERS

1. Acceptable Manufacturers: Subject to compliance with requirements specified in this section and as established by the Basis-of-Design materials, manufacturers offering similar products that may be incorporated into the Work include the following:
 2. 3M Canada
 3. Grace Construction Materials
 4. Henry Company (Henry Canada)
 5. IKO Industries Ltd.
 6. Soprema Canada
 7. Tremco Commercial Sealants and Waterproofing
 8. W.R. Meadows Inc.

2.2. SELF-ADHESIVE AIR AND VAPOUR BARRIER SYSTEM MATERIALS

1. Primer: SBS synthetic rubbers, adhesive resins and solvents used to prime porous substrates to enhance adhesion of self-adhesive membranes at temperatures above -10°C.
 1. Specific gravity at 20°C (kg/l): 0.79 to 1.0 kg/l
 2. Solids by weight: 24% to 53%
 3. Flash point: -30°C to ASTM D93
 4. Acceptable Materials:
 1. Perm-A-Barrier Adhesive, GCP Applied Technologies
 2. Blueskin Adhesive, Henry Company
 3. Hi-Tac Adhesive, Henry Company
 4. Aquatac Primer, Henry Company
 5. SAM Adhesive, IKO
 6. IKO SAM LVC
 7. AquaBarrier Primer, IKO
 8. Siga non-asphaltic AV Barrier, 3M
 9. Elastocol Stick, Soprema
 10. Exoair Primer #10, Tremco Inc
 11. Mel-Prime WB, W.R. Meadows
 12. Mel-Prime SB, W.R. Meadows
2. Air/Vapour Barrier Membrane (winter application): to CAN/CGSB 37.56 or ASTM D1970; SBS modified bitumen, self-adhering sheet membrane with polyethylene facer, for application temperatures between -10°C and 10°C and as follows:
 1. Thickness: 1 mm to 1.5 mm
 2. Tensile strength: 11.3 kN/m to 15.4 kN/m to ASTM D5147.

3. Ultimate elongation: 25% to 40%
4. Flexibility at cold temperature: minimum -30°C
5. Air permeability: <0.0003 L/sec. m²
6. Water vapour permeability: <0.05 perm
7. Static puncture: minimum 178 N
8. Lap adhesion: 800 N/m
9. Acceptable Materials:
 1. CCW-705LT, Carlisle
 1. Perm-A-Barrier Wall Membrane LT, GCP Applied Technologies
 2. Blueskin SALT, Henry Company
 3. AVB LT, IKO
 4. Sopraseal Stick 1100 T, Soprema.
 5. 3015NP, 3M
 6. Exoair 110 LT, Tremco Inc.
 7. Air Shield LT, W.R. Meadows.
3. Air/Vapour Barrier Membrane (summer application): to CAN/CGSB 37.56 or ASTM D1970; SBS modified bitumen, self-adhering sheet membrane with polyethylene facer, for application temperature above 5°C, and as follows:
 1. Thickness: 1 mm to 1.5 mm
 2. Tensile strength: minimum 6 kN/m
 3. Ultimate elongation: 25% to 40%
 4. Flexibility at cold temperature: minimum -17°C
 5. Air permeability: <0.0003 L/sec. m²
 6. Water vapour permeability: <0.05 perm
 7. Static puncture: 400 N
 8. Lap adhesion: minimum 1750 N/m
 9. Acceptable Materials:
 1. Perm-A-Barrier Wall Membrane, GCP Applied Technologies
 2. Blueskin SA, Henry Company
 3. AquaBarrier AVB, IKO.
 4. AVB LT, IKO
 5. Sopraseal Stick 1100, Soprema.
 6. 3015NP, 3M
 7. Exoair 110, Tremco Inc.
 8. Air Shield, W.R. Meadows.
4. High Service Temperature Self-Adhering Air/Vapour Barrier Membrane:
 1. Description: Prefabricated self-adhesive waterproofing membrane composed of an SBS modified bitumen in compliance with CGSB 37 GP 56M and tested to ASTM D1970.
 2. Components:
 1. Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 2. Prefabricated membrane: Complies with CAN/CGSB-37.56-M, 9th Draft.
 3. Top Surface: slip resistant.

4. Undersurface: silicone release film.
3. Properties:
 1. Thickness: 1.0 mm min.
 2. Water vapour permeance (ng/m²sPa): <1.6 when Tested to ASTM E96
 3. Service temperature rating: up to 115 degrees C.
4. Acceptable Materials:
 1. Ice and Water Shield HT, Grace.
 2. Blueskin Roof High Temperature Underlayment PE 200 HT, Henry Company
 3. Lastobond Shield HT, Soprema.

2.3. MASTICS AND ADHESIVES

1. Waterproofing Mastic: solvent-based mastic containing SBS modified bitumen, fibres and mineral fillers, used to seal around penetrations and extrusions.
 1. Compatibility: With air/vapour barrier membrane, substrate and insulation.
 2. Specific gravity at 20°C: 1.0 kg/l to 1.12 kg/l
 3. Application Temperature: -10°C to +35°C
 4. Solids by Weight: 70% to 83 %
 5. Acceptable Materials:
 1. Bituthene Mastic, GCP Applied Technologies
 2. Air-Bloc 21 or Air-Bloc 230-21 Adhesive, Henry Company
 3. 570-05 Polybitume Henry Company
 4. 925 BES Sealant Henry Company
 5. AquaBarrier Mastic, IKO.
 6. Sopramastic, Soprema.
 7. Exoair Termination Mastic, Tremco Inc.
 8. Pointing Mastic, W.R. Meadows.

2.4. ACCESSORIES

1. Thinner and cleaner for Butyl or Neoprene Sheet: as recommended by sheet material manufacturer.
2. Attachments: galvanized steel bars and anchors.
3. Roof-to-Wall Transition Membranes: Manufacturer's recommended reinforced self adhesive, compatible with roofing air and vapour membranes and wall materials specified in this Section.
 1. Basis of Design Materials:
 1. Henry Blueskin Butyl Flash for transition with EPDM, PVC and TPO Membranes.
4. Through Wall Membranes: Manufacturer's recommended reinforced self adhesive, compatible with air and vapour membrane and that will not become plastic and extrude onto finished surfaces when exposed to high wall temperatures.
 1. Acceptable Materials:
 1. Blueskin TWF, Henry Company
 2. TWF, IKO

3. Sopraseal WFM, Soprema
4. 3015TWF, 3M
5. Sealant: Non-hardening sealant compatible with vapour barrier materials, recommended by membrane manufacturer and In accordance with Section 07 92 00.
6. Butyl Adhesive: provide butyl based adhesive membrane for locations in contact with plasticized vinyl including, but not limited to, vinyl deck membranes.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2. ENVIRONMENTAL REQUIREMENTS

1. Verification of Conditions: Verify that conditions of substrate or work previously installed under other Sections or Contracts are acceptable for air barrier installation in accordance with manufacturer's written recommendations.
2. All membrane shall be installed at surface and ambient temperature of 5°C or above, in dry weather conditions.
3. For applications below 5°C consult membrane manufacturer's technical representative for instructions and, obtain Consultant's approval before proceeding with Work.
4. Self adhered membrane shall not be applied below application temperature of minus 10 °C despite primers being able to be applied at colder temperatures.

3.3. EXAMINATION

1. Verify that surfaces and conditions are ready to accept work of this section.

3.4. PREPARATION

1. Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
2. Remove loose or foreign matter, which might impair adhesion of materials.
3. Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions
4. Do not install materials during rain or snowfall.
5. Report unsatisfactory conditions to Consultant in writing.
6. Do not start work until deficiencies have been corrected.
 1. Beginning of Work implies acceptance of conditions.

3.5. INSTALLATION: SELF ADHERING SYSTEM

1. Apply primer to substrates in accordance with manufacturer's written instructions. Apply primer that will be covered with membrane the same day. Re-prime areas that are not covered the same day.

2. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 150 mm overlap at all end and side laps.
3. Corner details: Double cover outside and inside corners, use 300 mm wide initial strip of membrane centred on axis of corner. Follow with full width of sheet membrane to cover initial strip completely.
4. Construction and control joints: Install membrane in double thickness over properly sealed joints, use 300 mm wide initial strip of membrane centred over joint. Follow with full width of sheet membrane. Assure that joints are properly sealed; joint filler and a compatible sealant are installed
5. Tie-in to window frames, aluminium screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings in order to facilitate a continuous air, vapour & moisture membrane.
6. Roll laps and membrane with a counter top roller to effect seal.
7. Small protrusions (pipes, etc.) through the waterproofing membrane, should be pre-stripped with a membrane and sealed with mastic
8. Inspect membrane installation meticulously and immediately. Holes and tears in the membrane must be repaired with air / vapour barrier membrane material. The repair must exceed the affected surface area by a minimum of 150 mm. The membrane piece applied for the repair must be sealed around its edges with mastic.

3.6. FIELD QUALITY CONTROL

1. Manufacturer's Field Services:
 1. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS.
 2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 3. Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
2. The Consultant shall inspect installed membrane for continuity of air barrier prior to placement of insulation.

3.7. CLEANING

1. Proceed in accordance with Section 01 11 00 – General Requirements, Cleaning.
2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.8. PROTECTION

1. Protect finished work from penetrations.
2. Do not permit adjacent work to damage work of this section.
3. Ensure finished work is protected from climatic conditions.
4. Repair to manufacturers written instructions.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 13 – Modified Bituminous Air and Vapour Barrier

1.2. REFERENCES

1. American Concrete Institute International (ACI):
 1. ACI 302.2R-06, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. American Society for Testing and Materials International (ASTM)
 1. ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials.
 2. ASTM E154/E154M-08a(2019), Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 3. ASTM E1643-18a, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 4. ASTM E1745-17, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 5. ASTM E1993/E1993M-98(2013)e1, Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
 6. ASTM F1249-13, Standard Test Method for Water Vapour Transmission Rate through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
3. Canadian General Standards Board (CGSB):
 1. CAN/CGSB 51.32M77, Sheathing, Membrane, Breather Type. (Withdrawn)
 2. CAN/CGSB51.34M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction. (Withdrawn)

1.3. ADMINISTRATIVE REQUIREMENTS

1. Coordination:
 1. Coordination between all installers of each component of vapour and air retarder system is essential to ensure continuity of system and that junctions between the various components are effectively sealed.
 2. Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into vapour and air retarder elements including, but not limited to, various membranes, coatings and sealants as well as continuity with roofing membrane.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.

1. Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
2. Submit manufacturer's installation instructions including joint treatment recommendations.

1.5. QUALITY ASSURANCE

1. Mock-ups
 1. Construct mockup in accordance with Section 01 11 00 – General Requirements, Quality Control.
 2. Construct typical exterior wall panel, 3 m long by 4 m wide, incorporating window openings with frame and sill installed, insulation, building corner condition, junction with roof system; illustrating materials interface and seals.
 3. Locate where directed by Consultant.
 4. Mockup may remain as part of Work.
 5. Allow 24 hours for inspection of mockup by Consultant before proceeding with air/vapour barrier work.

1.6. DELIVERY, STORAGE AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements.
2. Store materials in clean, dry area in accordance with manufacturer's instructions.
3. Protect materials during handling and application to prevent damage.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.8. FIELD CONDITIONS

1. Apply vapour barrier membrane within the range of ambient and substrate temperatures recommended by vapour barrier membrane manufacturer.

2. Products

2.1. VAPOUR BARRIER SHEET MATERIALS

1. Plastic Sheet Vapour Retarder (Exterior Stud Walls): 6 mil polyethylene sheet meeting requirements of CAN/CGSB-51.34.
2. Plastic Sheet Vapour Retarder (Underslab): High density, puncture resistant polyethylene sheet in accordance with ASTM E1745 and CAN/CGSB-51.34, and as follows:
 1. Thickness: 10 mil
 2. Vapour Permeance: Nominal ≤ 0.044 Perms maximum
 3. Tensile Strength and Puncture Resistance: ASTM E1745 Class B minimum
 4. Acceptable Materials:
 1. VaporFlex, Layfield Construction Materials 10
 2. VaporBlock VB, Raven Industries 10

3. Stego Wrap, Stego Industries LLC 10 mil
4. Perminator, W.R. Meadows 10 mil

2.2. ACCESSORIES

1. Accessory Materials: Provide manufacturer's required seam tape, pipe boots and vapour proofing mastic forming a complete system in accordance with CAN/CSA A23.1 and ASTM E1643
2. Seam Tape: High density, air resistant polyethylene tape with pressure sensitive adhesive. Type as recommended by vapour retarder manufacturer. Minimum 100 mm for lap joints and perimeter seals, 50 mm wide elsewhere.
3. Sealant: Asbestos free nonhardening sealant, compatible with vapour retarder materials, recommended by vapour retarder manufacturer in accordance with Section 07 92 00.
4. Flashing Tape: Self-adhering waterproof tape 100 mm wide to AAMA 711 and as recommended by vapour retarder membrane manufacturer.
5. Fasteners: Provide non-corrosive metal screws, nails, plastic clips and other fasteners as recommended by air/vapour retarder manufacturer required for complete installation of Work.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2. EXAMINATION

1. Examine surfaces to receive membrane. Notify consultant if surfaces are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.3. INSTALLATION: SHEET VAPOUR BARRIER

1. Verify that services are installed and have been accepted by the Consultant and Authorities Having Jurisdiction prior to installation of vapour retarder.
2. Install sheet vapour retarder on warm side of exterior ceiling assemblies prior to installation of gypsum board to form continuous retarder in accordance with manufacturers written instructions.
3. Use sheets of largest practical size to minimize joints.
4. Install materials in a manner that maintains continuity; repair punctures and tears with sealing tape before work is concealed.
5. Openings:
 1. Cut sheet vapour retarder to form openings and lap and seal to window and door frames in accordance with good building envelope practice.
6. Seal perimeter of sheet vapour retarder 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. Install sealant bead with no gaps; smooth out folds and ripples occurring in sheet over sealant.
7. Seal lap joints of sheet vapour retarder as follows:
 1. Attach first sheet to substrate.
 2. Apply continuous bead of sealant over solid backing at joint.
 3. Lap adjoining sheet minimum 150 mm and press into sealant bead.
 4. Install staples through lapped sheets at sealant bead into wood substrate.
 5. Install sealant bead with no gaps; smooth out folds and ripples occurring in sheet over sealant.

3.4. INSTALLATION: UNDERSLAB SHEET VAPOUR BARRIER

1. Install vapour barrier in accordance with manufacturer's written instructions and ASTM E1643, and generally as follows:
 1. Unroll vapour barrier with the longest dimension parallel to direction of concrete placement.
 2. Lap vapour barrier onto face of grade beams.
 3. Overlap joints 200 mm and seal with manufacturer's required tape.
 4. Seal penetrations including pipe and conduit risers in accordance with manufacturer's written instructions.
 5. Make no additional penetrations except as required for placing of reinforcing steel and permanent utilities.
2. Repair damaged areas by cutting patches of vapour barrier membrane; sized to overlap damaged area a minimum of 150 mm to each side of puncture; and tape all sides using manufacturer's required tape.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 13 – Modified Bituminous Air and Vapour Barrier
3. Section 07 62 00 – Sheet Metal Flashing and Trim
4. Section 07 92 00 – Sealants
5. Section 09 21 16 – Gypsum Board Assemblies

1.2. REFERENCES

1. American Society for Testing and Materials International, (ASTM)
 1. ASTM A653/A653M19a, Standard Specification for Steel Sheet, ZincCoated (Galvanized) or Zinclron AlloyCoated (Galvannealed) by the HotDip Process.
 2. ASTM C920-18 - Standard Specification for Elastomeric Joint Sealants.
 3. ASTM C1185-08(2016), Standard Test Methods for Sampling and Testing Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards.
 4. ASTM C118608(2016), Standard Specification for Flat FiberCement Sheets.
 5. ASTM E84-19b, Standard Test Methods for Surface Burning Characteristics of Building Materials.
 6. ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials.
 7. ASTM E136-19, Standard Test Method for Behaviour of Materials in a Vertical Tube Furnace at 750°C.
 8. ASTM E228-17 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer.
 9. ASTM G155-13 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.
2. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
3. Underwriters Laboratories' of Canada (ULC)
 1. CAN/ULC S10218, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 2. CAN/ULC S11405, Standard Method of Test for Determination of NonCombustibility in Building Materials
 3. CAN/ULC S135:2004-AM1-R2016, Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), Includes Amendment 1

1.3. ADMINISTRATIVE REQUIREMENTS

1. Sequencing: Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature, specifications and data sheet and include:
 1. Preparation instructions and recommendations.
 2. Installation instructions.
 2. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Provide shop drawings indicating attachment methods, joinery, sealing methods and compliance with design criteria and requirements of related work.
 3. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit duplicate 150 mm long samples of wall system in each type, colour, texture and pattern required. Include clips, caps, battens, fasteners, closures and other exposed accessories.

1.5. QUALITY ASSURANCE

1. Installer Qualifications: Engage experienced installer with a minimum of three (3) years experience who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance.
2. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship of the following details:
 1. Sill and head connections at windows and penetrations
 2. Joint between panels
 3. Detailing of corner caps and flashings.
 4. Do not proceed with remaining Work until mock-up has been reviewed by Consultant
 5. Refinish mock-up area as required to produce acceptable Work; at no additional cost to the Owner

1.6. DELIVERY, STORAGE AND HANDLING

1. Store products in manufacturer's unopened packaging until ready for installation.
2. Store siding flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.8. ENVIRONMENTAL REQUIREMENTS

1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
2. Proceed with siding installation when substrate is completely dry.

1.9. WARRANTY

1. Manufacturer's Warranty: Submit manufacturer's standard warranty that panels are free from defects in materials and workmanship beginning from the date of substantial completion and as follows:
 1. Product Warranty: manufacturers standard limited, non prorated product warranty for a period of 30 years.
 2. Workmanship Warranty: 2 year
 3. Finish Warranty: 15 years: Deterioration of finish includes, but is not limited to, chipping, cracking, and peeling.

2. Products

2.1. MANUFACTURERS

1. Basis of Design: HardiePanel, James Hardie Industries Inc.
2. Acceptable Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis of Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:
 1. Allura Fiber Cement Products, Plycem
 2. James Hardie Industries Inc.
 3. Nichiha USA, Inc.

2.2. PERFORMANCE / DESIGN CRITERIA

1. Design composite building panel wall to provide for thermal movement of component materials caused by ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
2. Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.
3. Design members to withstand dead load and wind loads calculated in accordance with current Building Code and applicable local regulations, to maximum allowable deflection of 1/180th of span.
4. Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".
5. Design wall system to accommodate specified erection tolerances of structure.
6. Maintain following installation tolerances:
 1. Maximum variation from plane or location shown on drawings: 3 mm/m of length and up to 20 mm/100 m maximum.
 2. Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

2.3. MATERIALS

1. Fibre Cement Board Panels: Panels made from fibre reinforced cement board, free from asbestos fibres; in accordance with ASTM C1186 Type A, Grade II; and as follows:
 1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 5, maximum; when tested in accordance with ASTM E84.
 2. Combustibility: Noncombustible, when tested in accordance with ASTM E136, ULC S135 and ULC S114.
 3. Flexural Strength: 10 MPa when in equilibrium condition, and 7 MPa when in wet condition, tested in accordance with ASTM C1185.
 4. Freeze Thaw Resistance: 80 percent flexural strength retained, when tested in accordance with ASTM C1185.
 5. UV Resistance: No cracking, checking, or erosion.
 6. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C1185.
2. Vertical Fibre Cement Siding:
 1. Thickness: as indicated on Drawings.
 2. Size: as indicated on Drawings.
 3. Texture: as indicated In Finish Schedule on Drawings.
 4. Factory Finish: Manufacturer's standard factory applied finish in colour as indicated on Drawings.
 5. Basis of Design Materials:
 1. As indicated in Finish Schedule on Drawings.

2.4. ACCESSORIES

1. Subgirts: Rolled, Z-shaped, Z-275 galvanized steel girts to suit design loads and application.
2. Hat Sections and Other Sub framing: Rolled shapes, Z-275 galvanized steel to suit design loads and application.
3. Siding Accessories: Provide starter strips, edge trim, corner cap, perforated soffit boards and other items as recommended by siding manufacturer for building configuration, and as follows:
 1. Provide accessories made from same material as adjacent siding, unless otherwise indicated.
 2. Provide accessories matching colour and texture of adjacent siding, unless otherwise indicated.
4. Flashing: Provide pre-finished, galvanized sheet steel flashing and trims in accordance with Section 07 62 00, at window and door heads and where indicated.
5. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant; colour as directed.
6. Elastomeric Joint Sealant: single component polyurethane sealant joint sealant in accordance with Section 07 92 00.
7. Fasteners: Corrosion resistant fasteners as recommended by siding manufacturer for materials being fastened to and as follows:

1. Fastening to Wood: Ribbed, bugle head screws of sufficient length to penetrate a minimum of 25 mm into substrate.
2. Fastening to Metal: Ribbed, bugle head screws of sufficient length to penetrate a minimum of 6 mm or 3 screw threads into substrate.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2. PREPARATION

1. Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify Contractor of conditions not acceptable for installation of system.
2. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Ensure air/vapour barrier installation is complete and has been reviewed by the Consultant.

3.3. INSTALLATION: VERTICAL SIDING

1. Install materials in strict accordance with manufacturer's installation instructions.
2. Block framing between studs where horizontal joints occur.
3. Install metal Z flashing and provide a 6 mm gap at horizontal panel joints.
4. Place fasteners no closer than 9.5 mm from panel edges and 51 mm from panel corners.
5. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
6. Maintain clearance between siding and adjacent finished grade.
7. Specific framing and fastener requirements: refer to the applicable building code compliance reports.
8. Site paint exposed cut edges to match colour of board, trim, or plank.

3.4. INSTALLATION: TRIM AND MOULDING

1. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
2. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 25 mm plus full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
3. Place fasteners no closer than 19 mm and no further than 51 mm from side edge of trim board and no closer than 25 mm from end. Fasten maximum 406 mm on center.
4. Maintain clearance between trim and adjacent finished grade.
5. Trim inside corner with single board.

6. Outside Corner Board: Attach trim on both sides of corner with 16 gauge corrosion resistant finish nail 13 mm from edge spaced 406 mm apart, weather cut each end spaced minimum 305 mm apart.
7. Allow 3 mm gap between trim and siding.
8. Seal gap with high quality, paint-able sealant.
9. Shim frieze board as required to align with corner trim.
10. Site paint exposed cut edges to match colour of board, trim, or plank.

3.5. TOUCH-UPS

1. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
 1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.
 2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
 3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up colour to siding colour through use of manufacturer's branded touch-up kits.

3.6. CLEANING

1. Remove damaged, improperly installed, or otherwise defective siding materials and replace with new materials complying with specified requirements.
2. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 19 – Sheet Membrane Air and Vapour Barrier
3. Section 07 62 00 – Sheet Metal Flashing and Trim
4. Section 07 65 26 – Self-Adhered Membrane Flashing
5. Section 07 92 00 – Sealants
6. Division 22 – Plumbing: Coordination of pipes and pipe fittings and other materials penetrating roof membranes.
7. Division 23 – Heating, Ventilation and Air Conditioning: Coordination of ductwork and other materials penetrating roof membranes.
8. Division 26 – Electrical: Coordination conduit, wiring, communications cabling, cable trays and other materials penetrating roof membranes.

1.2. REFERENCES

1. American Society for Testing and Materials International, (ASTM).
 1. ASTM C728-17a, Standard Specification for Perlite Thermal Insulation Board.
 2. ASTM C1002-16, 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.
 3. ASTM D41/D41M-11(2016), Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 4. ASTM D312/D312M-16a, Standard Specification for Asphalt Used in Roofing.
 5. ASTM D2178/D2178M-15a, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
 6. ASTM D3272-76(2003), Standard Practice for Vacuum Distillation of Solvents from Solvent-Reducible Paints for Analysis (Withdrawn 2008)
 7. ASTM D6162/D6162M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
 8. ASTM D6163/D6163M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
 9. ASTM D6164/D6164M-16, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
 10. ASTM D6222/D622M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcement.
 11. ASTM D6223/D6223M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement.
 12. ASTM D6509/D6509M-16, Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcement.

13. ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials.
2. Canadian General Standards Board (CGSB)
 1. CGSB 37GP9Ma83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing. (Withdrawn)
 2. CGSB 37GP56M AMEND, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing. (Withdrawn)
 3. CAN/CGSB51.33M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction. (Withdrawn)
3. Canadian Roofing Contractors Association (CRCA)
 1. CRCA Roofing Specifications Manual.
4. Canadian Standards Association (CSA International)
 1. CSA-A123.305 (R2015), Asphalt Saturated Organic Roofing Felt (Reaffirmed 2010).
 2. CAN/CSA-A123.404 (R2013), Asphalt for Constructing BuiltUp Roof Coverings and Waterproofing Systems.
 3. CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Membrane Roofing Systems, Includes Update No. 1 (2010).
 4. CSA A231.1-14/A231.2-14, Precast Concrete Paving Slabs/Precast Concrete Pavers.
 5. CAN/CSA O80 Series-15, Wood Preservation
 6. CSA O12117, Douglas Fir Plywood, Includes Update No. 1 (2013).
 7. CSA O15117, Canadian Softwood Plywood.
5. Department of Justice Canada (Jus).
 1. Canadian Environmental Protection Act, 1999 (CEPA).
6. Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
7. Roofing Contractor's Association of British Columbia (RCABC)
 1. Roofing Practices Manual
 2. Roofing Contractors Association of B.C. Guarantee Corp. Guarantee Program.
8. Underwriters Laboratories' of Canada (ULC)
 1. CAN/ULC S102-18, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
 2. CAN/ULC S107-10, Methods of Fire Tests of Roof Coverings.
 3. CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 4. ULCS702.215, Mineral Fibre Thermal Insulation for Buildings, Part 2: Application Guidelines.
 5. CAN/ULC-S704.1-17, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 6. CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.3. ADMINISTRATIVE REQUIREMENTS

1. Convene pre-installation meeting one week prior to beginning work of this Section, with Contractor, Consultant, installer, manufacturer's representative in accordance with Section 01 11 00 – General Requirements, Project Meetings to:
 1. Verify project requirements.
 2. Review installation and substrate conditions.
 3. Co-ordination with other building subtrades.
 4. Review manufacturer's installation instructions and warranty requirements.
 5. Review RCABC warranty certificate requirements.

1.4. SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittals:
 1. Provide copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
 2. Provide copies of WHMIS MSDS and indicate VOC content for:
 1. Primers
 2. Vapour retarder membrane
 3. Sealers
 4. Insulation
 5. Base and cap sheet
2. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittals:
 1. Indicate flashing, control joints, tapered insulation details.
 2. Provide layout for tapered insulation.
3. Manufacturer's Certificate: certify that products meet or exceed specified requirements.
4. Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens, roofing felts, and membrane with specification requirements.
5. Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
6. Manufacturer's field report: in accordance with Section 01 11 00 – General Requirements, Quality Control.
7. Reports: indicate procedures followed, ambient temperatures and wind velocity during application.

1.5. QUALITY ASSURANCE

1. Obtain roofing membrane materials through one source from a single manufacturer.
2. Installer Qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience approved by manufacturer.

3. Roofing and sheet metal work shall be performed in conformance with roofing manufacturer's written recommendations using materials in accordance with CAN/ULC S107.
4. Perform Work to RCABC/RGC practice Manual and manufacturer's written instructions.
5. Provide only materials listed by RCABC/RGC.

1.6. FIRE PROTECTION

1. Comply with safety measures described in manufacturer's written installation requirements, requirements of insurance companies and other requirements of the Authorities Having Jurisdiction.
2. Fire Extinguishers, located within six (6) meters of each roofing torch, ULC labelled for ABC protection.
3. At the end of each workday, use a heat detector gun to spot any smouldering or concealed hot spots. Job planning must be organized to ensure workers are still on location at least one hour after torch application.
4. Do not apply torch directly to dry or unprotected wood surfaces.

1.7. DELIVERY, STORAGE, AND HANDLING

1. Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 11 00 – General Requirements, Common Product Requirements.
2. Storage and Handling Requirements:
 1. Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
 2. Provide and maintain dry, offground weatherproof storage.
 3. Store rolls of felt and membrane in upright position. Store membrane rolls with selvage edge up.
 4. Remove only in quantities required for same day use.
 5. Place plywood runways over completed Work to enable movement of material and other traffic.
 6. Store sealants at +5 degrees C minimum.
 7. Store insulation protected from weather, daylight and deleterious materials.
 8. Do not store materials on roof in concentrations that exceed design live load.

1.8. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.9. ENVIRONMENTAL REQUIREMENTS

1. Do not perform roofing work when air temperature, including wind chill, falls below the membrane manufacturer's recommended limit.
2. Do not apply roofing materials to a damp, frozen or unsuitable surface.

3. Do not expose roofing materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.

1.10. WARRANTY

1. Roofing Membrane Manufacturer: Provide manufacturer's warranty stating that they will repair or replace defective roofing (including labour) and base flashing materials that do not remain watertight, that splits, tears, or separates at the seams or from the substrate within the specified warranty period and as follows:
 1. Warranty Period: 15 year warranty, starting from Substantial Performance for the Project.
 2. Name of Warrantee: Warrantor shall issue a written and signed warranty identifying the owner's name as the warrantee, and stating that executed work will remain in place and be free of any defects in materials and workmanship for the stated warranty period.

2. Products

2.1. MANUFACTURERS

1. Basis-of-Design: Materials and colours listed below form the Basis-of-Design materials for this project.
2. Acceptable Membrane Manufacturers: Subject to compliance with requirements specified in this section and as established by the Basis-of-Design materials, manufacturers offering similar products that may be incorporated into the Work include the following:
 1. Henry Bakor
 2. IKO Industries Ltd
 3. Siplast
 4. Soprema
3. Use only materials from one manufacturer.

2.2. PERFORMANCE / DESIGN CRITERIA

1. Compatibility between components of roofing system is essential. Provide written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.
2. Roofing System: to CSAA123.21 for wind uplift resistance.

2.3. TYPICAL ROOF ASSEMBLY (R1)

1. Deck Covering:
 1. Plywood: Douglas-Fir plywood to CSA O121, Sheathing Grade.
 1. Tongue and groove, thickness as indicated on Drawings.
2. Primer:
 1. Primer comprised of elastomeric bitumen, volatile solvents and adhesive enhancing additives as recommended by membrane roofing manufacturer to suit substrate and installation conditions.
 1. Acceptable Materials:
 1. Elastocol Stick, Soprema.

2. Blueskin Adhesive – Henry Bakor
 3. Siplast
 4. IKO SAM Adhesive
3. Air And Vapour Retarder:
 1. Premanufactured Self Adhesive Air/Vapour Barrier: Self-adhesive vapour barrier membrane composed of SBS modified bitumen with thermoplastic polymers and high density polyethylene film and as follows:
 1. Thickness: Minimum 0.8 mm.
 2. Cold Bending: -35°C
 3. Static Puncture: 400 N.
 4. Membrane Breaking Strength (MPa): MD=75, XD=98.
 5. Water Vapour Permeance: 0.92 ng/Pa•s•m² to ASTM E96.
 6. Acceptable Materials:
 1. Sopravap'R, Soprema
 2. MVP, IKO
 3. Vapor Bloc SA – Henry Bakor
 2. Vapour retarder continuity strip: SBS membrane with nonwoven polyester reinforcement, glass grid and elastomeric bitumen. Sanded upper surface; underside selfadhesive, compatible with wall and roof air/vapour retarder membranes as recommended by accepted membrane manufacturers below.
 1. Acceptable Materials:
 1. Sopraseal Stick 130 – Soprema
 2. ModifiedPlus G100 Tack Sheet – Henry Bakor
 3. IKO
 4. Siplast
4. Insulation:
 1. Primary Flat and Sloped Insulation: Extruded polystyrene (XPS) insulation consisting of largest panels practical, having square edges minimum LTTR RSI 0.87/25 mm, total thickness as indicated on Drawings, sloped to a minimum 2% perpendicular from edge of roof to a minimum thickness of 50 mm; conforming to ULC S701, Type 4, to a tolerance not exceeding 3 mm from nominal size in any dimension, and as follows:
 1. Acceptable Materials:
 1. Styrofoam Brand Roofmate, Dow
 2. Foamular C-300, Owens-Corning Canada LP
 3. Sopra-XPS 30, Soprema
 2. Primary Flat and Sloped Insulation (alternate): Closed-cell polyisocyanurate foam core laminated to heavy nonasphaltic glass fibre reinforced facers; 25 mm thickness of largest panels practical, having square edges, minimum LTTR RSI 1.04/25 mm; conforming to ULC S704, Type 3, Class 2, to a tolerance not exceeding 3 mm from nominal size in any dimension, and as follows:
 1. Acceptable Materials:
 1. ACFoam III, Atlas Roofing Corporation
 2. Secureshield GC, Carlisle
 3. H-Shield GC, Hunter

4. Therm III, IKO
 5. E'NRGY 3, Johns Manville
 6. Paratherm, Siplast
 7. Sopra-ISO Plus, Soprema
3. Sloped insulation: sloped as indicated on Drawings.
5. Overlay Board:
 1. Overlay Board: 12.7 mm asphalt impregnated fiberboard.
 1. Install in two layers or completed with fire taped joints over insulation to provide torch safe surface.
6. Membrane:
 1. Roof membrane base sheet: composed of SBS modified bitumen and composite reinforcement, 2.2 mm thick, top and bottom faces covered with thermofusible plastic film, in accordance with CGSB 37GP56M:
 1. Properties:

	MD	XD
1. Strain Energy (kN/m)	7.8	7.2
2. Ultimate Elongation (%)	50	65
3. Tear Resistance (N)	125	
4. Dimensional Stability (%)	-0.2	0.0
5. Plastic Flow (oC)	≥ 110°C	
6. Cold Bending (at -30°C)	No Cracking	
 2. Acceptable Materials:
 1. Sopraply 520, Soprema
 2. Flashing, Stripping and Up-stand Membranes: Two-ply reinforced modified bitumen membrane base sheet and cap sheet; base sheet having selfadhering bottom surface and sanded top surface; cap sheet having bottom surface sanded and top surface is protected by coloured granules, and as follows:
 1. Prefabricated membrane to CAN/CGSB 37-GP-56M.
 2. Reinforcement: Composite polyester and glass grid.
 3. Elastomeric Bitumen: Mix of bitumen and SBS polymer.
 4. Protection: coloured granules, colour as selected by Consultant from manufacturer's full range.
 5. System Properties:

1. Strain Energy (kN/m)	8.3
2. Breaking Strength (N/50 mm)	16
3. Ultimate Elongation (%)	56
4. Tear Resistance (N)	120
5. Dimensional Stability (%)	0.4
6. Plastic Flow	105°C
7. Cold Bending (at -25°C)	No Cracking
8. Bending (at 70°C after 90 days)	No Cracking
9. Static Puncture (N)	380
 6. Basis of Design Materials:
 1. Sopraply 520, Soprema

3. Roofing cap sheet membrane for field surfaces and flashings and parapets:
 1. Description: Roofing membrane composed of SBS modified bitumen 4.0 mm thick (nominal) with a composite reinforcement and elastomeric bitumen. The top surface is protected with coloured granules. The thermofusible bottom surface is covered with a release film.
 1. Coloured Granules: grey.
 2. In conformance with: CGSB 37GP56M
 3. Properties:

	MD	XD
1. Strain Energy (kJ/m)	7.8	7.2
2. Ultimate Elongation (%)	50	65
3. Tear Resistance (N)	180	
4. Dimensional Stability (%)	0.5	0
5. Plastic Flow (°C)	≥ 110	
6. Cold Bending (at -25°C)	No Cracking	
 4. Basis of Design Materials:
 1. Sopraply Traffic Cap, Soprema
7. Adhesive:
 1. Insulation Adhesive: Manufacturers standard adhesives specifically formulated for installation of plastic insulation to roofing materials:
 1. Acceptable Materials:
 1. InstaFoam Products Inc. InstaStik
 2. Soprema Duotack Adhesive
 3. IKO Millenium
 4. 880-333 – Henry Bakor
 5. Siplast Parafast

2.4. ROOF DECK (R2) & ROOF (R3) ASSEMBLY

1. Deck Covering:
 1. Plywood: Douglas-Fir plywood to CSA O121, Sheathing Grade.
 1. Tongue and groove, thickness as indicated on Drawings.
2. Primer:
 1. Primer comprised of elastomeric bitumen, volatile solvents and adhesive enhancing additives as recommended by membrane roofing manufacturer to suit substrate and installation conditions.
 1. Acceptable Materials:
 1. Elastocol Stick, Soprema
3. Protection Membrane (R2):
 1. Roof membrane: composed of SBS modified bitumen and glass mat reinforcement, 2.5 mm thick, top face covered with thermofusible plastic film; underface, made of discontinuous self-adhesive strips, covered with silicone release film, and as follows:
 1. Acceptable Materials:
 1. Colvent Base 830, Soprema

4. Air And Vapour Retarder (R3):
 1. Premanufactured Self Adhesive Air/Vapour Barrier: Self-adhesive vapour barrier membrane composed of SBS modified bitumen with thermoplastic polymers and high density polyethylene film and as follows:
 1. Thickness: Minimum 0.8 mm.
 2. Cold Bending: -35°C
 3. Static Puncture: 400 N.
 4. Membrane Breaking Strength (MPa): MD=75, XD=98.
 5. Water Vapour Permeance: 0.92 ng/Pa•s•m² to ASTM E96.
 6. Acceptable Materials:
 1. Sopravap'R, Soprema
 2. MVP, IKO
 3. Vapor Bloc SA – Henry Bakor

5. Membrane:
 1. Roof membrane base sheet: composed of SBS modified bitumen and composite reinforcement, 2.2 mm thick, top and bottom faces covered with thermofusible plastic film, in accordance with CGSB 37GP56M:
 1. Properties:

	MD	XD
1. Strain Energy (kN/m)	7.8	7.2
2. Ultimate Elongation (%)	50	65
3. Tear Resistance (N)	125	
4. Dimensional Stability (%)	-0.2	0.0
5. Plastic Flow (oC)	≥ 110°C	
6. Cold Bending (at -30°C)	No Cracking	
 2. Basis of Design Materials:
 1. Sopraply 520, Soprema
 2. Flashing, Stripping and Up-stand Membranes: Two-ply reinforced modified bitumen membrane base sheet and cap sheet; base sheet having selfadhering bottom surface and sanded top surface; cap sheet having bottom surface sanded and top surface is protected by coloured granules, and as follows:
 1. Prefabricated membrane to CAN/CGSB 37-GP-56M.
 2. Reinforcement: Composite polyester and glass grid.
 3. Elastomeric Bitumen: Mix of bitumen and SBS polymer.
 4. Protection: coloured granules, colour as selected by Consultant from manufacturer's full range.
 5. System Properties:

1. Strain Energy (kN/m)	8.3
2. Breaking Strength (N/50 mm)	16
3. Ultimate Elongation (%)	56
4. Tear Resistance (N)	120
5. Dimensional Stability (%)	0.4
6. Plastic Flow	105°C
7. Cold Bending (at -25°C)	No Cracking
8. Bending (at 70°C after 90 days)	No Cracking
9. Static Puncture (N)	380

6. Basis of Design Materials:
 1. Sopraply 520, Soprema
3. Roofing cap sheet membrane for field surfaces and flashings and parapets:
 1. Description: Roofing membrane composed of SBS modified bitumen 4.0 mm thick (nominal) with a composite reinforcement and elastomeric bitumen. The top surface is protected with coloured granules. The thermofusible bottom surface is covered with a release film.
 1. Coloured Granules: grey.
 2. In conformance with: CGSB 37GP56M
 3. Properties:

	MD	XD
1. Strain Energy (kJ/m ²)	7.8	7.2
2. Ultimate Elongation (%)	50	65
3. Tear Resistance (N)	180	
4. Dimensional Stability (%)	0.5	0
5. Plastic Flow (°C)	≥ 110	
6. Cold Bending (at -25°C)	No Cracking	
 4. Basis of Design Materials:
 1. Sopraply Traffic Cap, Soprema

2.5. ACCESSORIES

1. Perimeter Fire Seal: SBS modified bitumen, minimum 60 gm/m² glass fleece reinforced, self adhering membrane having sanded top face, cut into strips minimum 150 mm wide x nominal 1.5 mm thick.
 1. Acceptable Materials:
 1. Modiflex Tapes, IKO
 2. Sopraguard Tape, Soprema
2. Pavers and Pedestals: refer to Section 07 76 00 – Roof Pavers and Pedestals.
3. Flashing and sheet metal in accordance with section 07 62 00 – Sheet Metal Flashing and Trim.
4. Waterproofing Mastic: Black, solvent based mastic containing SBS modified bitumen, fibres and mineral fillers.
5. Waterproofing Mastic: two component PMMA liquid membrane with fleece fabric.
 1. Basis of Design:
 1. Soprema Alsan RS 230 Field with Soprema Alsan RS 230 Flash
6. Torches: Use only torches designed for torching roofing material and acceptable to manufacturer.
7. Interlocking Balcony Tiles: Composite interlocking deck tiles as indicated in Finish Schedule.

2.6. PIPE SUPPORTS

1. Roof drain pans, vent stack covers and other roof penetration flashings: premanufactured, stainless steel construction, purposemade to suit application and location, designed to tie-in to SBS modified membrane roofing systems.
 1. Acceptable Materials:

1. Materials as required (coordinate with electrical and mechanical Drawings), by Thaler Metal Industries Ltd., including submittal of manufacturer's 20year Warranty.
2. Premanufactured Pipe Supports: fabricated from 100% recycled content, with 2.7 mm thickness galvanized steel frame, 150 mm wide x 100 mm tall x length to suit installation; including fasteners, bridge components, and angled supports as required for a complete installation and having the following accessories:
 1. Pipe and Conduit Support: Galvanized pipe clamp sized to suit gas pipe in accordance with manufacturers instruction's.
 2. Multi-Pipe and Conduit Support: Galvanized pipe support system size and number to suit pipes being supported in accordance with manufacturer's instructions.
 3. Extendable Height Support: Galvanized steel pipe extensions to suit installation in accordance with manufacturer's instructions.
 4. BasisofDesign:
 1. Clearline Technologies, C-Port

3. Execution

3.1. QUALITY OF WORK

1. Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and RCABC Roofing Practices Manual.
2. Do priming in accordance with manufacturers written recommendations.
3. The interface of the walls and roof assemblies to be fitted with durable rigid material sheet metal and plywood providing connection point for continuity of air barrier.
4. Assembly, component and material connections to be made in consideration of appropriate design loads.

3.2. EXAMINATION OF ROOF DECKS

1. Verification of Conditions:
 1. Inspect with Consultant deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed. The start of roofing work will mean roofing conditions are acceptable for work completion.
2. Evaluation and Assessment:
 1. Prior to beginning of work ensure:
 1. Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 2. Curbs have been built.
 3. Roof drains have been installed at proper elevations relative to finished roof surface.
 4. Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
3. Do not install roofing materials during rain or snowfall.

4. Provide fire protection during installation.

3.3. SHEATHING

1. Adhere sheathing with adhesive where indicated on Drawings with manufacturer's written instructions.
2. Place with long axis of each sheet transverse to trusses, with end joints staggered and fully supported.

3.4. PRIMING DECK

1. Apply deck primer to deck substrate at the rate recommended by manufacturer.
2. Surfaces to be primed must be free of rust, dust or any residue that may hinder adherence.
3. Cover primed surfaces with roofing membrane within time limits recommended by roofing membrane system manufacturer.

3.5. AIR AND VAPOUR RETARDER INSTALLATION

1. Install self adhering air/vapour barrier membrane by unrolling air/vapour barrier membrane onto substrate aligned with substrate materials starting at bottom of slope without removing silicone release sheet, and as follows:
 1. Align roll parallel to steel deck flutes supporting membrane overlaps on top of flute along entire length.
 2. Peel back one end of silicone release sheet and adhere membrane to substrate; peel remaining release sheet at a 45° angle to avoid wrinkles in membrane.
 3. Cut roll and start again where membrane is not properly aligned to deck flutes; realign membrane and overlap end of misaligned piece by 150 mm.
 4. Overlap adjacent membranes by 75 mm; overlap end laps by 150 mm; stagger end laps by 300 mm; place thin sheet of metal under end lap of membrane to provide structural support to lapped membranes.
2. Overlap roof air/vapour barrier to wall air/vapour barrier using compatible continuity strip to provide continuity of building envelope.

3.6. (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

1. Insulation: fully adhered, adhesive application:
 1. Adhere insulation to vapour barrier using manufacturer's recommended adhesive applied at a rate recommended by the manufacturer
 2. Place boards in parallel rows with ends staggered, and in firm contact with one another.
 3. Cut end pieces to suit.
 4. Apply adhesive in continuous ribbons at 300 mm on centre.
 5. Separate the membrane and insulation with a drainage layer or slipsheet.

2. Tapered insulation application:
 1. Adhere insulation using manufacturer's recommended adhesive applied at rate recommended by manufacturer; adhere insulation at locations where roof deck will be visible in final installation.
 2. Install tapered insulation in accordance with shop drawings. Stagger joints between layers 150 mm minimum.
3. Installation of Factory Laminated Base Sheet:
 1. Adhere base sheet board using adhesive applied in continuous strips spaced as required and based on manufacturer's instructions and the CSA A123.21 Wind Uplift Roof System Analysis Report.
 2. Heat seal side laps of the cover board with an industrial hot air welder as recommended by manufacturer.
 3. Line up end laps of the cover boards (not staggered) and apply primer as per manufacturer's recommendations and allow to "flash off" in preparation for the application of the self-adhesive cover strip membrane.
 4. Self-adhesive cover strip membrane shall be applied over each primed end lap of the cover board, rolled into place and a hot air welder is required to heat seal the side and end laps.
 5. Avoid the formation of wrinkles, swellings or fishmouths.
4. Perimeter Fire Seal Application
 1. Apply perimeter fire seal to roof perimeter and curb substrates prior to applying base sheet materials. Apply fire seal to vertical joints in parapet or curb sheathing, and at vertical corners.
 2. Extend fire seal minimum 50 mm up parapet faces and extend fire seal minimum 75 mm onto adjacent substrates. Ensure air bubbles and fish mouths are removed.
 3. Install perimeter fire seal to act as temporary moisture seal until installation of flashing materials.
5. Reinforced gusset installation:
 1. Install gussets at every angle, and on inside and outside corners.
 2. Install self adhesive gussets before installing self adhesive base sheet flashing membranes.
6. Base sheet flashing installation:
 1. Apply base sheet flashing when primer coat is dry and in accordance with manufacturer's written instructions.
 2. Position precut membrane pieces; peel back 100 mm to 150 mm of silicone release paper to hold the membrane in place at the top of the parapet, then gradually peel back remaining silicone release paper, pressing down on the membrane with aluminium applicator to provide good adhesion and to provide smooth transition between up-stand and field surface; smooth entire membrane surface with a roller for full adhesion.
 3. Cut off corners at end laps being covered by next roll.
 4. Install a reinforcing gusset in all inside and outside corners.
 5. Seal overlaps at the end of each workday.
7. Cap sheet application – adhered:

1. Install cap sheet in a full bed of adhesive applied at a rate recommended by membrane manufacturer using notched 5 mm neoprene squeegee starting at drains and perpendicular to the slope; use brush grade or trowel grade adhesive as required for different membrane installation requirements as recommended by manufacturer's written installation requirements.
 2. Lap side joints 100 mm and end joints 150 mm; stagger end joints and joints between membranes plies a minimum of 300 mm; stagger base and cap sheet membranes by 300mm.
 3. Brush surface to provide complete and uniform adhesion immediately after placement of membrane into adhesive.
 4. Cut off corners at end laps being covered by next roll.
 5. Provide a smooth application, free of wrinkles, fish mouths, air pockets or tears.
 6. Terminate cap sheet at top of cant or at perimeter.
8. Cap sheet application – torched:
1. Once base sheet is applied and no defects are apparent, proceed with cap sheet installation.
 2. Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge).
 3. Weld cap sheet onto base sheet with torch recommended by membrane manufacturer. During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.
 4. Avoid overheating. Take care to avoid excessive bitumen bleedout at joints during installation.
 5. Unless overlap widths differ between cap and base sheets, make sure joints between the two layers are staggered by at least 300 mm.
 6. Overlap cap sheet side laps by 75 mm and end laps by 150 mm. Cut off corners at end laps to be covered by next roll. Overlap surfaces must be granulefree or degranulated.
 7. Complete welds between two membranes. Leave no zone unwelded. In cold weather, adjust welding time to obtain homogenous seam.
 8. Once cap sheet is installed, carefully check overlapped joints. Leave bleedout at joints ungranulated until inspected and accepted by the roofing inspector. Apply coloured granules to bleedout area by priming with selfadhesive primer, and while still tacky shake granules onto surface and press into place.
9. Cap Sheet Flashings Application:
1. Install cap sheet flashing in 1 m widths. Overlap side by 100 mm. Stagger base and cap sheet overlaps by minimum 100 mm. Make overlaps 150 mm wide.
 2. Draw parallel chalk line 150 mm from parapet or upstand bases. Sink surface granules into bed of hot bitumen with torch from chalk line to parapet or upstand.
 3. Adhere cap sheet to base sheet membrane starting from bottom and working to top using trowel grade adhesive applied with 5 mm notched steel trowel at a rate recommended by membrane manufacturer; use roller to apply even pressure over entire surface to provide uniform adhesion across entire surface.

10. Roof penetrations:
 1. Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.7. FIELD QUALITY CONTROL

1. Inspection and testing of roofing application to be carried out by testing laboratory designated by Owner in cooperation with Consultant.
2. Inspection fees to be paid by Owner, in accordance with Section 01 11 00 – General Requirements, Quality Control.
3. Manufacturer's Field Services:
 1. Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
 2. Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 3. Schedule site visits to review Work at stages listed:
 1. After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 2. Twice during progress of Work at 25% and 60% complete.
 3. Upon completion of Work, after cleaning is carried out.
 4. Obtain reports within three days of review and submit.

3.8. CLEANING

1. Remove bituminous markings from finished surfaces.
2. In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
3. Repair or replace defaced or disfigured finishes caused by work of this section.

3.9. PROTECTION OF IN-PLACE CONDITIONS

1. Cover walls, walks, sloped roofs and adjacent work where materials hoisted or used. Roofing Contractor shall assume full responsibility for damage.
2. Use warning signs and barriers. Maintain in good order until completion of Work.
3. Clean off drips and smears of bituminous material immediately.
4. Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
5. Protect roof from traffic and damage. Comply with precautions deemed necessary by Consultant.
6. At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
7. Metal connectors and decking shall be treated with rust proofing or galvanization.

END OF SECTION

1. General

1.1. RELATED SECTIONS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 13 – Modified Bituminous Air and Vapour Barrier
3. Section 07 52 00 – Modified Bituminous Membrane Roofing
4. Section 07 65 26 – Self-Adhered Membrane Flashing
5. Section 08 11 13 – Steel Doors and Frames

1.2. REFERENCES

1. The Aluminum Association Inc. (AA)
 1. Specifications for Aluminum Sheet Metal Work in Building Construction.
 2. DAF452003(R2009), Designation System for Aluminum Finishes.
2. American Society for Testing and Materials International (ASTM)
 1. ASTM A240/A240M18, Standard Specification for Chromium and ChromiumNickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 2. ASTM A606/A606M18, Standard Specification for Steel, Sheet and Strip, HighStrength, LowAlloy, HotRolled and ColdRolled, with Improved Atmospheric Corrosion Resistance.
 3. ASTM A653/A653M19a, Standard Specification for Steel Sheet, ZincCoated (Galvanized) or ZincIron AlloyCoated (Galvannealed) by the HotDip Process.
 4. ASTM A792/A792M10(2015), Standard Specification for Steel Sheet, 55% AluminumZinc AlloyCoated by the HotDip Process.
 5. ASTM B3208(2014), Standard Specification for Solder Metal.
 6. ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 7. ASTM B37012, Standard Specification for Copper Sheet and Strip for Building Construction.
 8. ASTM D52314(2018), Standard Test Method for Specular Gloss.
 9. ASTM D822/D822M13(2018), Standard Practice for Filtered OpenFlame CarbonArc Exposures of Paint and Related Coatings.
 10. ASTM D4586/D4586M-07(2018), Standard Specification for Asphalt Roof Cement, Asbestos-Free.
3. Canadian Roofing Contractors Association (CRCA)
 1. Roofing Specifications Manual
4. Canadian Standards Association (CSA International)
 1. CSA A123.305 (R2015), Asphalt Saturated Organic Roofing Felt.
 2. AAMA/WDMA/CSA 101/I.S.2/A44017, Standard/Specification for Windows, Doors, and Skylights,
 3. CSA B11174(R2003), Wire Nails, Spikes and Staples.
5. Green Seal Environmental Standards
 1. Standard GS-03-97, Anti-Corrosive Paints.
 2. Standard GS-11-10, Paints and Coatings.

3. Standard GS-36-15, Commercial Adhesives.
6. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
7. Roofing Contractors Association of British Columbia (RCABC)
 1. Roofing Practices Manual
 2. Roofing Contractors Association of B.C. Guarantee Corp. Guarantee Program.
8. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 1. Architectural Sheet Metal Manual, 7th Edition, 2012
9. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule #1113-04, Architectural Coatings.
 2. SCAQMD Rule #1168-05, Adhesives and Sealants.

1.3. ADMINISTRATIVE REQUIREMENTS

1. Coordination:
 1. Coordinate work of this Section with interfacing and adjoining Work for proper sequencing of each installation and to provide positive weather resistance, durability of the work, and protection of materials and finishes.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.5. QUALITY ASSURANCE

1. Installer: Engage an experienced installer having a minimum of three years experience who has completed projects similar in material, design, and extent to that indicated for this Project and with a record of successful inservice performance.
2. Construct and install roof metal flashings in accordance with RCABC Manual details and in accordance with the RCABC Manual. If requirements conflict, this specification takes precedence over the manual.

1.6. DELIVERY, STORAGE AND HANDLING

1. Stack preformed and pre-finished material in manner to prevent twisting bending and rubbing.
2. Provide protection for galvanized surfaces.
3. Prevent contact of dissimilar metals during storage and protect from acids, flux, and other corrosive materials and elements
4. Protect pre-finished surfaces from scratches and from rust staining.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for reuse and recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.8. WARRANTY

1. The same warranty provisions apply to flashings associated with roofing as to the roofing.
2. Provide Warranty for sheet metal flashing and trim to include in maintenance manuals as specified in Section 01 11 00 – General Requirements, Closeout Submittals.

2. Products

2.1. METAL FLASHINGS

1. Zinc coated galvanized steel sheet (pre-finished): Type A commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.
 1. Class: F1S-Finished one side.
 2. Thickness: minimum 0.45 mm base metal thickness.
 3. Factory Finish: silicone modified polyester
 1. Basis of Design Materials:
 1. WeatherXL, Valspar or Perspectra, Dofasco
 4. Colour: As indicated on Drawings.
2. Formed aluminum flashings: Tension levelled, aluminum sheet in accordance with ASTM B209 and ANSI H35.1 alloy designation 3003H14 and as follows:
 1. Thickness: minimum 1.00 mm.
 2. Finish: prefinished, colour as indicated on Drawings.
3. Form flashings, copings and fascias to profiles indicated.

2.2. SCUPPERS

1. Form scuppers from 0.70 mm thick galvanized, prefinished steel sheet metal.
2. Sizes and profiles as indicated.
3. Provide necessary fastenings.

2.3. FABRICATION

1. Fabricate sheet metal building flashings and trim in accordance with the recommendations of SMACNA's Architectural Sheet Metal Manual that apply to the design, dimensions, metal, and other characteristics as required.
2. Fabricate aluminum flashings and other sheet aluminum work in accordance with AAIA Aluminum Sheet Metal Work in Building Construction.
3. Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
4. Apply isolation coating to metal surfaces to be embedded in concrete or mortar.
5. Make flashings of prefinished metal for all cap flashings, for all flashings adjacent to roofing at roof edges and area dividers and where exposed to view from ground. Make flashings for other locations, of plain galvanized metal as follows:

1. Use 0.45 mm metal core thickness except where otherwise indicated.
 2. Use 0.62 mm metal core thickness wherever a flat length exceeding 305 mm wide occurs.
 3. Use 0.80 mm metal core thickness for concealed fastening strips.
6. All straight run joints shall be S-Lock.
 7. Make joints to allow for thermal movement, space S-Lock joints at 2440 mm maximum centers.
 8. Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant in accordance with SMACNA standards.
 9. Make flashings for building into masonry and concrete so that joints can be lapped 100 mm or more.
 10. Strengthen free edges of metal flashings by folding to form a 13 mm hem.
 11. Make flashings to curbs, walls and parapets a minimum of 200 mm high, where possible.
 12. Where curb-mounted roof penetrations are not required, provide flashing sleeves and collars for all pipes and conduit extending through the roof. Sleeves shall be soldered to a piece of sheet metal extending at least 150 mm onto the surrounding roof.
 13. Make joints for corners and intersections with standing seams except where exposed of pre-finished metal when seams shall be flat locked.
 14. All bends machine made; form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
 15. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer, and as follows:
 1. Size as recommended by SMACNA manual or sheet metal manufacturer for application but not less than thickness of metal being secured.
 16. Back paint metal flashings in contact with dissimilar metals or materials with bituminous paint that would result in electrolytic action or corrosion.

2.4. ACCESSORIES

1. Isolation coating: alkali resistant bituminous paint.
2. Roofing Cement: to ASTM D4586, asphalt based, asbestos free.
3. Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
4. Sealants: as indicated in Section 07 92 00 - Sealants.
 1. Mastic Sealant: CAN/CGSB 37.29 polyisobutylene; non-hardening, non-skinning, nondrying, non-migrating sealant.
 2. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Section 07 92 00.
5. Fasteners: of same material as sheet metal, to CSA B111, as recommended by sheet metal manufacturer; non-corrosive. Finish of exposed parts to match material being fastened.
6. Washers: of same material as sheet metal, 1 mm thick with rubber packings.

7. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather resistant seaming and adhesive application of flashing sheet metal.
8. Metal Accessories: Provide non-corrosive sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work. Accessories shall match or be compatible with material being installed; size and thickness as required.
9. Touchup paint: as recommended by prefinished material manufacturer.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets.

3.2. EXAMINATION

1. Check mounting and counter-flashing of mechanical items and report any defect to the Consultant.
2. Verify that solid wood blocking or sheathing provided to backup all flashings and that all nails, screws set and wood provides a smooth flat plane.
3. Verify that all reglets, provided under other Sections or builtin by other trades, properly and securely located, true and level in line.

3.3. INSTALLATION GENERAL

1. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking and fastener disengagement.
2. Install metal flashings on all surfaces such as roof cant edges, sleepers, parapets and cap type, wall junctions, roof dividers, curbs, roof control joints, through roof penetrations and the like, and as otherwise required to provide flashing type protection to details. Unless otherwise directed extend all flashings down and onto the horizontal portion of the roof. Additionally install counter and base flashings unless otherwise directed by the Consultant.
3. Sheet metal flashings are intended to protect the roof membrane from accelerated deteriorating effects of the elements, and to limit mechanical damage of the membrane, and are not intended to protect the work from direct migration of moisture. Ensure that the roofing system membrane terminations are fully water tight, without reliance on covering flashing.
4. Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, over-stressing of components, failure of joint sealants, failure of connections, and other detrimental effects:
 1. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
 2. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

3. Temperature change (range): 67 degrees Celsius ambient; 100 degrees Celsius material surfaces.
5. Provide sheet metal flashing and trim to create a rain screen assembly to the completed air/vapour and roofing membrane termination details.
6. Install pre-finished metal fascia to complete edge details. Install as separate piece from flashing.
7. Call for inspection by roofing inspector, of completed roofing work prior to the installation of any metal flashings. Provide other flashing inspections, such as at start-up and periodic inspections, by the roofing inspector at frequencies required by RCABC.
8. Coordinate installation of flashing work of this Section with flashing work of other Sections which ties into this work. Coat surfaces of different metals such as aluminum and galvanized steel which are in contact to each other, with bituminous paint to prevent electrolysis.

3.4. INSTALLATION: METAL FLASHING

1. Apply metal roof flashing to RCABC recommended requirements as a minimum.
2. Install sheet metal flashing and trim in accordance with performance requirements, manufacturer's installation instructions, and SMACNA's Architectural Sheet Metal Manual.
3. Do not install metal flashings over flexible roof flashing until the flexible roof flashing has been inspected and approved by the Roofing Inspector. This includes curbs for roof mounted items.
4. Fasten metal base flashing to walls or upstands along top of flashing. Do not secure to cant strip. Form lapped corner joints. Extend rolled edge of base flashing approximately 25 mm on to roof from toe of cant, and rest on top of roof surface.
5. Do not use exposed fastening unless indicated, or concealed fastening is not possible. Locations and methods shall be approved by Consultant.
6. Provide underlay under sheet metal.
 1. Secure in place and lap joints 100 mm.
7. Counter-flash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 1. Flash joints using S-lock forming tight fit over hook strips, as detailed.
8. Lock end joints and caulk with sealant.
9. Insert metal flashing under cap flashing to form weather tight junction.
10. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
11. Underlayment: Install a slip sheet of red rosin paper and a course of polyethylene underlayment where installing stainless steel or aluminum directly on cementitious or wood substrates.
12. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
13. Caulk flashing at cap flashing with sealant.

14. Install pans, where shown around items projecting through roof membrane.
15. Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the Item manufacturer, to drain roof in the most efficient manner.
16. Coordinate roof drain flashing installation with roof drainage system installation.
17. All exposed and pre-finished flashings to provide a smooth flat surface free of indentations, bumps, oil-canning, or twists, all edges, bends hard, sharp and true to line.

3.5. INSTALLATION: SCUPPERS

1. Install scuppers as indicated.

3.6. CLEANING

1. Proceed in accordance with Section 01 11 00 – General Requirements, Cleaning.
2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
3. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
4. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Performance.
5. Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1. General

1.1. SUMMARY

1. This section includes provision of self-adhering bituminous sheet products for use as flexible flashing applications and as detailed and as follows:
 1. Standard flashing material for use around openings and air barrier and vapour barrier transitions and joints.

1.2. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 27 19 – Sheet Membrane Air and Vapour Barrier
3. Section 07 52 00 – Modified Bituminous Membrane Roofing
4. Section 07 62 00 – Sheet Metal Flashing and Trim
5. Section 08 11 13 – Steel Doors and Frames

1.3. REFERENCES

1. American Society for Testing and Materials (ASTM):
 1. ASTM D1970/D1970M-18, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
2. Canadian General Standards Board (CGSB):
 1. CGSB 37 GP 56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing
 2. CGSB 37 GP 9MA, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing

1.4. ADMINISTRATIVE REQUIREMENTS

1. Coordination between all installers of each component of membrane is essential to ensure continuity of system and that junctions between the various components are effectively sealed.
2. Verify with manufacturers and all tradesmen involved with installation procedures of building products incorporated into membrane elements including, but not limited to, various membranes, coatings and sealants.

1.5. INFORMATION SUBMITTALS / ACTION SUBMITTALS

1. Provide submittals in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
2. Product Data:
 1. Submit copies of the most current technical data sheets, describing materials physical properties, and explanations about product installation, including installation techniques, restrictions, limitations and other manufacturer recommendations.
 2. Submit membrane manufacturer's standard details that will be utilized for this project, indicate changes that must be made to make the details project specific for review by the Consultant.

1.6. QUALITY ASSURANCE

1. Work shall be performed only by skilled applicators, employed by an installation contractor operating all adequate and necessary equipment to execute such work in accordance with the manufacturer's recommendations and recognized standards.

1.7. DELIVERY, STORAGE AND HANDLING

1. Deliver materials to job site in original unopened packages, clearly marked with manufacturer's name, brand name and description of contents.
2. Use all means necessary to protect membrane materials before, during and after installation and, to protect the installed Work of all other trades.
3. Protect all materials stored on site. Do not store membrane more than two pallets high off ground. Do not store in temperature above 32°C for prolonged period of time. Store in dry area, away from high heat, open flame or sparks

2. Products

2.1. MATERIALS

1. Standard Use Self-Adhering Sheet Flashing:
 1. Prefabricated self-adhesive waterproofing membrane composed of an SBS modified bitumen in compliance with CGSB 37 GP 56M and tested to ASTM D1970.
 2. Components:
 1. Elastomeric bitumen: Mix of selected bitumen and SBS polymer.
 2. Top surface: plastic film.
 3. Undersurface: silicone release film.
 3. Properties:
 1. Thickness: 1.0 mm min.
 2. Water vapour permeance to ASTM E96 Method B (ng/m²sPa.): <49.
 4. Acceptable Materials:
 1. Flashing Tape, Dupont
 2. Flexwrap ND, Dupont (at window openings)
 3. Blueskin SA, Henry Company
 4. AquaBarrier AVB, IKO
 5. Sopraseal Stick 130, Soprema.

2.2. ACCESSORIES

1. Membrane Primer
 1. Description: Manufacturer recommended water-based single component proprietary for membrane used.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2. EXAMINATION AND PREPARATION OF SURFACES

1. Do not proceed with work until conditions are in accordance with manufacturers instructions.
2. Ensure surfaces are smooth, dry, clean and free of ice and debris as per manufacturer's recommendations.
3. Do not install materials in conditions of snow or rain.
4. Verify the compatibility of membrane components with curing compounds, coatings, or other materials which are already installed on the surfaces to be treated.

3.3. APPLICATION

1. Apply under metal flashing and as detailed.

3.4. METHOD OF EXECUTION

1. Perform Work on a continuous basis as surface and weather conditions allow.
2. Protect adjoining surfaces against damage that could result from the waterproofing installation.

3.5. PRIMER APPLICATION

1. Apply primer coating at the rate recommended by manufacturer. Primer is temperature sensitive and must be installed at temperature recommended by manufacturer.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Structural – Cast-In-Place Concrete
2. Section 07 27 19 – Sheet Membrane Vapour Barrier
3. Section 07 52 00 – Modified Bituminous Membrane Roofing
4. Section 07 62 00 – Sheet Metal Flashing and Trim
5. Section 08 80 50 – Glazing
6. Section 09 21 16 – Gypsum Board Assemblies
7. Section 09 30 13 – Tiling
8. Division 23 – Mechanical
9. Other technical sections as required

1.2. REFERENCES

1. American Society for Testing and Materials International, (ASTM)
 1. ASTM C794-18, Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 2. ASTM C834-17, Standard Specification for Latex Sealants
 3. ASTM C91919, Standard Practice for Use of Sealants in Acoustical Applications.
 4. ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
 5. ASTM C1193-16, Standard Guide for Use of Joint Sealants.
 6. ASTM C1330-18, Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants
 7. ASTM C1521-19, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
 8. ASTM D2240-15e1, Standard Test Methods for Rubber Property, Durometer Hardness.
2. Department of Justice Canada (Jus)
 1. Canadian Environmental Protection Act, 1999 (CEPA).
3. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
4. Sealant, Waterproofing, and Restoration Institute (SWRI) publication – Sealants: The Professionals' Guide 2013
5. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
6. Transport Canada (TC)
 1. Transportation of Dangerous Goods Act, 1992 (TDGA).
7. ULC
 1. ULC S115, Standard Method of Fire Tests of Firestop Systems

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
 1. Caulking compound
 2. Primers
 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 4. Manufacturers Sample Warranty
 2. Submit WHMIS MSDS Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for sealants. Indicate VOC content.
 3. Submit manufacturer's installation instructions for each product used.
 4. When required by Consultant, submit test certificates from an approved Canadian materials testing laboratory indicating that sealants meet the requirements of the standards specified, and that the tests have been conducted in accordance with ASTM D2240.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Provide colour samples of the actual sealants for approval; painted or printed colour charts are not acceptable.

1.4. QUALITY ASSURANCE

1. Caulking shall be performed by a caulking contractor with minimum 3 years successful experience in Work of similar size and complexity.
2. Before performing Work of this Section, submit the names of proposed materials. If specified using Standards, indicate Qualification Number.
3. Compatibility: Ensure sealants are compatible with adjacent materials and are approved by manufacture for use with adjacent materials.
4. Mock-Ups
 1. Construct mockup in accordance with Section 01 11 00 – General Requirements, Quality Control.
 2. Before performing caulking work do sample applications of each type of sealant for approval. Site locations for sample applications shall be designated by Consultant. Approved samples shall form standard for this project and no work of inferior quality will be allowed. Start no final work until approval of samples is given by the Consultant.

1.5. PERFORMANCE REQUIREMENTS

1. Sealant system shall satisfy following requirements for duration of warranty period:
 1. Waterproof, flexible, and thermally compatible with substrate under applicable service conditions.
 2. Provide a weather-tight seal that does not allow moisture penetration.
 3. Shall not de-bond, crack, or craze.
 4. Shall not leak.

2. Reference to products does not relieve manufacturer of responsibility to comply fully with specified criteria.

1.6. DELIVERY, STORAGE, AND HANDLING

1. Deliver, handle, store and protect materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements.
2. Deliver containers labelled and sealed, complete with written application and maintenance instructions.
3. Store materials in a dry heated enclosure in accordance with manufacturer's instructions.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.
2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
3. Place materials defined as hazardous or toxic in designated containers.
4. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
5. Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
6. Divert unused joint sealing material from landfill to official hazardous material collections site approved by Consultant.
7. Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.
8. Fold up metal banding, flatten, and place in designated area for recycling.

1.8. PROJECT CONDITIONS

1. Environmental Limitations:
 1. Do not proceed with installation of joint sealants under following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
 2. When joint substrates are wet.
2. JointWidth Conditions:
 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
3. JointSubstrate Conditions:
 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.
 2. Substrate must be clean, dry, and frost free.

1.9. WARRANTY

1. Contractor hereby warrants that caulking work will not leak, crack, crumble, melt, shrink, run, lose adhesion or stain adjacent surfaces in accordance with General Conditions, but for three (3) years.
2. Provide Warranty for sealants to include in maintenance manuals as specified in Section 01 11 00 – General Requirements, Closeout Submittals.

2. Products

2.1. MANUFACTURERS

1. Acceptable Manufacturers: Subject to compliance with requirements in this Section and as recommended by the manufacturer, manufacturers offering products that may be incorporated into the Work include the following:
 1. BASF, Sonneborn.
 2. Chemtron Manufacturing Ltd.
 3. Dow Corning Canada Inc.
 4. GE Silicones Limited.
 5. Sika Chemical of Canada Ltd.
 6. Tremco Ltd.

2.2. SEALANT MATERIALS

1. Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
2. When low toxicity caulks are not possible, confine usage to areas which off-gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.
3. Unless otherwise specified, VOC content limits of sealants shall be in accordance with SCAQMD Rule 1168 and as follows:
 1. Architectural Materials:
 1. Sealants: VOC content limit 250 g/L.
 2. Sealant Primers for Non-Porous Surfaces: VOC content limit 250 g/L.
 3. Sealant Primers for Porous Surfaces: VOC content limit 775 g/L.
 2. Roofing:
 1. Non-Membrane Related Sealants: VOC content limit 300 g/L.
 2. SBS Membrane Sealant Primer: VOC content limit 500 g/L.
 3. All Other Applications:
 1. Sealants: VOC content limit 420 g/L.
 2. Sealant Primers: VOC content limit 750 g/L.

2.3. SEALANT MATERIAL DESIGNATIONS

1. Type S-1: Acrylic Latex One Part, Shore A Hardness 20, to ASTM C834.
 1. Acceptable Materials:
 1. Latacalk, Chemtron.
 2. Sonolac, BASF Sonneborn.

3. Latex 100, Tremco.
2. Type S-2: Silicone Sealant; mould and mildew resistant.
 1. To ASTM C920; type S; grade NS; class 50; use NT, G, and A.
 2. Acceptable Materials:
 1. Multiseal, Chemtron
 2. 795 Silicone, Dow Corning.
 3. SCS2000, GE
 4. Spectrem 2 Silicone, Tremco Inc.
 1. To ASTM C920; type S; grade NS; class 50; use NT, G, and A.
 2. Acceptable Materials:
 1. 790 Silicone, Dow Corning.
 2. SilPruf SCS 2000, GE
 3. Spectrem 1 Silicone, Tremco Inc.
 3. To ASTM C920; type S; grade NS; class 25; use NT, G, and A.
 4. Acceptable Materials:
 1. OmniPlus, BASF Sonneborn.
 2. 786 Silicone, Dow Corning.
 3. SCS1700, General Electric.
 4. Tremsil 200, Tremco Inc.
3. Type S-3: Silicone Sealant; general construction and air-seal sealant.
 1. To ASTM C920: type S; grade NS; class 25; use NT, M, G, A, O.
4. Type S-5: Acoustical Sealant; interior, non-skimming, non-hardening, simple component synthetic rubber sealant.
 1. Acceptable Materials:
 1. Metaseal, Chemtron.
 2. Acoustical Sealant, Tremco
5. Type S-6: Multi-component polyurethane sealant; chemical curing, exterior wall sealant.
 1. To ASTM C920: type M; grade NS; class 50; use T, NT, M, A, O.
 2. Acceptable Materials:
 1. MasterSeal NP2, BASF
 2. Thioplast 400, Chemtron
 3. 830, Isoflex
 4. Sikaflex 2c NS, Sika.
 5. Dymeric, Tremco.
6. Type S-7: One-component polyurethane sealant; non-sag, for general construction.
 1. To ASTM C920: type S; grade NS; class 25; use NT, M, A, O.
 2. Acceptable Materials:
 1. Masterseal NPI, BASF
 2. Multiflex, Chemtron.
 3. Mapeflex P1, MAPEI Inc
 4. Sikaflex 1a, Sika.

5. Dymonic FC, Tremco Inc
6. Pourthane NS, W.R. Meadows Canada
7. Type S-8: Horizontal joint sealant; two component, self-levelling.
 1. To ASTM C920: type M; grade P; class 25; use T, M, O.
 2. Acceptable Materials:
 1. Sonolastic SL 2, BASF Sonneborn.
 2. Sikaflex 2c SL, Sika.
 3. THC-901, Tremco Inc
8. Type S-9: One part moisture curing, low modulus polyurethane sealant for sealing joints in level and slightly slope surfaces conforming to ASTM C920, type S, grade P, class 50, use T, M, A,O, MC-1-25-B-N.
 1. Acceptable Materials:
 1. Sonolastic SL 1, BASF Sonneborn.
 2. Vulkem 45 SSL, Tremco Inc
9. Type S-10: Control joint sealant: two-component, epoxy-urethane, self-levelling, load bearing saw cut or preformed control joints.
 1. Acceptable Materials:
 1. Planiseal Rapid Joint 15, MAPEI Inc.
 2. Loadflex, Sika.
 3. Rezi-Weld Flex with Pourthane NS, WR Meadows
10. Type S-11: One-component polyurethane sealant; medium-modulus, non-sag, low-VOC, UV stable.
 1. To ASTM C920: type S; grade NS; class 50; use NT, T, M, A, O, I.
 2. Acceptable Materials:
 1. Multiflex, Chemtron
 2. Vulkem 116, Mameco
 3. Dymonic 100, Tremco Inc.

2.4. COLOURS

1. Colours: To match adjacent materials, as selected by Consultant, from manufacturer's standard colour range.

2.5. SEALANT SELECTION

1. Where no specified type of sealant is shown or specified, choose one of the sealants specified in this Section appropriate for its location.
2. Make sealant selections consistent with manufacturer's recommendations.
3. Use acrylic sealant Type S1 only on the interior and only in situations where little or no movement can occur.
4. Use mould & mildew resistant silicone sealant Type S2 for nonmoving joints in washrooms and kitchens. Do not use on floors.
5. Use silicone general construction sealant Type S3 or Type S6 and S7 for all joints, interior and exterior, where no other specific sealant type specified.

6. Use acoustical sealant Type S5 and air seal sealant Type S3 only where they will be fully concealed and only where no constant or consistent air pressure difference will exist across the joint.
7. Use multicomponent sealant type S6, primed penetration element surfaces other than concrete, for mechanical and electrical service penetrations in concrete foundation walls.
8. Use multicomponent sealant Type S8 for horizontal joint sealant of plaza, floors and decks, exterior areas only, subject to pedestrian and vehicular traffic.
9. Use polyurethane, semi-self levelling sealant Type S-9 for in expansion joints in sidewalks, plazas, floors and other pedestrian and vehicular horizontal surfaces with slopes up to 6%.
10. Use control joint sealant S-10 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.
11. Use sealant S-11 for sealing exterior holes and penetrations around pipes and other services passing through concrete foundations and requiring greater movement capability.

2.6. ACCESSORIES

1. Preformed Compressible and NonCompressible backup materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on site experience and laboratory testing.
 1. Rod Type Sealant Backings:
 1. ASTM C1330, Type C (closed cell material with a surface skin), Type O (open cell material) or Type B (bicellular material with a surface skin).
 2. Use any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.
 3. Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 4. Nonadhering to sealant, to maintain two sided adhesion across joint.
 2. High Density Foam.
 1. Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
 3. Bond Breaker Tape.
 1. Polyethylene bond breaker tape or other tape recommended by sealant manufacturer which will not bond to sealant.
2. Preformed Sealants
 1. Preformed Silicone Sealant System: Manufacturer's standard system consisting of precured low modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral curing silicone sealant for bonding extrusions to substrates:
 1. Acceptable Materials:
 1. Dow Corning Corporation; 123 Silicone Seal.
 2. GE Silicones; UltraSpan US1100.

3. Tremco; Spectrem Ez Seal.

3. Primer: Non-staining type as recommended by sealant manufacturer.
4. Joint Cleaner: Non-corrosive solvent type recommended by sealant manufacturer for applicable substrate materials.
5. Bond Breaker: Pressure-sensitive plastic tape that will not bond to sealants.

3. Execution

3.1. PROTECTION

1. Protect installed Work of other trades from staining or contamination.

3.2. INSPECTION

1. Carefully inspect surfaces, materials to receive sealants and verify they are physically capable of retaining sealant bond.
2. Verify that fillers and backing provided under other Sections properly installed.
3. Grind joint surfaces if required to achieve adequate surface preparation.

3.3. SURFACE PREPARATION

1. Prepare surfaces in accordance with manufacturer's instructions.
2. Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
3. Maintain workmanship of highest quality in accordance with best trade practice.
4. Ensure that joint forming materials are compatible with sealant.
5. Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work. Wire brush loose materials and other foreign matter which might impair adhesion of sealant.
6. Use air stream to blow out dirt and water from crevices.
7. Ensure joint surfaces are dry and frost free
8. Prime all porous material (e.g. wood, masonry, concrete, ceramic or paver tile, etc).
9. Prime other joints when recommended by manufacturer. Use a brush that will reach all parts of the joints. Mask adjoining surfaces with tape prior to priming to prevent staining.

3.4. PRIMING

1. Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
2. Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.5. BACKUP MATERIAL

1. Use backer rod as specified, to limit depth of sealant and to act as bond breaker at back of joint.

2. Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
3. Where depth of joint does not permit the use of backer rod apply paper masking tape to back of joint to act as bond breaker.
4. Ensure that no joints are formed which are bonded on adjacent sides where there is any possibility of movement.

3.6. MIXING

1. Mix materials in strict accordance with sealant manufacturer's instructions.

3.7. APPLICATION

1. Apply sealant in strict accordance with manufacturer's recommendations.
2. For joints where movement is possible, apply backer rod to achieve a joint depth of one half the joint width but not less than 9 mm; for joints larger than 25 mm use a depth of 13 mm
3. Use pressure gun fitted with suitable nozzle. Use sufficient pressure to fill voids and joints solid.
4. Form surface of sealant smooth, free from ridges, wrinkles, sags, or air pockets and imbedded impurities. Neatly tool surface to a slight concave appearance.
5. Tool sealants to achieve air tight joints. Use wet tools as required.
6. Ensure bead is solid, filling entire space between sides and bedding material, exerting sufficient pressure to obtain maximum bond, by allowing sealant to bulge out in advance of nozzle.
7. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.
8. Seal perimeters of hollow metal door frames on both sides.
9. Seal control joints in gypsum board and stucco, and junctures between interior partitions with exterior walls.
10. Seal window and door frames around the inside perimeter, so that an airtight seal is obtained, as indicated on drawings.
11. Seal joints in floors and walls and around service and mechanical and electrical fixture penetrations.
12. Seal at all locations where dissimilar material meet.
13. Curing
 1. Cure sealants in accordance with sealant manufacturer's instructions.
 2. Do not cover up sealants until proper curing has taken place.

3.8. 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. On porous surfaces allow sealant to cure overnight, and remove excess by light wire brushing.
5. Correct staining and discolouring of adjacent surfaces as directed by Consultant.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 07 92 00 – Sealants
2. Section 08 71 00 – Door Hardware
3. Section 08 80 50 – Glazing
4. Section 09 21 16 – Gypsum Board Assemblies
5. Section 09 91 00 – Painting

1.2. REFERENCES

1. American Society for Testing and Materials International (ASTM)
 1. ASTM A653/A653M19a, Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
 2. ASTM A780/A780M-09(2015), Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.
 3. ASTM A879/A879M-12(2017), Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
 4. ASTM A924/A924M-18, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 5. ASTM C578-19, Specification for Rigid, Cellular Polystyrene Thermal Insulation
 6. ASTM C591-19, Specification for Un-Faced Pre-formed Rigid Cellular Polyisocyanurate Thermal Insulation
 7. ASTM C1289-18a, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 8. ASTM D1622/D1622M-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 9. ASTM D4726-18, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors.
 10. ASTM D6386-16a, Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
 11. ASTM D7396-14, Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting.
 12. ASTM E90-09(2016), Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 13. ASTM E413-16, Classification for Rating Sound Insulation
2. Builders Hardware Manufacturers Association (BHMA)
 1. BHMA A156.16-2013, Auxiliary Hardware.
3. Canadian Standards Association (CSA Group)
 1. CSA A440H-14, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.

2. CSA A440S1-19, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
3. CAN4-S106-M80(R1985), Standard Method for Fire Tests of Window and Glass Block Assemblies
4. CSAG40.20-13/G40.2113 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
5. CSA W47.1-09(R2014), Certification of companies for fusion welding of steel, Includes Update No. 3 (2011), Update No. 5 (2012), Update No. 6 (2013).
6. CSA W5918, Welded Steel Construction.
4. Canadian Steel Door Manufacturers' Association (CSDMA)
 1. CSDMA, Guide Specification for Installation and Storage of Hollow Metal Doors and Frames, 2012.
 2. CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2006.
 3. CSDMA, Selection and Usage Guide for Commercial Steel Doors, 2009.
5. National Fire Protection Association (NFPA)
 1. NFPA (Fire) 80, Standard for Fire Doors and Other Opening Protectives, 2016 Edition.
 2. NFPA (Fire) 252, Fire Tests of Door Assemblies, 2017 Edition.
6. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule 1113-11, Architectural Coatings.
 2. SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
7. The Society for Protective Coatings (SSPC)
 1. SSPC-PS 12.01, One Coat Zinc-Rich Painting System.
 2. SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems.
8. Underwriters' Laboratories of Canada (ULC)
 1. CAN/ULC S104-15, Standard Method for Fire Tests of Door Assemblies.
 2. CAN/ULC S10516, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULCS104.
 3. CAN/ULCS70111, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 4. CAN/ULCS70411, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Product Data:
 1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 2. Submit manufacturer's printed product literature, specifications and data sheets for each type of door and frame specified.
 3. Test and Evaluation Reports:
 1. Submit test reports from approved independent testing laboratories, certifying compliance with specifications.

2. All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
 1. The product manufacturer.
 2. The type of product.
 3. The model number/series number.
 4. The primary product designation.
 5. The secondary product designation.
 1. Positive design pressure.
 2. Negative design pressure.
 3. Water penetration resistance test pressure.
 4. Canadian air infiltration and exfiltration levels.
 6. The test completion date.
 3. The report will also contain the following information:
 1. Test dates.
 2. Report preparation dates.
 3. Test information retention period.
 4. Location of testing facilities.
 5. Full description of test samples, including:
 1. finish, weathering characteristics
 2. Condensation resistance.
 3. Forced entry resistance.
 6. Complete description of amendments, as applicable.
 7. Conclusion.
 8. Drawings signed by the testing laboratory, if provided.
2. Shop Drawings:
1. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 2. Indicate general construction of each type of door and frame, configurations, material, material thickness, jointing methods, mortises, reinforcements, anchors, arrangement of hardware, fire ratings, finish and special features.
 3. Reference door and frame types to Door Schedule. Indicate door numbers where applicable.

1.4. CLOSEOUT SUBMITTALS

1. Provide maintenance data for cleaning and maintenance of finishes for incorporation into manual specified in Section 01 11 00 – General Requirements, Closeout Submittals.

1.5. QUALITY ASSURANCE

1. Qualifications
 1. Manufacturer/Fabricator: Use a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.
 2. Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

2. Preconstruction Testing: Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:
 1. List by nationally recognized agency having factory inspection service and construct as detailed in Followup Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.6. DELIVERY, STORAGE, AND HANDLING

1. Deliver, store and handle materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements and as follows:
 1. Receive and store materials as recommended by materials manufacturer.
 2. Adequately protect surfaces from damage during moving, handling and storage.
2. Packaging Waste Management
 1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

2. Products

2.1. PERFORMANCE/DESIGN CRITERIA

1. Perform work in accordance with CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, except as otherwise specified herein.
2. Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of 35 degrees C to 35 degrees C.
3. Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
4. Steel fire rated doors and frames: Label and list fire rated doors and frames by an organization accredited by the Standards Council of Canada in conformance with CAN4-S104 and CAN4S105 for ratings indicated. Fire labels must be factory applied by the manufacturer.

2.2. MATERIALS

1. Steel:
 1. Doors and Frames: coated steel sheets to ASTM A924/M924; coating designation to ASTM A653/A653M: Commercial Steel (CS), Type B, ZF120; stretcher levelled.
 2. Exterior doors and frames: coated steel sheets to ASTM A924/M924; coating designation to ASTM A653/A653M: Commercial Steel (CS), Type B, ZF180 galvanized; stretcher levelled.
2. Nominal Base Metal Thickness Requirements:
 1. Frames: refer to frame fabrication requirements specified in this section.
 2. Doors: refer to door fabrication requirements specified in this section.
 3. Hardware Reinforcement for Doors and Frames: Carbon steel, welded in place, prime painted, to the following minimum nominal thicknesses:

Hardware Reinforcement	Door (mm)	Frame (mm)
Mortise Hinge:	3.51	3.51
Mortise or Bored Lock or Deadbolt:	1.98	1.98
Flush or Surface Bolt Front:	1.98	1.98
Surface or Concealed Closer:	2.74	2.74
Strike Reinforcements:	1.98	1.98
Hold Open Arm:	1.98	1.98
Electronic Hardware Reinforcements:	1.98	1.98
Pull Plates and Bars:	1.30	1.30
Mortar Box:	--	0.84
Surface Exit Devices:	1.98	1.98
Door Surface Hardware Reinforcements:	1.30	1.30
Frame surface hardware reinforcements:	2.74	2.74
Notes: Provide guard boxes to protect mortised cut-outs from spray applied insulation, fully sealed.		

3. Door Core Materials
 1. Honeycomb (interior only): Structural small cell 25 mm maximum. kraft paper honeycomb:
 1. Weight: 36.3 kg/ream minimum.
 2. Density: 16.5 kg/m³ minimum.
 3. Sanded to required thickness.
 2. Polystyrene: Rigid extruded, closed cell insulation, fire retardant treated meeting the requirements of ULC S701, Type 4, minimum thermal resistance RSI 0.8/25 mm thickness.
 3. Polyisocyanurate: Rigid, modified polyisocyanurate, closed cell board, Type 1, conforming to CAN/ULCS704:
 1. Density: 32 kg/m³.
 2. Thermal Values: RSI 2.0.

2.3. ADHESIVES

1. Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
 1. Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.
2. Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
3. Interlocking Edge Seam Adhesive: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.4. PRIMER

1. Touchup primer: to ASTM A780/A780M and SSPC-PS 12.01.
 1. Maximum VOC limit 50 g/L to GC-03.

2.5. PAINT

1. Prepare surfaces for field painting to ASTM D6386 and ASTM D7396.
2. Field paint steel doors and frames in accordance with Section 09 91 00 Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
 1. Maximum VOC emission level 50 g/L to GS-11 and to SCAQMD Rule 1113.

2.6. ACCESSORIES

1. Door silencers (bumpers): Grey rubber, to ANSI/BHMA A156.16 Type 6-180; three silencers on strike jambs of single door frames; two silencers on heads of double door frames; screw fastener applied. Stick on bumpers are not acceptable.
2. Floor anchors: 3.5 mm minimum adjustable floor clip angles with 2 holes for anchorage to floor.
3. Exterior Top Caps: Rigid polyvinylchloride (PVC) extrusion in accordance with CAN/CGSB 41GP19Ma.
4. Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with countersunk oval head sheet metal screws.
5. Make provisions for glazing as indicated and provide necessary glazing stops.
 1. Provide removable glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
 2. Design exterior glazing stops to be tamperproof.
6. Metallic paste filler: to manufacturer's standard.
7. Fasteners: tamperproof type 304 stainless steel screws with countersunk flat head.
8. Labels for fire doors and door frame: brass plate, riveted to door and door frame.
9. Sealant: Section 07 92 00 – Joint Sealants.
 1. Maximum VOC limit 250 g/L to SCAQMD Rule 1168.
10. Glazing: Section 08 80 50 – Glazing.

2.7. FABRICATION GENERAL

1. Welded construction: assemble units by welding in accordance with CSA W59 to produce a finished unit square, true and free of distortion. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.
2. Permit access by an approved inspection and testing company for the purpose of inspecting at random, doors being fabricated for this project.
3. Make provisions in doors and frames to suit requirements of trade or section providing electrically operated hardware or security devices. Provide removable

plates or knock outs for electrical contacts. Provide junction boxes on security door frames as required for door strikes, mag locks and door contacts. Ensure frames arrive on site prepared for wiring.

4. Fabricate galvanized steel channels to reinforce frames and screens as required for size, and for fire protection rating requirements. Extend reinforcements from floor to structure above. Design top connection to accommodate structural deflection. Conceal reinforcements in frames and screens.
5. Fabricate all rated doors, frames and screens to fire rating labelling authority standard.

2.8. FRAMES AND SCREENS FABRICATION: GENERAL

1. Fabricate frames in accordance with CSDMA specifications.
2. Accurately form frames to profiles indicated. Construct frames straight and free from twist or warp.
3. Exterior frames: 1.98 mm minimum welded type construction. 50 mm face standard frame profile, throat and frame width to suit wall construction.
4. Interior frames: 1.6 mm minimum for single doors; 1.98 mm for frames with opening width in excess of 1220 mm; welded type construction. 50 mm face standard frame profile, throat and frame width to suit wall construction. Knock-down frames are not allowed.
5. Blank, drill, reinforce and tap frames to receive mortised, templated hardware, security and electrical devices, using templates provided by finish hardware supplier. Reinforce frames for installation of closers. For transportation, install stiffener plates or two angle spreaders where required to prevent bending of frame and to maintain alignment when setting. Weld reinforcement in place. Remove prior to installation.
6. Provide removable portion of stop and frame where required for overhead concealed door closers, properly connected to frame, and prepare for attachment of closer prior to shipment.
7. Protect mortised cutouts with steel guard boxes.
8. Manufacturer's nameplates on frames and screens are not permitted.
9. Conceal fastenings except where exposed fastenings are indicated.
10. Provide factoryapplied touch up primer at areas where zinc coating has been removed during fabrication.
11. Partition Screens:
 1. Fabricate metal screens to profiles indicated.
 2. Supply jamb and mullion extensions and anchors required to secure screens to structure or framing provided under other Sections. Fabricate anchorage to prevent transfer of load from support framing to the screens when deflection of structure occurs.
 3. Provide concealed reinforcement for screens to receive handrails.
 4. Provide closely fitted steel glass stops where required. Mitre corners. Drill and countersink fasteners symmetrically at 150 mm o.c. Screw stops in place.
12. Provide fire labelled frames for those openings requiring fire protection ratings, as scheduled on Drawings.

2.9. FRAME ANCHORAGE

1. Provide appropriate anchorage to floor and wall construction.
2. Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm minimum adjustment
3. Locate wall anchors immediately above or below each hinge reinforcement on the hinge jamb, and directly opposite on the strike jamb. Provide three anchors per jamb for frames up to 2300 mm. Add one anchor per jamb for each additional 760 mm or fraction thereof in frame height.

2.10. FRAMES: WELDED TYPE

1. Welding in accordance with CSA W59.
2. Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butted joints with air drying paste filler. Sand to a smooth uniform finish. Touch up damaged galvanized finish with zinc rich primer.
3. Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
4. Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
5. Securely attach floor anchors to inside of each jamb profile.
6. Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.11. DOOR FABRICATION GENERAL

1. Fabricate steel doors rigid, neat in appearance, and free from defects including warp and buckle; 45 mm thickness of types and sizes indicated on drawing, and as follows:
 1. Door faces of all steel doors shall be fabricated without visible seams, free of scale, pitting, coil brakes, buckles and waves.
 2. Form edges true and straight with minimum radius suitable for thickness of steel used.
 3. Bevel lock and hinge edges 3 mm in 50 mm; confirm requirement with builder's hardware or door swing that could dictate a different bevel.
 4. Top and bottom of doors shall be provided with inverted, recessed, nominal 1.60 mm steel end channels, welded to each face sheet at 150 mm O/C.
 5. Equip exterior doors with factory installed flush PVC top caps. Equip fire labelled exterior doors with factory installed flush steel top caps.
 6. Provide fire labelled doors for those openings requiring fire protection ratings, as indicated on Drawings.
 7. Fabricate doors with the following clearances:
 1. Clearance between door and frame and between meeting edges of doors swinging in pairs shall not exceed 3 mm
 2. Clearance between the bottom of door and floor shall not exceed 19 mm or as required to accommodate specified hardware
 3. Clearance between bottom of door and a raised noncombustible sill in accordance with NFPA 80

4. Clearance between bottom of door and nominal surface of combustible floor coverings in accordance with NFPA 80
2. Fabricate doors with longitudinal edges locked seam and spot welded. Seams: not visible, grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish. Bevel both stiles of single doors 1 in 16.
3. Exterior Doors: Flush, lock seam construction, insulated doors fabricated in accordance with CAN/CGSB 82.5, and as follows:
 1. Face Sheets: Minimum 1.60 mm base steel sheet thickness.
 2. Insulation Stiffened Core: Insulated and sound deadened with polystyrene or polyisocyanurate at choice of manufacturer; core laminated under pressure to each face sheet.
4. Interior Doors: Flush, lock seam construction, hollow steel doors fabricated in accordance with CSDMA Manufacturing Specifications for Doors and Frames, and as follows:
 1. Face sheets: Minimum 1.30 mm base steel sheet thickness.
 2. Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.
5. Fire Rated Doors: Flush, lock seam construction, hollow steel doors fabricated in accordance with CAN4 S104 and NFPA 80, and as follows:
 1. Face sheets: Minimum nominal 1.60 mm base steel sheet thickness.
 2. Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.
 3. Equip pairs of fire labelled doors with minimum 2.74 mm steel surface mounted flat bar astragal, welded to door face; plug welded on face and stitch welded to butt edge of door.
 4. Labelled by Underwriters Laboratories of Canada, ITS/Warnock Hersey, or other testing laboratory approved by the authority having jurisdiction.

3. EXECUTION

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2. EXAMINATION

1. Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work means acceptance of existing conditions

3.3. INSTALLATION GENERAL

1. Install fire rated doors and frames in accordance with requirements of NFPA 80.
2. Install back angle for sill PMMA membrane to terminate on below the threshold in line with the primary air seal.
3. Install doors, frames and accessories in accordance with reviewed shop drawings, ANSI A250.11, CSDMA Guide Specification for Installation and Storage

of Hollow Metal Doors and Frames, manufacturer's data, and as specified in this Section.

4. Damaged or twisted door and frames, or doors with interior cores or frame telegraphing through, will be rejected.

3.4. FRAME INSTALLATION

1. Door Frames:

1. Remove temporary spreaders before installing door frames, leaving exposed surfaces smooth and undamaged.
2. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set; limit of acceptable frame distortion 2 mm out of plumb measured on face of frame, maximum twist corner to corner of 3 mm; align horizontal lines in final assembly.
3. Brace frames rigidly in position until adjacent construction is complete; install wooden spreaders at third points of frame rebate to maintain frame width, install centre brace to support head of frames 1200 mm and wider in accordance with ANSI A250.1; do not use temporary metal spreaders for bracing of frames 1.
4. Place frames before construction of enclosing walls and ceilings, except for frames located in existing walls or partitions allowing for deflection of adjacent construction to ensure that structural loads are not transmitted to frames, and as follows:
 1. Check and correct opening width and height, squareness, alignment, twist and plumb as frames are installed in accordance with CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames.
 2. Metal Stud Partitions: Provide a minimum of three wall anchors per jamb for frames up to 2150 mm high and 1 additional anchor for each 600 mm over 2150 mm high; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb; attach wall anchors to studs with screws.
 3. Remove wooden braces after frames are securely fastened or attached to adjacent construction.
5. Install glazing materials and studded door silencers.
6. Do not site weld unless approved by Consultant in writing for the specific screen.
7. For frames over 1220 mm in width, provide vertical support at the centre of head.

2. Window Frames:

1. Installation of borrowed lights is same as for door frames.
2. Site assemble large borrowed lights to provide true and even alignment with flush butt hairline jointing, all fasteners concealed.
3. Site weld only when approved by Consultant in writing for the specific location.
4. Align all horizontal rails in final assembly.
5. Install sealant and back-up materials.

3. Frame Tolerances: Install frames to tolerances listed in ANSI A250.11, and as follows:

1. Squareness: Maximum 1.6 mm measured across opening between hinge jamb and strike jamb.
2. Plumbness: Maximum 1.6 mm measured from bottom of frame to head level.
3. Alignment: Maximum 1.6 mm measured offset between face of hinge jamb and strike jamb relative to wall construction.
4. Twist: Maximum 1.6 mm measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.
4. Install door silencers.
5. Caulk perimeter of frames between frame and adjacent material at interior (primary air seal) and exterior (water shedding) seal sides of the door. Allow drainage at the sill. Primary air seal to be continuous with back angle at sill.
6. Maintain continuity of air barrier and vapour retarder.

3.5. DOOR INSTALLATION

1. Fit hollow metal doors accurately in frames within clearances required for proper operation; shim as necessary for proper operation.
2. Install hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
3. Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 1. Hinge side: 1.0 mm.
 2. Latchside and head: 1.5 mm.
 3. Finished floor, noncombustible sill and thresholds: 6 mm; 13 mm at openings in non-fire rated separations where undercuts are indicated.
4. Adjust operable parts for correct clearances and function.

3.6. FINISH REPAIRS

1. Touch-up areas where galvanized coating has been removed or damaged with primer.
2. Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.7. GLAZING

1. Install glazing for doors and frames in accordance with Section 08 80 50 Glazing.

3.8. ADJUSTING

1. Adjust doors for smooth and balanced door movement

3.9. CLEANING

1. Clean doors, frames and screens.

3.10. FIELD PAINTING

1. Prepare surfaces for field painting, to ASTM D6386 and ASTM D7396.
2. Field painting: refer to Section 09 91 00 Painting. Protect weatherstrips from paint. Provide final finish, free of scratches or other blemishes.

END OF SECTION

1. General

1.1. RELATED SECTIONS

1. Section 06 10 00 - Rough Carpentry
2. Section 07 52 00 – Modified Bituminous Membrane Roofing
3. Section 07 92 00 - Sealants
4. Section 08 80 50 - Glazing

1.2. REFERENCES

1. Aluminum Association (AA)
 1. AA DAF-45-2003 (R2009), Designation System for Aluminum Finishes.
2. Fenestration and Glazing Industry Alliance (FGIA)
 1. AAMA CWDG196, Aluminum Curtain Wall Design Guide Manual.
 2. AAMA CW1004, Care and Handling of Architectural Aluminum From Shop to Site.
 3. AAMA CW1185, Design Wind Loads for Buildings and Boundary Layer Wind Tunnel Testing.
 4. AAMA T1RA104, Sound Control for Fenestration Products.
 5. AAMA 50314, Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
 6. AAMA 611-14, Voluntary Specifications for Anodized Finishes Architectural Aluminum.
 7. AAMA 612-17a, Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum.
 8. AAMA 260320, Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 9. AAMA 260417a, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
3. American Society for Testing and Materials International, (ASTM).
 1. ASTM A36/A36M19, Standard Specification for Carbon Structural Steel.
 2. ASTM A123/A123M17, Standard Specification for Zinc (HotDip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM A16799 (2009), Standard Specification for Stainless and HeatResisting ChromiumNickel Steel Plate, Sheet, and Strip. (Withdrawn 2014)
 4. ASTM A653/A653M20, Standard Specification for Steel Sheet, ZincCoated (Galvanized) or ZinIron AlloyCoated (Galvannealed) by the HotDip Process.
 5. ASTM B20914, Standard Specification for Aluminum and AluminumAlloy Sheet and Plate.
 6. ASTM B22114, Standard Specification for AluminumAlloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

7. ASTM E283/E283M-19, Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Skylights, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
8. ASTM E330/E330M14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.
9. ASTM E33100 (2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
10. ASTM E41316, Classification for Rating Sound Insulation.
11. ASTM E547-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
12. ASTM E783-02(2018), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
13. ASTM E110515, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
4. Canadian Standards Association (CSA Group).
 1. CSA A440-17 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights, Includes Errata (2018)
 2. CSA A440S1-19, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440-17, North American Fenestration Standard/Specification for Windows, Doors, and Skylights.
 3. CSAG40.20-13/G40.2113 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel., Includes update No. 1 (2014).
 4. CAN/CSAG16418, Hot Dip Galvanizing of Irregularly Shaped Articles.
 5. CSA-S136-16 North American Specification for the Design of Cold-Formed Steel Structural Members.
 6. CSA-S157-17/S157.1-17, Strength Design in Aluminum / Commentary on CSA S157-17, Strength Design in Aluminum.
 7. CSA W59.218, Welded Aluminum Construction.
5. Environmental Choice Program (ECP).
 1. CCD45, Sealants and Caulking Compounds.
 2. CCD47, Architectural Surface Coatings.
 3. CCD48, Surface Coatings - Recycled WaterBorne.
6. Society for Protective Coatings (SSPC).
 1. SSPC Paint 20 Zinc Rich Coating (Type I - Inorganic and Type II – Organic), Includes Editorial Revision (2004)
 2. SSPC Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel (Type 1 and Type 2) Includes Editorial Revision (2004).
7. BC Building Code (BCBC), current version 2018.

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit shop drawings signed and sealed by the Manufacturer's Engineer clearly detailing profiles, construction, assembly, finishes, installation for all conditions,

also flashing, caulking, sealing, provision for thermal movement and glazing, attachment to building structure and method of adjustment.

2. Test and Evaluation Reports:
 1. Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
 2. All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
 1. The product manufacturer.
 2. The type of product.
 3. The model number/series number.
 4. The primary product designation.
 5. The secondary product designation.
 1. Positive design pressure.
 2. Negative design pressure.
 3. Water penetration resistance test pressure.
 4. Canadian air infiltration and exfiltration levels.
 6. The test completion date.
 3. The report will also contain the following information:
 1. Test dates.
 2. Report preparation dates.
 3. Test information retention period.
 4. Location of testing facilities.
 5. Full description of test samples, including:
 1. Anodized finish, weathering characteristics.
 2. Condensation resistance.
 3. Forced entry resistance.
 4. Mullion deflection - combination and composite windows.
 6. Complete description of amendments, as applicable.
 7. Conclusion.
 8. Drawings signed by the testing laboratory, if provided.

1.4. QUALITY ASSURANCE

1. Window fabricator shall have a minimum of 5 years successful experience in the fabrication and erection of metal windows of similar sizes, shapes and finishes to the units required for this project and shall have ample facilities to produce, furnish and supply the units as required for installation without delay to the Work.
2. Retain a professional engineer registered in the Province of the Work experienced in structural design in glass and aluminum window units, connections to door units and connections to building, to ensure the adequacy of the structural aspects of the design, manufacture, and installation of complete assembly. This Engineer is called the "Manufacturer's Engineer" elsewhere in this Section.
3. Only fabricators approved by Manufacture shall fabricate and install products of this Section.

1.5. DELIVERY, STORAGE AND HANDLING

1. Deliver, handle and store units in accordance with manufacturer's directions.
2. Store units at site on raised wood pallets protected from the elements and corrosive materials. Do not remove from crates or other protective covering until ready for installation.
3. Store all glass units vertically on end with solid bearing full thickness of insulating units.
4. Store prefabricated frame assemblies blocked off the ground to prevent warping, twisting, undo strain on assembly or physical abuse and damage.

1.6. SITE CONDITIONS

1. Protect aluminum finishes and glazing during erection against disfiguration, contamination or damage by abuse of harmful materials. Install protective cover where exposure to damage is critical.
2. Coordinate installation of windows with Work specified in other Sections to ensure proper placement and installation of vapour barrier, insulation and flashing in order that air/vapour/thermal barrier of building is intact and moisture will be diverted to the exterior.

1.7. WARRANTY

1. Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:
 1. Framing, panels and glazing: failure of performance requirements specified in Contract Documents; 2 years.
 2. Sealed glass units: misting, dusting and seal failure; 2 years.
 3. Sealants, caulking: failure to maintain seal; 2 years.
 4. Aluminum brake shapes: oilcanning and delaminations; 2 years.
2. Provide Warranty for aluminum windows to include in maintenance manuals as specified in Section 01 11 00 – General Requirements, Closeout Submittals.

2. Products

2.1. MANUFACTURERS

1. Acceptable Manufacturers: Subject to compliance with requirements specified in this section and as established by the Basis of Design Materials, manufacturers offering other products that may be incorporated into the Work include, but are not limited to the following:
 1. A & D Prevest Inc.
 2. Alumicor Limited
 3. Columbia Skylights (**basis of design is ACVCM4040DGC**)
 4. Ferguson Glass Western Ltd. (Engineered Aluminum Products Inc.)
 5. Kawneer Canada Ltd.

2.2. PERFORMANCE / DESIGN CRITERIA

1. Thermal Performance

1. U(SI) maximum 2.4. in accordance with BCBC, Part 10
2. SHGC: maximum 0.4 in accordance with ASHRAE 90.1-2016.
2. Wind loads: Provide Skylight system; include anchorage, capable of withstanding wind load design pressures based on the British Columbia Building Code; 2018 Edition
3. Air Infiltration: The test specimen shall be tested in accordance with ASTM E283. Air infiltration rate shall not exceed 0.06 cfm/ft² (.0003 m³/s-m²) at a static air pressure differential of 6.24 PSF (300 Pa).
4. Water Resistance (static): The test specimen shall be tested in accordance with ASTM E547. There shall be no leakage at static air pressure differentials of 10 PSF (479 Pa), 12 PSF (575 Pa) and 15 PSF (718 Pa).
5. Uniform Load: A static air design load of 30 PSF (1437 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

2.3. MATERIALS

1. Basis of Design Materials:
 1. VCM Curb Mount, Columbia Skylights.
2. Skylight Base Frame: Vinyl extrusions, minimum 1.5 mm thick. Fusion welded corners with four sided condensation gutter and weep holes in each corner.
3. Extruded Aluminum Frame: Alloy 6063-T5 or 6063-T6, 1.58 mm minimum thickness, exposed sheet finished to match frames as specified above.
4. Glass: Clear, as indicated in window schedule, sealed glass units as specified under Section 08 80 50 – Glass and Glazing.
5. Fasteners: To ASTM A167, stainless steel, type 316 selected to prevent galvanic action with the components fastened, of suitable size to sustain imposed loads.
6. Gaskets: Neoprene or EPDM with dimensional tolerances and durometer hardness and of suitable size and shape to meet the requirements of the specifications and their specific application. Gaskets shall be virgin material as manufactured by Tremco Ltd., Tremco Ltd. Gaskets shall conform to Tremco Information Bulletins:
 1. For EPDM TDB4601
 2. For Neoprene TDB2701
7. Supporting angles, plates, bars, rods, and other steel accessories: Mild steel CAN3G40.20/G40.21, shop painted with zinc chromate primer, thickness as required to sustain imposed loads and in no case less than 5 mm thick.
8. Sealant: Including primer, joint filler, as specified in Section 07 92 00.
9. Dielectric separator: Bituminous paint CAN/CGSB1.108.
10. Thermal separator: Polyvinylchloride, 50 Shore A durometer hardness +5.
11. Glazing Tape: Refer to Section 08 80 50.
12. Anchors: Three way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

13. Concealed Flashing: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
14. Metal air seal/vapour barrier (by window supplier) to be bonded to window frame and extend behind mounting frame. Seal all corners to maintain air sea/vapour retarder. Install flexible flashing with continuous metal retaining strip to lap to interior wall assembly.

2.4. FABRICATION

1. Fit and assemble all Work in the shop insofar as practical.
2. Carefully fit and match all Work for continuity of line and design, using rigidly secured joints with hairline contact, unless otherwise shown.
3. Reinforce members and joints with steel plates, bars, rods or angles for rigidity and strength as needed to fulfill performance requirements. Use concealed stainless steel fasteners for jointing which cannot be welded.
4. Separate unlike metals or alloys with a heavy coating of bituminous paint, separator gaskets or slip gaskets as required to prevent galvanic action.
5. Provide weepholes in the glazing recess and an air seal at the interior glass line.
6. Provide curbing as indicated on Drawings with negligible deflection under design loads.
7. Provide bi-level drainage systems with no interruptions to rafter or purlin drainage plane are permitted.

2.5. FABRICATION GLASS

1. Glass fabrication specified under Section 08 80 50.

2.6. FINISHES

1. Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 1. Acrylic enamel paint: Exposed aluminum sections shall be given a factory applied thermosetting acrylic enamel coating in accordance with American Architectural Manufacturers Association specification AAMA 603.8. Colour: manufacturer's standard dark brown.
 2. Unexposed aluminum: Mill finish.
2. Isolation Coating
 1. Isolate aluminum from following components, by means of isolation coating:
 1. Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 2. Concrete, mortar and masonry.
 3. Wood.
3. Nonexposed surfaces may be left natural.

3. Execution

3.1. EXAMINATION

1. Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies have been corrected.
2. Ensure that all flashings built in or provided by others integrate with system to divert moisture to exterior.
3. Ensure that all anchor blocks or inserts required to receive system are correctly located and installed.
4. Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.
5. Ensure that building air and vapour retarding membranes can be sealed to window units to maintain system integrity. Coordinate with materials installation specified in Section 07 25 19 – FoamInPlace Insulation and Section 07 27 13 – Modified Bituminous Air and Vapour Barrier.

3.2. PREPARATION

1. Obtain all dimensions from the job site.
2. Provide data, dimensions and components, anchors and assemblies to be installed by others in proper time for installation.

3.3. ERECTION

1. Erect Work in strict accordance with manufacturer's written instructions.
2. Conceal all anchors and fitments. Exposed heads of fasteners not permitted. Joints in exposed work to be flush hairline butt joints.
3. Install units level and plumb, securely anchored, and without distortion.
4. Use anchors that will permit sufficient adjustment for accurate alignment. Make allowance for deflection of building structure.
5. Build in and provide any supplementary reinforcing and bracing required by assembly loads and deflections.
6. Secure Work adequately to structure in a manner not restricting thermal and wind movement.
7. Correctly locate and install flashings, deflectors and weep holes to ensure proper drainage of moisture to exterior.
8. Maintain alignment with adjacent Work.
9. Isolate aluminum surfaces from adjacent dissimilar materials and metals with coatings of bituminous paint.
10. Fill shim spaces at perimeter of assembly to maintain continuity of thermal barrier with foam in place insulation and seal with materials specified in Section 07 92 00 – Sealants.

3.4. GLAZING

1. Ensure all stops, gaskets, splines, seals etc., are perfectly aligned and ready to receive glazing and insulated panels as specified herein.
2. Install glazing to approved details and instruction, using material specified in accordance with manufacturer's instructions.

3. Glazing stops, snap covers shall be of a continuous length from corner to corner, and be fitted at corners.
4. All preformed tapes or gaskets shall be of a continuous length corner to corner and shall be cut over length to prevent stretching. Joints, splices and corners shall be mitred and sealed.
5. Clean all contact surfaces of glazing with solvent and wipe dry. Ensure all glazing channels are clean, true to line, and free of dirt or debris and that weep and drainage vents are open.
6. Rest glazing on setting blocks at 1/4 points.
7. Install shims at sides to align glass units.
8. Apply a full heel bead of nondrying nonskinning sealant to the interior perimeter of each glass unit to provide positive air/vapour seal to warm light of glass.

3.5. SEALANT

1. Caulk and seal full perimeter of windows to building air/vapour retarder to provide and maintain the designed air/vapour/thermal barrier integrity and weather tightness.
2. Install sealants and backup materials in strict accordance with manufacturer's written instruction.

3.6. FIELD QUALITY CONTROL

1. Field Tests: Consultant shall select skylight units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 1. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
 1. Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², which ever is greater.
 2. Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 PSF (383 Pa).
 2. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.7. CLEANING

1. At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.
2. At completion of Work, remove all protective surface covering film and wrappings. Clean all glass, panels and frames using mild soap or other cleaning agent approved by manufacturer.

3. Remove all excess glazing or joint sealing materials from exposed surfaces.
Clean and polish glass.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 08 11 13 – Steel Doors and Frames.
2. Door Hardware Schedule

1.2. REFERENCES

1. American National Standards Institute (ANSI)/Builders Hardware Manufacturers Association (BHMA)
2. Canadian Steel Door and Frame Manufacturers' Association (CSDFMA)
 1. CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
3. Builders Hardware Manufacturers Association (BHMA)
 1. Directory of Certified Products.
4. Door and Hardware Institute (DHI)
 1. Sequence and Format for the Hardware Schedule.
 2. ANSI/DHI A115.IG, Installation Guide for Doors and Hardware.
5. Underwriters Laboratory (ULC)
 1. CAN/ULC S13.3 M90 (R1997) Amendment 1, Standard for Door Closers Intended for use with Swinging Doors.
 2. ULC/ORD-C14(e)-M1985 Guide for Hardware for Fire Doors and Emergency Exits.
 3. ULC/ORD-C228-1995 Door Closers and Holders.
 4. ULC C305-M1972 Panic Hardware.
 5. ULC-S132-2016 Tests for Emergency Exit and Emergency Fire Exit Hardware.
 6. ULC-S533-15 Standard for Egress Door Securing and Releasing Devices.

1.3. ADMINISTRATIVE REQUIREMENTS

1. PreInstallation Meetings: convene pre-installation meeting in accordance with Section 01 11 00 – General Requirements, Project Meetings to:
 1. Verify project requirements.
 2. Review installation and substrate conditions.
 3. Co-ordination with other building sub-trades.
 4. Review manufacturer's warranty requirements.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature, specifications and data sheets.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:

1. Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
2. After approval samples will be returned for incorporation in the Work.
3. Hardware List:
 1. Submit contract hardware list in accordance with Door Hardware Schedule on Drawings.
 2. Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
 3. Coordinate Division 28 Security Contractor, Division 26 Electrical Contractor and Division 8 Door and Hardware Contractors to jointly prepare, submit, and obtain certified approval from the Consultant shop drawings for work related to door access control systems prior to undertaking the on-site work. The joint submission will clarify and assign responsibility between these Divisions for labour and materials associated with the supply and installation of electronic and physical components for doors and access control. An individual drawing shall be submitted in AutoCadd format for each door within the project scope depicting both public and secure side of door and arrangement of access control and security components, conduit, and cabling.
4. Keying Schedule:
 1. Submit keying schedule prepared by or under the supervision of qualified Architectural Hardware Consultant (AHC), detailing Owner's final keying instructions for locks, including schematic keying diagram and index each key set to unique door designations.
5. Manufacturer's Instructions:
 1. Submit manufacturer's installation instructions.

1.5. CLOSEOUT SUBMITTALS

1. Provide operation and maintenance data for door closers, locksets, door holders electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 11 00 – General Requirements, Closeout Submittals.

1.6. MAINTENANCE MATERIAL SUBMITTALS

1. Extra Materials:
 1. Provide maintenance materials in accordance with Section 01 11 00 – General Requirements, Closeout Submittals.
 2. Supply two sets of wrenches for door closers, locksets and fire exit hardware.

1.7. QUALITY ASSURANCE

1. Regulatory Requirements:
 1. Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
2. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

3. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8. DELIVERY, STORAGE, AND HANDLING

1. Packing, Shipping, Handling and Unloading:
 1. Deliver, store, handle and protect materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements.
 2. Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
2. Storage and Protection:
 1. Store finishing hardware in locked, clean and dry area.

1.9. WASTE DISPOSAL AND MANAGEMENT

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.10. WARRANTY

1. Provide written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
2. Failures include, but are not limited to, the following:
 1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of operators and door hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
3. Warranty Period: From date of Substantial Performance, and as follows:

Hardware Type	Warranty Term
Locks, latches and cylinders	2 years
Closers	25 years
Hinges	1 year
Panics	3 years
Miscellaneous	1 year
Electrical Hardware:	5 years

2. Products

2.1. HARDWARE ITEMS

1. Use one manufacturer's products only for similar items.

2.2. DOOR HARDWARE

1. As indicated in Door Hardware Schedule.

2. Weatherstripping:
 1. Head and jamb seal:
 1. Extruded aluminum frame and solid closed cell neoprene insert, clear anodized finish.
 2. Door bottom seal:
 1. Extruded aluminum frame and closed cell neoprene sweep, clear anodized finish.
3. Barrier Free Pneumatic Door Operator:
 1. Heavy duty pneumatically assisted door closer, capable of multi-door operation, complete with actuators, control boxes, pneumatic tubing and compressed air source.
 2. Self-contained control box/compressor combination for independent operation of two door leaves.
 3. Control boxes: complete with electric strike relay.
 4. Mount operators on either push or pull sides of doors as required to place them inside rooms.
 5. Actuation of operators by card readers.
 6. Provide switched line voltage to control box. Locate switch adjacent to box.
 7. Provide low voltage wiring to each actuator and 6 mm diameter air tubing to each operator.
 8. Mount control box in location as directed by Consultant.

2.3. FASTENINGS

1. Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
2. Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
3. Exposed fastening devices to match finish of hardware.
4. Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
5. Use fasteners compatible with material through which they pass.

2.4. KEYING

1. Doors, padlocks and cabinet locks to be keyed as directed. Prepare detailed keying schedule in conjunction with Consultant.
2. Provide keys in duplicate for every lock in this Contract.
3. Provide three master keys for each MK or GMK group.
4. Stamp keying code numbers on keys and cylinders.
5. Provide all permanent cores and keys to Owner.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
2. Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
3. Furnish manufacturers' instructions for proper installation of each hardware component.

3.2. INSTALLATION

1. 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.
2. Where door stop contacts door pulls, mount stop to strike bottom of pull.
3. Install key control cabinet.
4. Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
5. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
6. Remove construction cores when directed by Owner, install permanent cores and check operation of locks.

3.3. ADJUSTING

1. Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
2. Lubricate hardware, operating equipment and other moving parts.
3. Adjust door hardware to provide tight fit at contact points with frames.

3.4. CLEANING

1. Perform cleaning after installation to remove construction and accumulated environmental dirt.
2. Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
3. Remove protective material from hardware items where present.

4. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.5. DEMONSTRATION

1. Maintenance Staff Briefing:
 1. Brief maintenance staff regarding:
 1. Proper care, cleaning, and general maintenance of projects complete hardware.
 2. Description, use, handling, and storage of keys.
 3. Use, application and storage of wrenches for door closers, lock-sets, and fire exit hardware.
 2. Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.6. SCHEDULE

1. Refer to Door Hardware Schedule on Drawings.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 08 11 13 – Steel Doors and Frames

1.2. REFERENCES

1. American National Standards Institute (ANSI).
 1. ANSI Z97.12015, Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test
2. American Society for Testing and Materials International, (ASTM).
 1. ASTM C54205 (2017), Specification for LockStrip Gaskets.
 2. ASTM C1172-19, Standard Specification for Laminated Architectural Flat Glass
 3. ASTM C1503-18, Standard Specification for Silvered Flat Glass Mirror
 4. ASTM D79017, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 5. ASTM D100313, Test Method for Haze and Luminous Transmittance of Plastics.
 6. ASTM D192916, Test Method for Determining Ignition Temperature of Plastics.
 7. ASTM D224015e1, Standard Test Method for Rubber Property - Durometer Hardness.
 8. ASTM E8419b, Test Method for Surface Burning Characteristics of Building Materials.
 9. ASTM E330/E330M14, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
3. Canadian General Standards Board (CGSB).
 1. CAN/CGSB12.12017, Safety Glazing.
 2. CAN/CGSB12.2M91(R2017), Flat, Clear Sheet Glass.
 3. CAN/CGSB12.3M91(R2017), Flat, Clear Float Glass.
 4. CAN/CGSB12.4M91(R2017), Heat Absorbing Glass.
 5. CAN/CGSB12.82017, Insulating Glass Units. (Withdrawn)
 6. CAN/CGSB12.9M91, Spandrel Glass. (Withdrawn)
 7. CAN/CGSB 12.20-M89, Structural Design of Glass for Buildings (Withdrawn)
4. Canadian Standards Association (CSA International).
 1. CAN/CSA A440.2:19/A440.3:19, Fenestration energy performance/User guide to CSA A440.2-09, Fenestration energy performance.
 2. CSA Certification Program for Windows and Doors 2000.
5. Environmental Choice Program (ECP)
 1. CCD04595, Sealants and Caulking.
6. European Standard (EN)
 1. BS EN 1096-4:2018, Glass in building - Coated glass: Product standard.

2. BS EN 14179-1:2016, Glass in building - Heat soaked thermally toughened soda lime silicate safety glass. Definition and description.
3. BS EN 14179-2:2005, Glass in building - Heat soaked thermally toughened soda lime silicate safety glass. Evaluation of conformity/ Product standard.
7. Glazing Association of North America (GANA)
 1. GANA Glazing Manual.
 2. GANA Glazing Reference.
8. Insulating Glass Manufacturers Alliance.

1.3. ADMINSTRATIVE REQUIREMENTS

1. Convene pre-installation meetings: one week prior to beginning work of this Section.
 1. Verify project requirements.
 2. Review installation conditions.
 3. Co-ordinate with other building subtrades.
 4. Review manufacturer's instructions and warranty requirements.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit manufacturer's printed product literature, specifications and data sheet.
 2. Submit two copies of WHMIS MSDS Material Safety Data. Indicate VOC's:
 1. For glazing sealant materials during application and curing.
2. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit shop drawings for window glazing and include the following:
 1. Submit glass thermal and wind load stress analysis documenting adequate glass thickness and/or heat treatment to meet stresses generated. Thermal stress analysis to consider effects of external shading, conduction at glass edge, heat build-up and contribution of LowE coatings.
 2. Shop drawings shall be signed and sealed by a professional engineer qualified in the province of the Work, and who was responsible for their preparation.
3. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit 300 mm x 300 mm size of each glazing type. Consultant reserves the right to change colour of glass after review of submitted samples.

4. Information Submittals:
 1. Manufacturer's Instructions: Submit manufacturer's installation instructions.
 2. Submit proof of IGMAC certification for insulating glass units, including component codes.

1.5. CLOSEOUT SUBMITTALS

1. Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 11 00 – General Requirements, Closeout Submittals.

1.6. QUALITY ASSURANCE

1. Manufacturer's technical recommendations:
 1. Perform glazing work in accordance with written recommendations from the glass manufacturer or glass fabricator.
 2. Certify glass compatibility with glazing materials (i.e. insulating glass sealants, structural sealants and silicones, gaskets, setting blocks, etc.)
 3. Designs to be analyzed for thermal stress and wind/snow loads.
 4. Provide shop inspection for glass.
2. Window fabricator shall be a member in good standing of the Fenestration Association of BC and adhere to the rules and regulations for workmanship, training and personnel as set forth by the association.
3. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
 1. Provide testing and analysis of glass under provisions of Section 01 11 00 – General Requirements, Quality Control.
 2. Provide shop inspection and testing for glass.
4. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
5. Tempered glass shall be heat soaked in accordance with EN 14179-1 and EN 14179-2 for the following applications: railings, balustrades, exposed overhead locations, exterior exposures one or more storeys above pedestrian areas, heavy tempered glass, fabricated glass with cut outs, notches, holes or countersinks. Provide manufacturer's factory label on each unit confirming tempered glass has been heat soaked.
6. Mock-ups
 1. Construct mockups in accordance with Section 01 11 00 – General Requirements, Quality Control.
 2. Construct mockup to including glass glazing, and perimeter air barrier and vapour retarder seal.
 3. Mock-up will be used:
 1. To judge workmanship, substrate preparation, operation of equipment and material application.
 4. Locate where directed.
 5. Allow 24 hours for inspection of mockup before proceeding with work.

6. When accepted, mockup will demonstrate typical standard of quality required for this work. Approved mockup may remain as part of finished work.

1.7. SITE CONDITIONS

1. Environmental Requirements:
 1. Install glazing when ambient temperature is 4 degrees C minimum. Maintain ventilated environment for 24 hours after application.
 2. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.9. WARRANTY

1. Provide manufacturer's guarantee for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work.
 1. Sealed Glass Units: Replace units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surface of glass: 10 Years.
 2. Coated- Glass: Replace units that display peeling, cracking, and other deterioration in metallic coating under normal use: 10 Years.
 3. Laminated Glass: Replace units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C1172: 5 Years.
 4. Provide warranty for glazing to include in maintenance manuals as specified in Section 01 11 00 – General Requirements, Closeout Submittals.

2. Products

2.1. MANUFACTURERS

1. Basis of Design products are named in this Section; additional manufacturers offering similar setting systems may be incorporated into the work provided they meet the performance requirements established by the named products.
2. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Vision Glass:
 1. AGC Flat Glass North America (formerly AFG or AFGD)
 2. AHC Glass (formerly Visteon)
 3. Cardinal Glass Industries Inc
 4. Garibaldi Glass Industries Inc
 5. Guardian Glass
 6. Pilkington Glass of Canada
 7. Prelco Inc.

8. Vitro Architectural Glass (formerly PPG Industries)
9. Schott Glass AG
10. Viracon Inc.

2.2. PERFORMANCE / DESIGN CRITERIA

1. Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
 1. Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
 2. Size glass to withstand wind loads, dead loads and positive and negative live loads as measured in accordance with ANSI/ASTM E330 and in accordance with CAN/CGSB-12.20.
 3. Limit center-of-glass deflection to the smallest of:
 1. Displacement associated with the structural capacity of the glazing unit.
 2. L-100, where L is the shortest side dimension of the unit measured in inches.
 3. Or 19 mm

2.3. MATERIALS

1. Clear Float Glass: to CAN/CGSB12.3, glazing quality, thickness as indicated.
2. Safety glass: to CAN/CGSB12.1, transparent, thickness as indicated.
 1. Type: 2tempered.
 2. Class: B-float.
 3. Category: II – 540 J impact resistance.
3. Silvered mirror glass: to ASTM C1503, minimum 5 mm thick.
 1. Type:
 1. Washrooms: 1A-Float glass for normal use.
 2. Sliding Closet Doors: 3C Film reinforced
 2. Tint: Clear
 3. Edges: Polished. Seal edges to prevent chemical or atmospheric penetration of backing.
4. Spandrel glass: to CAN/CGSB12.9, colour as indicated, 6 mm thick.
 1. Type: 2Heat strengthened.
 2. Class: A-Float.
 3. Style: 3Organic – applied silicone elastomeric coated.
 4. Form: Insulating glass unit.
 5. Acceptable Materials:
 1. Opaci-Coat 300, ICD
 2. Span-Kote
5. Low Emissivity (Low E) Glass: to CAN/CGSB12.10, thickness as indicated and as follows:
 1. Basis of Design Materials:
 1. Energy Select 40, AGC
 2. Solarban 60, Vitro Architectural Glass (formerly PPG Industries)

3. Guardian SN68, Vitrum Glass Group

2.4. MATERIALS: SEALED INSULATING GLASS

1. Drawings and Specifications for insulated glass units are intended to show design concept, configuration, components and arrangement; they are not intended to identify nor solve completely the problems from thermal stress. Insulating glass units shall withstand thermal stresses created by shadowing of exterior components or assembly and elevated interstitial space temperatures. Glass thermal stress analysis shall be provided by Contractor.
2. Double Pane Insulating Glass Units: meet or exceed requirements of CAN/CGSB12.8. Units shall be certified by the Insulated Glass Manufacturers Alliance (IGMA). Overall unit thickness shall be 25 mm using 6 mm glass thickness for individual panes. Use two stage seal method of manufacture, as follows:
 1. Primary Seal: polyisobutylene sealing compound between glass and metal spacer/separator, super spacer bar or TDSE Intercept.
 2. Secondary Seal: polyurethane, silicone or polysulphide base sealant, completely filling gap between the two lites of glass at the edge up to the spacer/separator and primary seal.
3. Spacer/separator to provide continuous vapour barrier between interior of sealed unit and secondary seal.
4. Clear Float Glass: to CAN/CGSB12.3, glazing quality, for inner lite and exterior lite above 2133 mm and as indicated on Drawings.
5. Clear Safety Glass: to CAN/CGSB-12.1-M90 for outer lite below 2133 mm, as indicated on Drawings and as follows:
 1. Type: 2tempered.
 2. Class: Bfloat.
6. Provide low-E coating on No.2 surface of insulating glass units.
7. Gas: 95% Argon filled
8. Other Glazing Accessories: setting blocks to CAN/CSAA440.

2.5. GLASS RAILING

1. Tempered Glass: transparent, tempered glass, glazing quality having minimal inclusions exceeding the requirements of CAN/CGSB-12.1-M90, and as follows:
 1. Edges: Grounds with no chips cracks or flaws. Sharp corners and edges eased and polished.
 2. Total Thickness: as indicated on Drawings.
2. Glass Railing Hardware: in accordance with Section 05 73 14 – Glazed Aluminum Railings.

2.6. GLASS CANOPY

1. Laminated Tempered Glass: transparent, heat-soaked laminated tempered glass, glazing quality having minimal inclusions exceeding the requirements of CAN/CGSB-12.1-M90, and as follows:
 1. Edges: Grounds with no chips cracks or flaws. Sharp corners and edges eased and polished.
 2. Total Thickness: as indicated on Drawings.
 3. Laminating Film:

1. Material: SentryGuard Plus (SGP)
 2. Minimum film thickness: 1.52 mm
 3. Colour: Clear
2. Glass Canopy Hardware: in accordance with Section 05 50 00 – Metal Fabrications.

2.7. ACCESSORIES

1. Sealant: in accordance with Section 07 92 00 – Joint Sealants.
2. Setting blocks: Neoprene, EPDM, or Silicone, 8090 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.
3. Spacer shims: Neoprene or Silicone, 5060 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
4. Glazing tape:
 1. Preformed butyl compound with integral resilient tube spacing device, 1015 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.
 2. Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.
5. Glazing splines: resilient polyvinyl chloride or silicone, extruded shape to suit glazing channel retaining slot, black colour.
6. Glazing clips: manufacturer's standard type.
7. Screws, bolts and fasteners: ASTM F738M; Type 304 stainless steel.
8. Glass presence markers: easily removable, non-residue depositing.
9. Lockstrip gaskets: to ASTM C542.
10. Mirror attachment accessories:
 1. C26 (polished chrome) finished steel, or stainless steel edge clips, with fastening concealed behind mirror.
 2. Mirror adhesive, chemically compatible with mirror coating and wall substrate.

2.8. FABRICATION

1. Verify glazing dimensions on Site.
2. Clearly label each glass light with maker's name, weight, quality, type and certification number. Do not remove labels until after work has been reviewed by Engineer.
3. Accurately size glass to fit openings allowing the clearances shown on the following tables:
 1. Minimum glass clearances:

	Thickness	Edge Clearance	Face Clearance
(1)	2 mm	3 mm (a)	1.5 mm
(2)	3 mm	3 mm (a)	3 mm

	Thickness	Edge Clearance	Face Clearance
(3)	4 mm	3 mm (a)	3 mm
(4)	5 mm	3 mm (a)	3 mm
(5)	6 mm	5 mm	3 mm
(6)	6 mm	6 mm	3 mm
(7)	over 6 mm	6 mm or 3/4 times the glass thickness, whichever is greater	

(a) where any dimension of glass exceeds 760 mm increase minimum edge clearance by 1.5 mm.

4. Bite of glass edge on stop:
 1. Up to 1270 mm united size: 6 mm minimum.
 2. 1270 mm to 2540 mm united size: 10 mm minimum.
 3. Over 2540 mm united size: 13 mm minimum.

3. Execution

3.1. COMPLIANCE

1. Install work in accordance with the Quality Management provisions specified in this section and manufacturer's written instructions.
2. Size glass to Code requirements and verify glass for openings are correctly sized and are within allowable tolerances. Install glass with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

3.2. MANUFACTURER'S INSTRUCTIONS

1. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3. EXAMINATION

1. Verify that openings for glazing are correctly sized and within tolerance.
2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.4. PREPARATION

1. Ensure all wood backing rebates and stops properly primed and finished, coordinate with Section 06 20 00 – Finish Carpentry and Section 06 40 00 – Architectural Woodwork.
2. Ensure all glazing rebates smooth and true, free of projections nails, screws, fastenings properly set to prevent contact with glass.
3. Ensure all stops, splines, glazing accessories provided by others accurately cut to length and proper size and type for specific glazing.
4. Clean contact surfaces with solvent and wipe dry.
5. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
6. Prime surfaces scheduled to receive sealant.

3.5. GENERAL

1. Remove and replace glazing stops in original locations, using original fasteners, securely set and undamaged.
2. Use setting blocks, spacers and, for wet glazing, shims, as required to properly support the glass, centred in place in the glazing space independent of the glazing materials and to uniformly distribute its load.
3. Use a minimum of 2 setting blocks, located at the quarter points. Locate spacers at jamb edges of glass, uniformly spaced at 600 mm o.c. maximum, and 300 mm maximum from top to bottom.
4. Assess coloured glass units for colour uniformity and arrange to avoid abrupt variation in appearance.
5. Handle and install heat absorbing glass in accordance with manufacturer's directions.
6. Prevent nicks, abrasion and other damage likely to develop stress on edges.
7. Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.
8. Trim tape protruding more than 2 mm above stop.
9. Leave labels on glass until it has been set and inspected and accepted. Leave glass whole and without cracks, scratches or other defects and with settings in perfect condition at completion. Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with acceptable materials. Units producing distorted vision shall be rejected and replaced at no cost to the Owner.
10. Remove, dispose of, and replace broken, cut and abraded glass.
11. Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up

3.6. EXTERIOR

1. Arrange for installed glass to have labels facing the interior. Ensure that sufficient space is left within the glazing space to allow thermal movement of glass without imposing stress on the glass.
2. Install curtain wall glazing to Section 08 44 13, and as follows:
 1. Perform work in accordance with GANA Glazing Manual.
 2. Cut glazing spline to length; install on glazing light. Seal corners by butting spline and sealing junctions with sealant.
 3. Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.
 4. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
 5. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
 6. Trim protruding tape edge.
3. Install pressed steel frame and hollow steel door glazing as follows:
 1. Perform work in accordance GANA Glazing Manual.
 2. Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

3. Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
4. Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.
5. Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
6. Install removable stops with spacer strips inserted between glazing and applied stops, 6 mm below sight line.
7. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
8. Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7. INTERIOR

1. Glazing materials and installation to meet BC Building By-law requirements for fire rated separations where required; refer to drawings for locations of fire rated separations.
2. Arrange for installed glass to have labels facing the interior. Ensure that sufficient space is left within the glazing space to allow thermal movement of glass without imposing stress on the glass.
3. Provide insulating glass units in sound attenuated partitions.
4. Unless otherwise specified or indicated, interior glazing shall be dry glazing.
5. Install extruded resilient channel gasket around entire perimeter of glass. Make tight butt joint at corners of lights. Place setting blocks at sill and spacers at both jambs as required to centre the unit in the frame. Place the unit into the frames and apply the stops against the gaskets. Tighten the screws or clips to obtain positive uniform pressure avoiding excessive pressure.
6. Ensure rattle free cushioning.
7. Install spacer shims at 600 mm o.c. to centre balustrade glazing in rebate space. Install shims 6 mm below sight line. Apply cap bead of glazing sealant to uniform line, flush with rebate sightline and tool to smooth appearance, both sides.
8. Install twosided frameless structural butt joint glass assemblies where indicated using tempered safety glass with slightly wet grinded kerf and polished butt-joint edges for aesthetics. Ensure precise levelling of sill member achieved and provision made at head to accommodate deflection of structure. For glazing at head and sill use wet, dry, or wet/dry glazing systems. Position glazing so vertical edges spaced slightly apart and seal with clear, colourless, or coloured silicone sealant. At framing or rebate locations, provide silicone sealant in clear, colourless, or colour selected by Consultant. Ensure sealant flush with and does not protrude above glazing stop or rebate.
9. Install wet glazing materials to obtain complete contact and adhesion over the full bite area of the unit and to be free from gaps, air bubbles and embedded foreign matter. Use primers where recommended by the glazing material manufacturer. Use sufficient bedding compound so that when glass is pressed into place, excess compound is forced well out around entire margin. Use shims to ensure maintenance of uniform face clearance. Where required on both sides of a unit, make shims coincident.

10. Install glazing tape to ensure complete contact and adhesion over the full bite area of the unit. Make joints only at corners of the unit. Use preshined glazing tape at glass installed with pressure plates. Fit tape accurately with tight joints, free from tension, gaps and cracks. After installation of the glass, the glazing tape shall not extend more than 3 mm above the line of the fixed stop. Remove and reglaze units where the glazing tape exceeds this tolerance.
11. Gun in a heel bead of glazing compound ensuring a continuous seal between glazed element and frame.
12. Finish gunned bead surfaces uniformly smooth and straight, to slope away from glass.

3.8. INSTALLATION: MIRRORS

1. Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.
2. Set mirrors with clips. Anchor rigidly to wall construction.
3. Secure mirrors with a minimum of 4 clips per piece. Provide pads to prevent direct metal-to-glass contact of clips or screws.
4. Align mirrors (in multiple application) to a parallel and true plane surface to produce a true reflection across all sections.
5. Install plumb and level.

3.9. CLEANING

1. Perform cleaning after installation to remove construction and accumulated environmental dirt.
2. Remove traces of primer, caulking.
3. Remove glazing materials from finish surfaces.
4. Remove labels after work is complete.
5. Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
6. Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.10. PROTECTION OF FINISHED WORK

1. After installation, mark light with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

3.11. SCHEDULE

1. PVC Windows:
 1. Sealed unit tempered safety glass as indicated in Section 08 53 10 – Polyvinylchloride (PVC) Windows
2. Aluminum Doors:
 1. Interior Vestibules: Single 6 mm clear tempered safety glazing.
 2. Exterior Entrances: Sealed glass unit tempered safety glazed doors and sidelights. 6 mm clear exterior light; 6 mm clear interior light, low E coating to #2 surface.
3. Hollow Steel Doors and Borrowed Lights:

1. Exterior Doors: Sealed glass unit, 6 mm tempered safety glazing for both lights with low e coating to #2 surface.
2. Interior Doors:
 1. Single pane 6 mm tempered safety glazing.
 2. Single 6 mm clear wired glazed light, as indicated.
4. Metal Framed Skylights:
 1. Sealed glass unit, triple glazed, 6 mm tempered safety glazing for exterior, middle, and interior lights with low e coating to #2 and #5 surfaces.
5. Mirrors:
 1. Single 5 mm non-tinted float glass mirror.
6. Shower Enclosures:
 1. Single 10 mm clear tempered safety glazing.
7. Other glass types as indicated on Drawings.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 21 16 – Fibrous Insulation
3. Section 07 92 00 – Sealants
4. Section 09 30 13 – Tiling
5. Section 09 91 00 – Painting

1.2. REFERENCES

1. Aluminum Association (AA)
 1. AA DAF-45-2003(R2009), Designation System for Aluminum Finishes.
2. American Society for Testing and Materials International, (ASTM)
 1. ASTM A653/A653M-19a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 2. ASTM C423-17, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 3. ASTM C475/C475M17, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 4. ASTM C51404(2014), Specification for Nails for the Application of Gypsum Board.
 5. ASTM C55703(2017), Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 6. ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members
 7. ASTM C84019, Standard Specification for Application and Finishing of Gypsum Board.
 8. ASTM C95418, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 9. ASTM C100218, Standard Specification for Steel SelfPiercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 10. ASTM C104714a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 11. ASTM C1178/C1178M18, Specification for Coated Glass Mat WaterResistant Gypsum Backing Panel.
 12. ASTM C1278/C1278M-17 Standard Specification for Fiber-Reinforced Gypsum Panel.
 13. ASTM C1325-18, Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units
 14. ASTM C1396/C1396M-17, Standard Specification for Gypsum Board.
 15. ASTM C1658/C1658M-18, Standard Specification for Glass Mat Gypsum Panels
 16. ASTM D3273-16, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

17. ASTM D4977/D4977M-03(2019), Standard Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion
18. ASTM D5420-16, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
19. ASTM E90-09(2016), Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
20. ASTM F1267-18, Standard Specification for Metal, Expanded, Steel
3. Association of the Wall and Ceilings Industries International (AWCI)
4. Canadian General Standards Board (CGSB)
 1. CAN/CGSB71.25M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
 2. CAN/CGSB51.34M86., AMEND., Vapour Barrier, Polyethylene Sheet for Use in Building Construction. (Withdrawn)
5. Underwriters' Laboratories of Canada (ULC)
 1. CAN/ULCS10210, Surface Burning Characteristics of Building Materials and Assemblies.
 2. CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials
 3. CAN/ULC S702.1:2014-AMD1, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification

1.3. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

1.4. DELIVERY, STORAGE AND HANDLING

1. Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.
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. SITE CONDITIONS

1. Environmental
 1. Maintain temperature minimum 10 degrees C, maximum 21 degrees 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.

1.6. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

2. Products

2.1. MANUFACTURERS

1. Acceptable Manufacturers:
 1. CertainTeed Gypsum Canada Inc.
 2. CGC Inc.
 3. GeorgiaPacific Canada, Inc.

2.2. GYPSUM MATERIALS

1. Standard board: to ASTM C1396/C1396M, and as follows:
 1. Type: regular and fire resistant.
 2. Size: 1220 mm x maximum practical length.
 3. Thickness: as indicated on Drawings.
 4. Ends: square cut.
 5. Edges: tapered.
 6. Acceptable Materials:
 1. Wallboard (Type X CertainTeed.
 2. Sheetrock (Firecode Type X), CGC Inc.
 3. Toughrock Gypsum Wallboard (Fireguard), Georgia-Pacific Canada, Inc.
2. Fire Resistant board: reinforced with glass fibres, to ASTM C1396/C1396M and ULC S114, UL Type C and as follows:
 1. Type: fire resistant.
 2. Size: 1220 mm x maximum practical length.
 3. Thickness: as indicated on Drawings.
 4. Ends: square cut.
 5. Edges: tapered.
 6. Acceptable Materials:
 1. Wallboard (Type C) CertainTeed.
 2. Sheetrock (Firecode Type C), CGC Inc.
 3. Toughrock Gypsum Wallboard (Fireguard Type C), Georgia-Pacific Canada, Inc.
3. Wall sheathing board: to ASTM C1177 and ASTM C3273 and as follows:
 1. Type: regular and fire resistant.
 2. Size: 1220 mm x maximum practical length.
 3. Thickness: as indicated on Drawings.
 4. Edges: square.
 5. Acceptable Materials:
 1. GlasRoc Exterior Sheathing, Certain Teed.
 2. Securock Glass Mat Sheathing, CGC Inc.

3. Dens-Glass Gold, Georgia-Pacific Canada, Inc.
4. Mould resistant board: to ASTM C1396/C1396M and as follows:
 1. Type: regular and fire resistant.
 2. Size: 1220 mm x maximum practical length.
 3. Thickness: as indicated on Drawings.
 4. Acceptable Materials:
 1. M2Tech Moisture & Mould Resistant Gypsum Board, CertainTeed.
 2. Sheetrock Mold Tough, CGC Inc.
 3. ToughRock Mold-Guard, Georgia-Pacific Canada, Inc.
 4. Quietrock ES-MR, Pabco Gypsum
5. Acoustically rated board: to ASTM C1396/C1396M and as follows:
 1. Type: regular and fire resistant.
 2. Thickness: as indicated on Drawings.
 3. Edges: tapered
 4. STC Ratings (Assemblies): tested to ASTM E90; as indicated on Drawings.
 5. Basis of Design Materials:
 1. QuietRock, CertainTeed.
 2. Gold Bond SoundBreak XP, National Gypsum Company
 3. QuietRock ES, Pabco Gypsum
6. Cementitious backer board: to ASTM C1325 and as follows:
 1. Substrate for ceramic tiles.
 2. Size: 1220 mm x maximum practical length.
 3. Thickness: as indicated on Drawings.
 4. Acceptable Materials:
 1. Durock, CGC Inc.
 2. Wonderboard, Custom Building Products Ltd.
7. Non-Cementitious backer board: to ASTM C1178 and as follows:
 1. Substrate for ceramic tiles.
 2. Type: regular and fire resistant.
 3. Size: 1220 mm x maximum practical length.
 4. Thickness: as indicated on Drawings
 5. Acceptable Materials:
 1. Diamondback (Type X), CertainTeed.
 2. Fiberock Aqua-Tough Interior Panel Abuse Resistant (Type FRX), CGC Inc.
 3. DensShield (Fireguard) Tile Backer, Georgia Pacific

2.3. FRAMING MATERIALS

1. Wood framing in accordance with Section 06 10 00 – Rough Carpentry and as indicated on Structural Drawings.
2. Studs and Tracks: as indicated in Section 09 22 00.
3. Metal furring runners, hangers, tie wires, inserts, anchors.

4. Drywall furring channels: 0.75 mm core thickness galvanized steel channels for screw attachment of gypsum board.
5. Resilient clips: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

2.4. INSULATION MATERIALS

1. Mineral Fiber Insulation for Fire and Smoke Rated Assemblies: Un-faced preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ULC S702; having maximum flame spread and smoke developed of 20/20 in accordance with CAN/ULC S102 and being non-combustible in accordance with CAN/ULC S114 and as follows:
 1. Type: 1.
 2. Width: to friction fit in stud spaces.
 3. Thickness: to fill a minimum of 90% of the cavity thickness.
 4. STC Ratings: as indicated on Drawings.
 5. Acceptable Materials:
 1. MinWool Sound Attenuation Fire Batts, Johns Manville
 2. Sound Attenuation Fire Batts, Owens-Corning Canada Inc.,
 3. AFB Acoustical Fire Batt, Rockwool Inc.
2. Mineral Fiber Acoustical Insulation for Non-rated Assemblies: Un-faced, preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ASTM C423, ASTM E90, ASTM E413 and ULC S702 and as follows:
 1. Type: 1.
 2. Width: to friction fit in stud spaces.
 3. Thickness: to fill a minimum of 90% of the cavity thickness.
 4. STC Ratings: as indicated on Drawings
 5. Acceptable Materials:
 1. NoiseReducer, Sound Control Fibre Glass Batts, CertainTeed
 2. Sound Shield Glass Fibre Batts, Johns Manville
 3. Thermafiber UltraBatt, Owen-Corning Canada LP.
3. Fibrous Glass Acoustical Insulation for Non-rated Assemblies: Un-faced, preformed GreenGuard™ or formaldehyde free binder fibrous insulation meeting the requirements of ASTM C423, ASTM E90, ASTM E413 and ULC S702 and as follows:
 1. Type: 1.
 2. Width: to friction fit in stud spaces.
 3. Thickness: to fill a minimum of 90% of the cavity thickness.
 4. Acceptable Products:
 1. NoiseReducer, Sound Control Fibre Glass Batts, CertainTeed
 2. Sound Shield Glass Fibre Batts, Johns Manville
 3. Quietzone Acoustic Insulation, Owen-Corning Canada Inc.

2.5. CEILING/WALL ACCESS DOORS

1. Architectural, flush mounting access panels for gypsum board installation, thickness and fire rating to match wall assembly, manufacturer's standard sizes

selected to suit access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, air tight gasket and screwdriver slot latch mechanism. Confirm proposed location and number of access doors with Consultant prior to installation.

1. Non-Rated Access Doors and Frames:
 1. Concealed Flange Access Panel: Flush design frame with a drywall bead taping flange, specifically for use with gypsum board.
 1. Frame: 1.90 mm (14 gauge) galvanized steel.
 2. Door Panel: 1.52 mm (16 gauge) galvanized steel.
 3. Hinge: Fully concealed pin type hinge with 175 degree opening.
 4. Latch: Screwdriver operated cam latch.
 2. Exterior Flange Stainless Steel Access Panel: Surface mounted with exposed flange frame design. No. 4 polished finish 304 stainless steel.
 1. Frame: 1.21 mm (18 gauge) stainless steel.
 2. Door Panel: 1.52 mm (16 gauge) stainless steel.
 3. Hinge: Fully concealed pin type hinge with 175 degree opening.
 4. Latch: Screwdriver operated cam latch.
2. Fire-Rated Access Doors and Frames:
 1. Concealed Flange Fire-Rated Wall Access Panel: Flush design frame with a drywall bead taping flange, specifically for use with gypsum board.
 1. Frame: 1.61 mm (14 gauge) galvanized steel.
 2. Door Panel: 1.99 mm (16 gauge) galvanized steel, uninsulated.
 3. Hinge: Fully concealed pin type hinge with 90 degree opening, self-closing device. Latch: Allen key operated latch with interior latch release.
 4. Rating: as indicated
 2. Concealed Flange Fire-Rated Ceiling Access Panel: Flush design frame with a drywall bead taping flange, specifically for use with gypsum board.
 1. Frame: 1.99 mm (16 gauge) galvanized steel.
 2. Door Panel: 1.31 mm (18 gauge) galvanized steel, with high temperature insulation and 0.85 mm (22 gauge) metal liner.
 3. Hinge: Fully concealed pin type hinge with 90 degree opening, self-closing device.
 4. Latch: Allen key operated latch with interior latch release.
 5. Rating: as indicated
3. Acceptable Manufacturers:
 1. Access Panel Solutions
 2. Acudor Products, Inc.
 3. Chicago Metallic/Rockfon Corporation
 4. Nystrom Building Products Co.

2.6. FINISHES

1. Paint: in accordance with Section 09 91 00 – Painting.
2. Tiling: in accordance with Section 09 30 13 – Tiling.

2.7. ACCESSORIES

1. Nails: to ASTM C514.
2. Steel drill screws: to ASTM C1002.
3. Stud adhesive: to CAN/CGSB71.25.
4. Laminating compound: as recommended by manufacturer, asbestosfree.
5. Casing beads, corner beads, control joints and edge trim: to ASTM C1047, ABS, PVC, or zincoated by hotdip process, 0.5 mm base thickness, perforated flanges, one piece length per location.
6. Cornice cap: 12.7 mm deep x partition width, of 1.6 mm base thickness galvanized sheet steel, prime painted. Include splice plates for joints.
7. Shadow mould: 35 mm high, snapon trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white colour.
8. Strippable Edge Trim: Extruded PVC with pre-masked L-shaped tape on trim with tear away protective serrated strip for removal after compound and paint is applied, for use at areas where gypsum butts aluminum frames and where gypsum butts concrete or concrete block.
9. Sealants: in accordance with Section 07 92 00 - Sealants.
10. Acoustic sealant: nonhardening, nonskinning, permanently flexible and having VOC content less than the VOC limits of State of California's South Coast Air Quality Management District Rule #1168 and in accordance with Section 07 92 00 – Sealants.
11. Firestopping: refer to Section 07 84 00 for firestopping and smoke seals for project as required for all new and existing surfaces, penetrations, irregular connections, and locations as described in Section 07 84 00.
12. Insulating strip: rubberized, moisture resistant, 3 mm thick cork or closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.
13. Joint Treatment Materials: Provide joint compound and accessory materials in accordance with ASTM C475 and as follows:
 1. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Interior Mould Resistant Gypsum Board: Fibreglass mesh tape.
 3. Tile Backing Panels: As recommended by panel manufacturer.
 2. Joint Compound for Interior Gypsum Board: Vinyl based, non-asbestos, low dusting type compatible with other compounds applied on previous or for successive coats, and as follows:
 1. Prefilling: Setting type taping compound.
 2. Embedding and First Coat: Drying type compound.
 3. Fill Coat: Drying type compound.
 4. Finish Coat: Drying type, sandable topping compound.
 5. Acceptable Materials:
 1. CertainTeed Dust Away
 2. CGC Dust Control
 3. Joint Compound for Tile Backing Panels:

1. Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.
4. Joint Compound for Interior Mould Resistant Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: Setting type joint compound.
 2. Embedding and First Coat: Setting type joint compound.
 3. Fill Coat: Setting type, sandable topping compound.

3. Execution

3.1. ACOUSTIC ASSEMBLIES

1. Maintain continuity of acoustic rated assemblies, including at junction with dissimilar adjacent materials and components such as beams, slabs, columns above ceilings and the like.

3.2. ERECTION

1. Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.
2. Do application of gypsum sheathing in accordance with ASTM C1280.
3. Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.
4. Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
5. Install work level to tolerance of 1:1200.
6. Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
7. Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
8. Furr gypsum board faced vertical bulkheads within and at termination of ceilings.
9. Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
10. Install gypsum 19 mm above finished floor at base of walls. Seal fire rated partitions with fire caulking as indicated in Section 07 84 00.
11. Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.
12. Furr openings and around builtin equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
13. Furr duct shafts, beams, columns, pipes and exposed services where indicated.
14. Erect drywall resilient furring transversely across studs and joists spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.
15. Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3. APPLICATION

1. Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.
2. Apply single or double layer gypsum board to wood and metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. Maximum spacing of screws 300 mm on centre.
 1. SingleLayer Application:
 1. Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.
 2. Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.
 2. DoubleLayer Application:
 1. Install gypsum board for base layer and exposed gypsum board for face layer.
 2. Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
 3. Apply base layers at right angles to supports unless otherwise indicated.
 4. Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
3. Apply mouldresistant gypsum board where wall tiles to be applied and at locations as indicated. Apply mouldresistant sealant to edges, ends, cutouts which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.
4. Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cutouts around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.
5. Apply board using stud adhesive on furring or framing and laminating adhesive on base layer of gypsum board.
6. Install ceiling boards in direction that will minimize number of endbutt joints. Stagger end joints at least 250 mm.
7. Install gypsum board on walls vertically to avoid endbutt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or firerated assemblies require vertical application.
8. Install gypsum board with face side out.
9. Do not install damaged or damp boards.
10. Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4. INSTALLATION

1. Erect accessories straight, plumb or 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 on centre or using contact adhesive for full length.

2. Install casing beads around perimeter of suspended ceilings.
3. Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
4. Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
5. Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.
6. Construct control joints of preformed units or two backtoback casing beads set in gypsum board facing and supported independently on both sides of joint.
7. Provide continuous polyethylene dust barrier behind and across control joints.
8. Locate control joints where indicated and at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.
9. Install control joints straight and true.
10. Construct expansion joints at building expansion and construction joints. Provide continuous dust barrier.
11. Install expansion joint straight and true.
12. Install cornice cap where gypsum board partitions do not extend to ceiling.
13. Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
14. Splice corners and intersections together and secure to each member with 3 screws.
15. Install access doors to electrical and mechanical fixtures specified in respective sections.
 1. Rigidly secure frames to furring or framing systems.
16. 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.
17. Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:
 1. Levels of finish:
 1. Level 0: No taping, finishing or accessories required for areas of temporary construction.
 2. Level 1: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable and for plenum areas above ceilings, in attics or in concealed spaces.
 3. Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable and when gypsum is used as a substrate for tile.
 4. Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth

- and free of tool marks and ridges and where areas are to receive a heavy coating of textured material.
5. Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges and where light textures or wall coverings are to be applied.
 18. 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.
 19. 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.
 20. Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
 21. Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
 22. Mix joint compound slightly thinner than for joint taping.
 23. Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.
 24. Remove ridges by light sanding or wiping with damp cloth.
 25. Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Section 06 10 00 – Rough Carpentry
2. Section 07 92 00 – Sealants
3. Section 09 21 16 – Gypsum Board Assemblies

1.2. REFERENCES

1. American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
 1. ANSI/CTI (Ceramic) A108/A118/A136.1-2017, Specification for the Installation of Ceramic Tile - A Collection of 20 ANSI/CTI A108 Series Standards on Ceramic Tile Installation: A108.1A-C, 108.4 -.17, A118.1-.15, ANSI A136.1.
 2. CTI (Ceramic) A118.3-2013, Specifications for Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1-2017).
 3. CTI (Ceramic) A118.4-2012, Specifications for Latex Portland Cement Mortar (included in ANSI A108.1-2017).
 4. CTI (Ceramic) A118.5-1999, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1-2017).
 5. CTI (Ceramic) A118.6-2013, Specification for Ceramic Tile Grouts (included in ANSI A108.1-2017).
 6. CTI/ANSI A137.1-2017, American National Standards Specifications for Ceramic Tile
2. American Society for Testing and Materials International (ASTM)
 1. ASTM C136/C136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 2. ASTM C14418, Standard Specification for Aggregate for Masonry Mortar.
 3. ASTM C150/C150M-19a, Standard Specification for Portland Cement
 4. ASTM C20718, Standard Specification for Hydrated Lime for Masonry Purposes.
 5. ASTM C627-18, Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
 6. ASTM C84718, Standard Specification for Metal Lath.
 7. ASTM C979/C979M16, Standard Specification for Pigments for Integrally Coloured Concrete.
 8. ASTM D226/D226M-17, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
 9. ASTM E84-19b, Standard Test Method for Surface Burning Characteristics of Building Materials
3. Canadian General Standards Board (CGSB)
 1. CAN/CGSB 25.20-95, Surface Sealer for Floors (Withdrawn)
 2. CAN/CGSB51.34M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction. (Withdrawn)
 3. CAN/CGSB 75.1-M88, Tile, Ceramic (Withdrawn)
4. Canadian Standards Association (CSA International)

1. CSAA3000-18, Cementitious materials compendium
5. International Organization for Standardization (ISO)
 1. ISO 13007:2014, Classifications for Adhesives and Grouts.
6. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
7. Tile Council of North America (TCNA)
 1. 2015 TCNA Handbook for Ceramic, Glass, and Stone Tile Installation.
8. Terrazzo Tile and Marble Association of Canada (TTMAC)
 1. Tile Specification Guide 09 30 00, 2018-2019, Tile Installation Manual.
 2. Hard Surface Maintenance Guide.
9. Underwriters' Laboratories of Canada (ULC)
 1. CAN/ULC S102.2-18, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies

1.3. ADMINISTRATIVE REQUIREMENTS

1. Pre-construction Meeting: Arrange a pre-construction meeting in accordance with Section 01 11 00 – General Requirements, Project Meetings attended by Contractor, Consultant, tile installer, tile supplier, and mortar and grout representative to discuss the following:
 1. Substrate and backing surfaces flatness requirements.
 2. Installation techniques associated with specified materials.
 3. Compatibility between specified materials and between adjacent materials.
 4. Concerns arising from site conditions.
 5. Concerns of installers or suppliers arising from as-constructed conditions.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Include manufacturer's information on:
 1. Ceramic tile, marked to show each type, size, and shape required.
 2. Cementitious backer unit.
 3. Dry-set cement mortar and grout.
 4. Divider strip.
 5. Elastomeric membrane and bond coat.
 6. Reinforcing tape.
 7. Levelling compound.
 8. Latex cement mortar and grout.
 9. Commercial cement grout.
 10. Organic adhesive.
 11. Slip resistant tile.
 12. Waterproofing/Crack isolation membrane.
 13. Fasteners.

2. Submit shop drawings in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Indicate tile layout, patterns, colour arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, and setting details.
 2. Locate and detail movement joints.
3. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures:
 1. Tile: Submit actual tile samples illustrating colour, texture, size and pattern for each type of tile specified.
 2. Grout: Submit manufacturer's full range of colours available for each type of grout specified.
 3. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.
 4. Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

1.5. MAINTENANCE MATERIAL SUBMITTALS

1. Extra Materials
 1. Provide maintenance materials in accordance with Section 01 11 00 – General Requirements, Closeout Submittals.
 2. Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.
 3. Maintenance material same production run as installed material.

1.6. QUALITY ASSURANCE

1. Conform to requirements of Terrazzo, Tile and Marble Association of Canada (TTMAC), Tile Specification Guide 09 30 00, Tile Installation Manual.
2. Obtain each type of tile material required from single source. For colour consistency, ensure the supplier has capacity to provide products from the same production run, dye lot, calibre and batch number.
3. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
4. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this project. Installer must be registered as a member in good standing with the Terrazzo, Tile and Marble Association of Canada.

1.7. DELIVERY, STORAGE AND HANDLING

1. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
2. Store materials to prevent damage or contamination.
3. Store materials in a dry area, protected from freezing, staining and damage.
4. Store cementitious materials on a dry surface.

1.8. WASTE MANAGEMENT AND DISPOSAL

1. Separate and recycle waste materials in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.

1.9. SITE CONDITIONS

1. Surfaces for tile installation must be clean, dimensionally stable, cured, level, plumb and free of contaminants such as oil, sealers and curing compounds.
2. Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation. Tile and setting material stored at same conditions 48 hours before and 7 days after application.
3. Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.
4. Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

2. Products

2.1. MATERIALS

1. Factory blend tile that exhibits colour variations within the ranges selected and package, therefore tile units taken from one package show the same range in colours as those taken from other packages.
2. Provide tile products manufactured in accordance with CAN/CGSB 75.1 or ANSI A108.1 as appropriate to the Basis-of-Design Materials.
3. Performance Requirements:
 1. Static Coefficient of Friction: Tile installed on walkway surfaces having following values as determined by testing identical products per ANSI A137.1:
 1. Level Surfaces: Minimum 0.6 dry.
 2. LoadBearing Performance: Provide installations rated for the following load-bearing performance in accordance with ASTM C627 for ceramic tile installed on walkway surfaces:
 1. Extra Heavy: Passes cycles 1 through 14.
 3. Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section and as required by TTMAC; calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance specified in Section 03 35 00; measurements will be made in the same manner as used in Section 03 35 00.
 1. Large Format Tiles: provide minimum floor flatness of FF50; equivalent to 3 mm with no more than 2 gaps under 3000 mm straightedge measurement.
 4. Provide Products used in exits having a flame spread rating of 25 or less when tested in accordance with ASTM E84 or ULC S102.2.

2.2. FLOOR TILE

1. Floor Tile: to CAN/CGSB-75.1, slip resistant, stain resistant. Colours, manufacturers, sizes and types as listed in Finish Schedule on Drawings.

2.3. WALL AND BASE TILE

1. Wall Tile: To CAN/CGSB-75.1 including bull-nosed tile, colours, manufacturers, sizes and types as listed in Finish Schedule on Drawings.

2.4. MORTAR, GROUT, AND ADHESIVE MANUFACTURERS

1. Acceptable Manufacturers: Subject to compliance with requirements herein, provide products from one of the following manufacturers:
 1. Ardex Americas
 2. Custom Building Products Ltd.
 3. Flextile Ltd.
 4. Laticrete International Inc.
 5. MAPEI Inc.

2.5. MORTAR AND ADHESIVE MATERIALS

1. Mortar to be of the following properties unless otherwise specified:
 1. Cement: Grey meeting requirements of CSA A3000.
 2. Sand: to ASTM C144, passing 16 mesh.
 3. Hydrated lime: to ASTM C207, Type N.
 4. Latex additive: formulated for use in cement mortar and thin set bond coat.
 5. Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.
 6. Mortars and Adhesives:
 1. Maximum VOC limit 65 g/L to SCAQMD Rule 1168.
2. Thin Set Mortar: modified, non-sagging, dry-set lightweight cement mortar with polymer and complying with ANSI A118.4, A118.11 and ISO 13007 C2TES1P1.
 1. Acceptable Materials:
 1. ProLite Premium Blend LFT Mortar, Custom Building Products
 2. 66 FlexLite Mortar, Flextile Ltd.
 3. 255 Multimax, Laticrete International Inc.
 4. Ultralite Mortar, MAPEI Inc
3. Polymer Modified Mortar: Modified non-sagging dry-set cement mortar with polymer for large and heavy tile thin-set applications, complying with ANSI A118.4, A118.11 and ISO 13007 C2TES1P1:
 1. Acceptable Materials:
 1. X5, Ardex
 2. Versabond LFT, Custom Building Products
 3. 56SR Mortar, Flextile Ltd.
 4. 4-XLT, Laticrete International Inc.
 5. Ultraflex LFT, MAPEI Inc.

2.6. GROUT

1. Colouring Pigments:
 1. Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.

2. Colouring pigments to be added to grout by manufacturer.
 3. Job coloured grout are not acceptable.
 4. Use in Commercial Cement Grout, DrySet Grout, and Latex Cement Grout.
2. Ready-to-Use Grout: Professional-grade, ready-to-use colour consistent quartz aggregate, for use with grout joints 1.5 to 12 mm.
 1. Colour: Colours to match materials, confirm colour with Consultant prior to ordering.
 2. Acceptable Materials:
 1. Fusion Pro Component Grout, Custom Building Products
 2. ColorMax Plus or Flex-Quartz, Flextile Ltd.
 3. Plasma, Laticrete International Inc.
 4. Flexcolour CQ, MAPEI Inc.
 3. Epoxy Grout: Multi-component, factory prepared, 100 percent epoxy resin and hardener with sand or mineral filler material; comply with ANSI A118.3 and ISO 130007 Classification R2/RG/ Classification RD for industrial grade.
 1. Colour: Colours to match materials, confirm colour with Consultant prior to ordering.
 2. Acceptable Materials:
 1. CEG-Lite, CEG-IG 100% Solid Commercial Epoxy Grout, Custom Building Products.
 2. FlexEpoxy 100 – 100% Solids 2-Component Epoxy Grout, Flextile Ltd.
 3. Latapoxy SpectraLOCK Pro Premium, Laticrete International Inc.
 4. SpectraLOCK 2000 IG, Laticrete International Inc.
 5. Kerapoxy CQ, Premium Epoxy Mortar and Grout, MAPEI Inc.
 4. Grout:
 1. Maximum VOC limit 65 g/L to SCAQMD Rule 1168.

2.7. MEMBRANES

1. Waterproofing Membrane: Sheet membrane.
 1. Acceptable Materials:
 1. RedGard Fabric Membrane, Custom Building Products
 2. Hydro Ban Sheet Membrane, Laticrete International Inc.
 3. DITRA, Schluter Systems
 4. Kerdi, Schluter Systems
2. Sound Control and Crack Isolation: bonded fleece surface, self adhering membrane.
 1. Acceptable Materials:
 1. EasyMat Tile & Stone Underlayment with Peel and Stick Primer, Custom Building Products
 2. Flexilastic 2000 SC with Flextile 4000 primer, Flextile.
 3. 125 Sound & Crack Adhesive, Laticrete International Inc.
 4. Mapesonic 2, (Sheet Membrane with MAPEI SM Primer) MAPEI Inc.

2.8. ACCESSORIES

1. Trim shapes:
 1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Use slip resistant trim shapes for horizontal surfaces of showers, overflow ledges, recessed steps, shower curbs, drying area curbs, and stools.
 3. Use trim shapes sizes conforming to size of adjoining field wall tile, including existing spaces, unless specified otherwise.
 4. Expansion and Control Joints for Thin-Set Applications: Profiles joined by a soft CPE movement joint material or thermoplastic rubber insert, with integral perforated anchoring legs for setting the joint into the setting bed:
 1. Height: As required to suit application
 2. Colour: As selected by Consultant
 3. Acceptable Materials:
 1. Schlüter Systems
 5. Transition joint strip with integral perforated anchoring leg for setting the strip into the setting materials.
 6. Straight edge strips with integral perforated anchoring leg for setting the strip into the setting material:
 1. Height: As required to suit application.
 2. Acceptable Materials:
 1. SCHIENE, Schlüter®
 7. Internal and External Corners: provide trim shapes as follows where indicated.
 1. Bullnose shapes for external corners including edges.
 2. Coved shapes for internal corners.
 3. Special shapes for:
 1. Base to floor internal corners to provide integral coved vertical and horizontal joint.
 2. Base to floor external corners to provide bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall.
 3. Wall top edge internal corners to provide integral coved vertical joint with bullnose top edge.
 4. Wall top edge external corners to provide bullnose vertical and horizontal joint edge.
2. Sealant: in accordance with Section 07 92 00 - Joint Sealants.
 1. Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.
3. Sound Matting: as indicated in Section 09 64 00.
4. Waterproofing Seaming Membrane: Seam and corner material. 4 mil thick, polyethylene membrane with polypropylene fleece laminated on both sides.
 1. Acceptable Materials:
 1. KERDI-BAND, Schlüter®
5. Waterproofing Accessories:
 1. Seals: Prefabricated mixing valve and pipe seals:
 1. Acceptable Materials:

1. KERDI-SEAL, Schlüter®
6. Tile sealer and protective coating: to CAN/CGSB25.20, Type 1 or 2 to tile and grout manufacturer's recommendations.

2.9. PATCHING AND LEVELLING COMPOUND

1. Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
2. Have not less than the following physical properties:
 1. Compressive strength 25 MPa.
 2. Tensile strength 7 MPa.
 3. Flexural strength 7 MPa.
 4. Density 1.9.
3. Capable of being applied in layers up to 12 mm thick, being brought to feather edge, and being trowelled to smooth finish.
4. Ready for use in 48 hours after application.
5. Acceptable Materials:
 1. CustomTech TechLevel 150 with CustomTech TechPrime A, Custom Building Products
 2. 59 Flex Flo with 4040 Concrete Primer, Flextile Ltd.
 3. NXT Level, Laticrete International Inc.
 4. Novoplan Easy Plus, MAPEI Inc

2.10. CLEANING COMPOUNDS

1. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
2. Materials containing acid or caustic material are not acceptable.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2. PREPARATION

1. Protect surrounding work from damage or disfiguration arising from work of this Section.
2. Surfaces: Thoroughly clean substrate surfaces receiving tile finishes to remove grease, oil or dust films, and other contaminants affecting bond of materials within bonding systems and as follows:
 1. Clean back of each tile before installation to remove surface contaminants and cutting residue, firing release dust and other debris detrimental to bond and final surface appearance.

3. Surface Levelling: apply self levelling compound to make backing surfaces flat and true to tolerances in plane listed in performance requirements above and as required by TTMAC.

3.3. WORKMANSHIP

1. Do tile work in accordance with TTMAC Tile Installation Manual except where specified otherwise.
2. Apply tile or backing coats to clean and sound surfaces.
3. Back Buttering: Obtain minimum 95% mortar coverage in accordance with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108 series of tile installation standards for the following applications:
 1. Glass tile
 2. Tile in wet areas.
 3. Tile having tiles 305 mm or larger in any direction.
 4. Tile installed with chemical resistant mortars and grouts
 5. Tile having tiles with raised or textured backs.
 6. Tile having tile installation rated for Heavy or Extra Heavy Duty.
 7. All porcelain tiles with more than 20% of the tile backs covered with "white firing release" shall be "back buttered" so that 100% of the back is covered with adhesive mortar rated for C627, Extra Heavy Duty rating.
4. Fit tile around corners, fitments, fixtures, drains and other builtin objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.
5. Maximum surface tolerance 1:800.
6. Make joints between tile uniform, plumb, straight, true, even and flush with adjacent tile. Confirm joint width with Consultant. Ensure sheet layout not visible after installation. Align patterns.
7. Lay out tiles as indicated on drawings or minimum perimeter tiles are minimum 1/2 size.
8. Sound tiles after setting and replace hollowsounding units to obtain full bond.
9. Make internal angles square, external angles rounded.
10. Use round edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.
11. Install divider strips at junction of tile flooring and dissimilar materials.
12. Allow minimum 24 hours after installation of tiles, before grouting.
13. Clean installed tile surfaces after installation and grouting cured.
14. Install prefabricated control and movement joints in tile Work in accordance with detail 301MJ from TTMAC Installation Manual to suit installation indicated.
15. Locate expansion, control, contraction, and isolation joints, as indicated in the TTMAC Installation manual to suit installation.
16. Fill control joints with sealant in accordance with Section 07 92 00 - Joint Sealants. Keep building expansion joints free of mortar and grout.

3.4. WATERPROOFING AND CRACK SUPPRESSION MEMBRANE INSTALLATION

1. Install waterproofing and crack suppression membrane in accordance with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.
2. Install tiling after sheet membranes are cured and tested to confirm that it is watertight.

3.5. WALL AND BASE TILE

1. Install tile on gypsum and cementitious board to TTMAC details 305W and 306W.

3.6. FLOOR TILE

1. Install large format floor tile in accordance with TTMAC detail 329 LFT

3.7. TILE SEALER AND PROTECTIVE COATING

1. Apply manufacturer's recommended floor sealer in strict accordance with manufacturer's written instructions for the specific tile type being sealed.
2. Apply sealer to tiles before grouting in cases of absorbent biscuit tiles and again after completion and cleaning of grouting process.

3.8. FIELD QUALITY CONTROL

1. Manufacturer's Field Services:
 1. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9. CLEANING

1. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter using Job Site Cleaner listed above:
 1. Remove grout residue from tile as soon as possible.
 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation.
 3. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.
 4. Flush surface with clean water before and after cleaning.
 5. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to grout manufacturer. Trap and remove coating to prevent it from clogging drains.
2. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies:
 1. Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.
 2. Protect floor areas from traffic after grouting is completed in accordance with manufacturer's written instructions.
 1. Keep traffic off floors for a minimum of 72 hours after completion of grouting.

2. Use stepping boards where access is required for light foot traffic only after 24 hours from completion of grouting.
3. Provide protective covering until Substantial Performance of the Work.
4. Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for a minimum of 14 days after installation.

END OF SECTION

1. General

1.1. RELATED REQUIREMENTS

1. Technical sections as indicated.

1.2. REFERENCES

1. American Society of Testing and Materials (ASTM)
 1. ASTM D16-19, Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 2. ASTM E84-19b, Standard Test Method for Surface Burning Characteristics of Building Materials.
2. Department of Justice Canada (Jus)
 1. Canadian Environmental Protection Act (CEPA), 1999, c. 33.
3. Environmental Protection Agency (EPA)
 1. EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
4. Green Seal
 1. Green Seal Standards GS-11, Paint.
 2. Green Seal Standard GC-03, Anti-Corrosive Paints.
5. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 1. Material Safety Data Sheets (MSDS).
6. Master Painters Institute (MPI)
 1. MPI Architectural Painting Specifications Manual.
7. National Fire Code of Canada – 2015.
8. South Coast Air Quality Management District (SCAQMD), California State
 1. SCAQMD Rule 1113-16, Architectural Coatings.
9. Society for Protective Coatings (SSPC)
 1. SSPC Painting Manual, Volume 2

1.3. ADMINISTRATIVE REQUIREMENTS

1. Pre-Installation Meeting:
 1. Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Construction Progress Schedule.
 1. Verify project requirements.
 2. Review installation and substrate conditions.
 3. Coordination with other building subtrades.
 4. Review manufacturer's installation instructions and warranty requirements.
2. Scheduling
 1. Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.

2. Obtain written authorization from Consultant for changes in work schedule.
3. Schedule painting operations to prevent disruption of and by other trades.
3. Health and Safety:
 1. Do construction occupational health and safety in accordance with Health and Safety Requirements.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

1. Submit product data in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit product data and instructions for each paint and coating product to be used.
 2. Submit product data for the use and application of paint thinner.
 3. Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 11 00 – General Requirements, Submittal Procedures. Indicate VOCs during application and curing.
2. Submit samples in accordance with Section 01 11 00 – General Requirements, Submittal Procedures.
 1. Submit full range colour sample chips to indicate where colour availability is restricted.
 2. Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
 1. 3 mm plate steel for finishes over metal surfaces.
 2. 13 mm birch plywood for finishes over wood surfaces.
 3. 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
 4. 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
 3. Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
3. Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 11 00 – General Requirements, Closeout Submittals include following:
 1. Product name, type and use.
 2. Manufacturer's product number.
 3. Colour numbers.
 4. MPI Environmentally Friendly classification system rating.
4. Submit a list of all painting materials to the Consultant for review prior to ordering materials.
5. Manufacturer's Instructions:
 1. Submit manufacturer's installation and application instructions.
6. Submit quality assurance submittals in accordance with Section 01 11 00 – General Requirements, Quality Control.

1. Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 1. Lead, cadmium and chromium: presence of and amounts.
 2. Mercury: presence of and amounts.
 3. Organochlorines and PCBs: presence of and amounts.
2. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5. QUALITY ASSURANCE

1. Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
2. Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
3. Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.
4. Mock-Ups
 1. Construct mockups in accordance with Section 01 11 00 – General Requirements, Quality Control.
 1. Provide 3 m x 3 m mockup. Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures.
 2. Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
 3. Locate where directed.
 4. Allow 24 hours for review of mockup before proceeding with work.
 5. When accepted, mockup will demonstrate minimum standard of quality required for this work. Approved mockup may remain as part of finished work.

1.6. DELIVERY, STORAGE, AND HANDLING

1. Packing, Shipping, Handling and Unloading:
 1. Pack, ship, handle and unload materials in accordance with Section 01 11 00 – General Requirements, Common Product Requirements and manufacturer's written instructions.
2. Acceptance at Site:
 1. Identify products and materials with labels indicating:
 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. Storage and Protection:
 1. Provide and maintain dry, temperature controlled, secure storage.
 2. Store materials and supplies away from heat generating devices.
 3. Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
5. Store temperature sensitive products above minimum temperature as recommended by manufacturer.
6. Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.
7. Remove paint materials from storage only in quantities required for same day use.
8. Fire Safety Requirements:
 1. Provide one 9 kg Type ABC dry chemical 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 National Fire Code of Canada requirements.

1.7. WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling in accordance with Section 01 11 00 – General Requirements, Waste Management and Disposal.
2. Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal, regulations.
3. Ensure emptied containers are sealed and stored safely.
4. Unused paint materials must be disposed of at official hazardous material collections site as approved by Consultant.
5. Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
6. Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
7. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
8. To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
 1. Retain cleaning water for water-based materials to allow sediments to be filtered out.
 2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 3. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

4. Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
5. Empty paint cans are to be dry prior to disposal or recycling (where available).
9. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
10. Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by individuals or organizations for verifiable re-use or re-manufacturing.

1.8. SITE CONDITIONS

1. Heating, Ventilation and Lighting:
 1. Ventilate enclosed spaces.
 2. Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
 3. Provide continuous ventilation for seven days after completion of application of paint.
 4. Coordinate use of existing ventilation system with Consultant and ensure its operation during and after application of paint as required.
 5. Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 6. Provide minimum lighting level of 323 Lux on surfaces to be painted.
2. Temperature, Humidity and Substrate Moisture Content Levels:
 1. Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:
 1. Ambient air and substrate temperatures are below 10 degrees C.
 2. Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
 3. Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 4. The relative humidity is over 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 5. Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 6. Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 2. Perform painting work when maximum moisture content of the substrate is below:
 1. 12% for concrete and masonry (clay and concrete brick/block).
 2. 15% for wood.

3. 12% for plaster and gypsum board.
4. Allow new concrete and masonry to cure minimum of 28 days.
3. Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
4. Test concrete, masonry and plaster surfaces for alkalinity as required.
3. Surface and Environmental Conditions:
 1. Apply paint finish 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. Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 3. Apply paint when previous coat of paint is dry or adequately cured.
4. Additional interior application requirements:
 1. Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
 2. Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.
5. Additional exterior application requirements:
 1. Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 2. Do not apply paint when:
 1. Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
 2. Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 3. Surface to be painted is wet, damp or frosted.
 3. Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
 4. Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 5. Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

2. Products

2.1. MATERIALS

1. Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
2. Provide paint materials for paint systems from single manufacturer.
3. Only qualified products with E2 "Environmentally Friendly" ratings are acceptable for use on this project, Use E3 rated products where available.
4. Conform to latest MPI requirements for all painting work including preparation and priming.

5. Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.
6. Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
7. Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
 1. Use waterbased coatings where available.
 2. Nonflammable.
 3. Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
 4. Manufactured without compounds which contribute to smog in the lower atmosphere.
 5. Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
8. Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
9. Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.
10. Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
 1. Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
 2. Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.
11. Waterborne paints and stains, recycled waterborne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.
12. Recycled waterborne surface coatings must not contain:
 1. Lead in excess of 600.0 ppm weight/weight total solids.
 2. Mercury in excess of 50.0 ppm weight/weight total product.
 3. Cadmium in excess of 1.0 ppm weight/weight total product.
 4. Hexavalent chromium in excess of 3.0 ppm weight/weight total product.
 5. Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.
13. VOC limits for architectural paints and coatings applied to interior surfaces in accordance with Green Seal Standard GS-11 and as follows:
 1. Interior Flat Coating or Primer: maximum VOC limit 50 g/L.
 2. Interior Non-Flat Coating or Primer: maximum VOC limit 150 g/L.
14. VOC limits for anti-corrosive and anti-rust paints applied to interior ferrous metal substrates in accordance with Green Seal Standard GS-03 and as follows:
 1. Anti-Corrosive/Anti-Rust Paint: maximum VOC limit 250 g/L.

15. VOC limits for wood finishes, floor coatings, stains, primers and shellacs applied to interior elements in accordance with SCAQMD Rule 1113 and as follows:
 1. Clear Wood Finishes – Lacquer: maximum VOC limit 275 g/L.
 2. Clear Wood Finishes – Sanding Sealers: maximum VOC limit 275 g/L.
 3. Clear Wood Finishes – Varnish: maximum VOC limit 275 g/L.
 4. Clear Brushing Lacquer: maximum VOC limit 275 g/L.
 5. Floor Coatings: maximum VOC limit 50 g/L.
 6. Sealers and Undercoaters: maximum VOC limit 100 g/L.
 7. Shellac – Clear: maximum VOC limit 730 g/L.
 8. Shellac – Pigmented: maximum VOC limit 550 g/L.
 9. Stain: maximum VOC limit 100 g/L.
 10. Pigmented Lacquer: maximum VOC limit 275 g/L.
 11. Low-Solids Coatings: maximum VOC limit 120 g/L.

2.2. COLOURS

1. Colours: As indicated in Finish Schedule on Drawings.
2. Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3. MIXING AND TINTING

1. Unless otherwise specified or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in contained prior to and during application to ensure break-up of lumps, completed dispersion of settled pigment, and colour and gloss uniformity.
2. Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
3. Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin waterbased paints.
4. Thin paint for spraying in accordance with paint manufacturer's instructions.

2.4. GLOSS/SHEEN RATINGS

1. Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - VelvetLike Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - SatinLike Finish	20 to 35	min. 35
Gloss Level 5 - Traditional SemiGloss Finish	35 to 70	

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

2. Gloss level ratings of painted surfaces as indicated in Finish Schedule.

2.5. EXTERIOR SURFACES

1. Unless otherwise specified, all exterior painting work to be in accordance with MPI Premium Grade finish requirements.
2. Asphalt Surfaces: (zone / traffic marking for drive and parking areas, etc.)
 1. EXT 2.1A Latex zone / traffic marking finish.
3. Concrete Vertical Surfaces: (including horizontal soffits):
 1. EXT 3.1A – Latex, gloss level as directed
4. Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal:
 1. EXT 5.1R Water Based Light Industrial - gloss level as directed (over H.B. Epoxy).
5. Steel High Heat: heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted:
 1. EXT 5.2A Heat resistant enamel finish, maximum degrees C.
 2. EXT 5.2B Heat resistant aluminum enamel finish, maximum 427 degrees C.
 3. EXT 5.2C Inorganic zinc rich coating, maximum 400 degrees C.
 4. EXT 5.2D High heat resistant coating, maximum 593 degrees C.
6. Galvanized Metal: non chromate passivated; high contact/high traffic areas (doors, frames, railings and handrails, etc.):
 1. EXT 5.3J – Water Based Light Industrial - gloss level as directed (over epoxy)
7. Dressed Lumber: Cedar soffits:
 1. EXT 6.3D Semitransparent stain finish.
8. Bituminous Coated Surfaces: cast iron pipe, concrete, etc.:
 1. EXT 10.2A Latex semi-gloss level finish.

2.6. INTERIOR SURFACES

1. Unless otherwise specified, all interior painting work to be in accordance with MPI Premium Grade finish requirements.
2. Concrete Vertical Surfaces: including ceilings and undersides of mezzanines and stairs etc.:
 1. INT 3.1C - High performance architectural latex; gloss level as directed by Consultant.
3. Concrete horizontal surfaces: floors and stairs:

1. INT 3.2B - Alkyd floor enamel, gloss level as directed by Consultant.
4. Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal:
 1. INT 5.1R - High performance architectural latex; gloss level as directed.
5. Steel high heat: (boilers, furnaces, heat exchangers, breeching, pipes, flues, stacks, etc., with temperature range as noted):
 1. INT 5.2A - Heat resistant enamel finish, maximum 205 degrees C.
 2. INT 5.2B - Heat resistant aluminum paint finish, maximum 427 degrees C.
 3. INT 5.2C - Inorganic zinc rich coating, maximum 400 degrees C.
 4. INT 5.2D - High heat resistant coating, maximum 593 degrees C.
6. Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts:
 1. INT 5.3M - High performance architectural latex gloss level as directed.
7. Dressed Lumber: doors, door and window frames, casings, mouldings, etc.:
 1. INT 6.3A – Latex; gloss level as directed by Consultant.
8. Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, and textured finishes:
 1. INT 9.2B - High performance architectural latex; gloss level as directed by Consultant.
9. Bituminous coated surfaces: cast iron pipe, concrete, etc.:
 1. INT 10.2A - Latex semi-gloss level finish.

2.7. SOURCE QUALITY CONTROL

1. Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
 1. Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
 2. Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
 3. Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

3. Execution

3.1. MANUFACTURER'S INSTRUCTIONS

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2. GENERAL

1. Perform preparation and operations for interior and exterior painting in accordance with MPI - Architectural Painting Specifications Manual except where specified otherwise.

2. Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3. EXAMINATION

1. 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.
2. Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.
3. Maximum moisture content as follows:
 1. Stucco, plaster and gypsum board: 12%.
 2. Concrete: 12%.
 3. Wood: 15%.
 4. Clay and Concrete Block/Brick: 12%

3.4. PREPARATION

1. Protection:
 1. Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable nonstaining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
 2. Protect items that are permanently attached such as Fire Labels on doors and frames.
 3. Protect factory finished products and equipment.
 4. Protect passing pedestrians and general public in and about the building.
2. Surface Preparation:
 1. Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 2. Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 3. Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.
3. Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual requirements and coating manufacturer's recommendations. Refer to MPI Manual in regard to specific requirements and as follows:
 1. Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 2. Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 3. Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 4. Allow surfaces to drain completely and allow to dry thoroughly.

5. Prepare surfaces for waterbased painting, waterbased cleaners should be used in place of organic solvents.
6. Use trigger operated spray nozzles for water hoses.
7. Many waterbased paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up waterbased paints.
4. Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
5. Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 1. Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 2. Apply wood filler to nail holes and cracks.
 3. Tint filler to match stains for stained woodwork.
6. Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
7. Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air, or vacuum cleaning.
8. Touch up of shop primers with primer as specified.
9. Do not apply paint until prepared surfaces have been accepted by Consultant.

3.5. APPLICATION

1. Method of application to be as approved by Consultant. Apply paint by brush, roller, air sprayer or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.
2. Brush and Roller Application:
 1. Apply paint in uniform layer using brush and/or roller type suitable for application.
 2. Work paint into cracks, crevices and corners.
 3. Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 4. Brush and/or roll out runs and sags, and overlap marks. Rolled surfaces free of roller tracking and heavy stipple.
 5. Remove runs, sags and brush marks from finished work and repaint.
3. Spray application:
 1. Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 2. Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

3. Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
4. Brush out immediately all runs and sags.
5. Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
4. Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
5. Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
6. Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
7. Sand and dust between coats to remove visible defects.
8. Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
9. Finish inside of cupboards and cabinets as specified for outside surfaces.
10. Finish closets and alcoves as specified for adjoining rooms.
11. Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6. MECHANICAL/ELECTRICAL EQUIPMENT

1. Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
2. Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
3. Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
4. Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
5. Do not paint over nameplates.
6. Keep sprinkler heads free of paint.
7. Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
8. Paint fire protection piping red except where noted on Drawings.
9. Paint disconnect switches for fire alarm system and exit light systems in red enamel.
10. Paint natural gas piping yellow except where noted on Drawings.
11. Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touchup as required, and paint conduits, mounting accessories and other unfinished items.
12. Do not paint interior transformers and substation equipment.

3.7. SITE TOLERANCES

1. Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
2. Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
3. Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8. FIELD QUALITY CONTROL

1. Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or nonMPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Consultant.
2. Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
3. Cooperate with inspection firm and provide access to areas of work.
4. Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.9. CLEANING

1. Proceed in accordance with Section 01 11 00 – General Requirements, Cleaning.
2. Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces

END OF SECTION

Opening List

<u>Opening</u>	<u>Hdw Set</u>	<u>Fire Rating</u>	<u>Door Material</u>	<u>Frame Material</u>
Washroom (Dr 1)	1.0		Hollow Metal	Hollow Metal
Service Room (Dr 2)	2.0		Hollow Metal	Hollow Metal
Storage Room	3.0		Hollow Metal	Hollow Metal

DOOR HARDWARE

Section 087100

PROJECT: Jack Bagley Park Washroom
Powder Point RD
Nanoose Bay, BC, CANADA
V9P 9E9

OWNER:

ARCHITECT: Heaccity Studio Architecture
108 E. Pander St.
Vancouver, BC
V6A 1T3

Prepared By: Shawne Dery
Tillicum Agencies

Date: 2 September 2021

Hardware List

<u>Mfg</u>	<u>Description</u>	<u>Product Number</u>	<u>Finish</u>
MK	Hinge, Full Mortise, Hvy Wt	TA386 NRP 4-1/2" x 4"	US32D
PE	Astragal	357SP 84"	
	Gasketing	312CR	
	Sweep	18062CNB	
	Threshold	2727A	
RO	Door Stop	441H	US26D
	Flush Bolt	555	US26D
	Kickplate	K1050 16" x 2" LDW	630
SA	Deadbolt	485	US26D
	Passage Latch	10XU15 LL	US26D
	Storeroom/Closet Lock	10XG04 LL	US26D
	Surface Closer	351 CPS	EN
	Surface Closer	351 UO	EN

Manufacturer List

<u>Code</u>	<u>Name</u>
FL	Fleming
MK	McKinney
PE	Pemko
RO	Rockwood
SA	SARGENT

Option List

<u>Code</u>	<u>Description</u>
NRP	Non Removable Pins

Finish List

<u>Code</u>	<u>Description</u>
US32D	Satin Stainless Steel
US26D	Brass Satin Chrome Plated
US26D	Satin Chromium Plated
EN	Powder Coated to match US28

Hardware Sets

SET #1.0

Doors: Washroom (Dr 1)

3	Hinge, Full Mortise, Hvy Wt	TA386 NRP 4-1/2" x 4"	US32D	MK
1	Deadbolt	485	US26D	SA
1	Passage Latch	10XU15 LL	US26D	SA
1	Surface Closer	351 UO	EN	SA
1	Door Stop	441H	US26D	RO
1	Threshold	2727A		PE
1	Gasketing	312CR		PE
1	Sweep	18062CNB		PE
1	Astragal	357SP 84"		PE

NOTE: Note: Door may be left in unlocked position during operational hours and secured after hours by use of key. Door, may be secured inside by use of thumb turn, depressing inside lever will retract deadbolt and leave door in unlocked position for next user. Lock has a visual indicator showing occupied or vacant. Park personnel to check to make sure door is secure after hours and open during operational hours.

SET #2.0

Doors: Service Room (Dr 2)

3	Hinge, Full Mortise, Hvy Wt	TA386 NRP 4-1/2" x 4"	US32D	MK
1	Deadbolt	485	US26D	SA
1	Storeroom/Closet Lock	10XG04 LL	US26D	SA
1	Surface Closer	351 CPS	EN	SA
1	Kickplate	K1050 16" x 2" LDW	630	RO
1	Threshold	2727A		PE
1	Gasketing	312CR		PE
1	Sweep	18062CNB		PE
1	Astragal	357SP 84"		PE

NOTE:

SET #3.0

Doors: Storage Room

6	Hinge, Full Mortise, Hvy Wt	TA386 NRP 4-1/2" x 4"	US32D	MK
2	Flush Bolt	555	US26D	RO
1	Deadbolt	485	US26D	SA
1	Storeroom/Closet Lock	10XG04 LL	US26D	SA
2	Kickplate	K1050 16" x 2" LDW	630	RO
1	Threshold	2727A		PE
1	Gasketing	312CR		PE
2	Sweep	18062CNB		PE

Hardware Sets

2 Astragal

357SP 84"

PE

NOTE:

Modified 30 August 2021
By JR

JACK BAGLEY PARK WASHROOM PAVILION									
FINISH SCHEDULE - BASIS OF DESIGN (ALTERNATES BY CLIENT APPROVAL)									
TAG	DESCRIPTION	AREA	CARRIER	PRODUCT	NUMBER	FINISH	COLOUR	THICKNESS	NOTES
CT	CERAMIC TILE	WASHROOMS	DALTILE	COLORMATCH GLAZED VERAMIC		MATTE	FERN 80		4X16 TILES C/W MATCHING 4X4 COVE BASE (TRIMMED AS REQUIRED)
FC	FIBRE CEMENT BOARD PANEL SIDING	EXTERIOR SIDING	THOMAS HARDIE	HARDIR PANEL SMOOTH		COLOUR PLUS SMOOTH	FROM STANDARD SELECTION	5/16"	C/W HARDIETRIM BATTEN BOARDS (STANDARD COLOURPLUS SMOOTH FINISH)
GWB	GYPSUM WALL BOARD	INTERIOR WALLS & CEILING	-	-	-	-	-	SEE ASSEMBLY SCHEDULE	USE PAPER-FREE MOLD-RESISTANT GREENBOARD IN WASHROOMS TYP.
P1	LATEX PAINT	INTERIOR WALLS	BENJAMIN MOORE	-	TBC	EGGSHELL	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P2	LATEX PAINT	INTERIOR CEILINGS	BENJAMIN MOORE	-	TBC	SATIN	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P3	LATEX PAINT	DOORS	BENJAMIN MOORE	-	TBC	SEMI-GLOSS	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P4	ACRYLIC PAINT	UNDERSIDE OF ROOF SHEATHING	BENJAMIN MOORE	-	TBC		STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
PC	POLISHED CONCRETE	FLOOR IN ALL AREAS	-	-	-	VARIES	NATURAL	-	APPLY DENSIFIER WHERE NOTED
SC	SMOOTH CONCRETE	CAST IN PLACE CONCRETE BENCHES	-	-	-	-	-	-	USE PAPER-FACED FORMWORK FOR SMOOTH FINISH
SP	SOLID PHENOLIC	WASHROOM VANITY COUNTER	BOBRICK	SIERRASERIES			STANDARD COLOUR TO BE CONFIRMED	3/4"	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
WS	WOOD STAIN	EXPOSED TIMBER STRUCTURE	SANSIN	ENVIRO STAIN	KP-12UVW	-	GREY	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL

LANDSCAPE NOTES:

1. GENERAL

- 1.1. CONTRACTOR TO ENSURE DRAWINGS AND SPECIFICATIONS HAVE BEEN REVIEWED (COMPLETE) AND THAT SUB-CONTRACTORS ARE PROVIDED WITH COMPLETE INFORMATION AT TIME OF BIDDING, MOBILIZATION UPON AWARD, AND DURING SITE CONSTRUCTION.
- 1.2. CONTRACTOR TO VERIFY ALL UNITS AND QUANTITIES SHOWN.
- 1.3. CONTRACTOR TO IMMEDIATELY NOTIFY CONTRACT ADMINISTRATOR OF ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS PRIOR TO COMMENCING WORK. DO NOT COMMENCE WORK UNTIL DISCREPANCY IS CLARIFIED OR RESOLVED.
- 1.4. CONTRACTOR TO IMMEDIATELY NOTIFY CONTRACT ADMINISTRATOR OF ANY SCHEDULE DELAYS IMPOSED BY UNFORESEEN ISSUES. SUBMIT WRITTEN NOTICE.
- 1.5. CONTRACTOR TO SUBMIT RFIS THROUGH EMAIL FOR FORMAL RECORD.
- 1.6. CONTRACTOR TO SUBMIT REQUESTS FOR REVIEW BY CONSULTANTS MINIMUM 72HRS IN ADVANCE OF REBAR AND FORM WORKS, ELECTRICAL AND CIVIL ENGINEERING RELATED UTILITY TRENCHING, AND GENERAL PREPARATIONS PRIOR TO LARGE CONCRETE POURS.
- 1.7. CONTRACTOR WILL RECEIVE THE ISSUE FOR CONSTRUCTION DRAWING SET IN DIGITAL PDF FORMAT AT THE TIME OF AWARD. MAINTAIN ONE COPY ON SITE IN CLEAN CONDITION. MAINTAIN REGULAR SITE NOTES AND REDLINES REGARDING SITE CHANGES ON THE COPY. PROVIDE THE REDLINE DRAWING SET AND A MARKED UP PDF SET FOR PROJECT RECORDS AT THE TIME OF SUBSTANTIAL COMPLETION.
- 1.8. INCLUDE A STATUTORY DECLARATION OF PROGRESS PAYMENT AND WCB SUBMITTAL WITH EACH PROGRESS CLAIM. FAILURE TO PROVIDE THESE SUBMITTALS WILL INHIBIT THE CONTRACT ADMINISTRATOR FROM REVIEWING A CLAIM OR PREPARING A PAYMENT CERTIFICATE.

2. SCHEDULE

- 2.1. COMPLETE WORK FOR CRITICAL SCHEDULE MILESTONES.

3. WARRANTY

- 3.1. THE PROJECT REQUIRES A ONE YEAR WARRANTY ON ALL HARD AND SOFTSCAPE WORK.
- 3.2. THE WARRANTY PHASE WILL COMMENCE AT THE TIME OF SUBSTANTIAL COMPLETION OF THE TOTAL CONTRACT.

4. FIELD LAYOUT AND SURVEY COORDINATION

- 4.1. SITE LAYOUT TO BE BASED ON TSS (TOTAL STATIONING SURVEY) OR APPROVED EQUAL GPS METHOD TO ENSURE ACCURACY IN LAYOUT.
- 4.2. SITE LAYOUT AND SURVEY FILES CAN BE PROVIDED TO THE CONTRACTOR IN AUTOCAD FORMAT AT THE TIME OF CONSTRUCTION START-UP.

5. SITE MOBILIZATION, STAGING, AND SAFETY

- 5.1. PROVIDE MOD-U-LOCK FENCE OR APPROVED EQUAL AROUND THE LIMIT OF CONSTRUCTION AND PROTECT THE SITE AT ALL TIMES FROM PUBLIC ACCESS.
- 5.2. PROVIDE INFORMATION ON INTENDED SITE STORAGE AND STAGING AREA(S) AND HAULING AT CONSTRUCTION START-UP. IF STORAGE OR STAGING AREA(S) ARE TO BE MOVED BETWEEN DIFFERENT PHASES OF WORK, INFORM OWNER AND CONTRACT ADMINISTRATOR AT CONSTRUCTION START-UP WITH MARKED UP PLANS.
- 5.3. PROVIDE PROOF OF A BC-ONE (BC-1) CALL AT THE TIME OF CONSTRUCTION START-UP MEETING.
- 5.4. ENSURE ESC (EROSION AND SEDIMENT CONTROL) MEASURES HAVE BEEN REVIEWED PRIOR TO COMMENCING DEMOLITION OR EXCAVATION WORKS OF THE SITE. AMEND ANY ESC RELATED REQUESTS FROM THE PROJECT ENVIRONMENTAL CONSULTANT IMMEDIATELY. PROVIDE PHOTO PROOF AND EMAIL CONFIRMATION TO THE CONTRACT ADMINISTRATOR AND ENVIRONMENTAL CONSULTANT FOR APPROVAL PRIOR TO COMMENCING WORK. ENSURE TREE PROTECTION FENCING HAS BEEN REVIEWED PRIOR TO COMMENCING WORK.

6. SITE CLEANLINESS

- 6.1. MAINTAIN THE SITE IN A CLEAN AND ORDERLY FASHION AND FOLLOWING BEST PRACTICES WITH CURRENT WCB SAFETY REQUIREMENTS.
- 6.2. RECYCLE CARDBOARD AND WASTE MATERIALS AS PER WASTE MANAGEMENT AND DISPOSAL PROCEDURES DEFINED UNDER DIVISION 1 OF THE SPECIFICATIONS.
- 6.3. ENSURE A POWER WASH AND CLEAN-UP HAS BEEN PROVIDED PRIOR TO THE SUBSTANTIAL COMPLETION REVIEW.
- 6.4. ENSURE CLEAN ROADS AND SITE ENTRY/EXIT THROUGH THE ENTIRE COURSE OF CONSTRUCTION.

7. HARDSCAPES

- 7.1. GENERAL REQUIREMENTS
 - 7.1.1. ENSURE THAT HARDSCAPES MEET FLUSH WITH ADJOINING SURFACES UNLESS NOTED OTHERWISE.
 - 7.1.2. PROVIDE MOCK-UPS OF HARDSCAPE ELEMENTS AS PER PROJECT SPECIFICATIONS.
 - 7.1.3. MOCK-UPS TO INCLUDE A SAMPLE OF JOINT QUALITY, INCLUDING ANY FILLERS OR SEALANTS SPECIFIED. REFER TO SPECIFICATIONS.
 - 7.1.4. ENSURE JOINT SEALANTS SPECIFIED ARE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS.
 - 7.1.5. INSTALL FILLERS (I.E. MORTAR, GROUT) OR SEALANTS A MINIMUM 48 HOURS PRIOR TO REVIEW OF SITE MOCK-UPS TO ENSURE COLOUR IN PRODUCTS HAS SET TO TRUE FINISH.
 - 7.1.6. ENSURE THAT TRENCHING HAS BEEN REVIEWED AND ACCEPTED PRIOR TO BACKFILLING OF MATERIALS.
 - 7.1.7. PROVIDE COPIES OF ELECTRICAL TRENCHING REPORTS AND PLUMBING REPORTS PROVIDED BY BUILDING INSPECTION DEPARTMENT TO THE CONTRACT ADMINISTRATOR AND OWNER.
 - 7.1.8. ENSURE BACKFILL MATERIALS ARE AS PER SPECIFICATIONS.
 - 7.1.9. PROVIDE SIEVE TESTS AND AFFILIATED SUBMITTALS OF ALL GRANULARS, SANDS AND BACKFILL MATERIALS FOR APPROVAL PRIOR TO ORDER AND INSTALLATION. REFER TO SPECIFICATIONS.
 - 7.1.10. WHEN MEETING A NEW HARD SURFACE TO AN EXISTING HARD SURFACE, PROVIDE NOTICE TO THE CONTRACT ADMINISTRATOR OF ANY CONDITIONS WHERE THE JOINT WILL RESULT IN MORE THAN A 6MM DIFFERENTIAL (I.E. A NEW CONCRETE SIDEWALK IS MEETING AGAINST AN EXISTING ASPHALT SIDEWALK THAT HAS A SMALL DEPRESSION). DO NOT COMMENCE WORK UNTIL THE CONTRACT ADMINISTRATOR HAS CLARIFIED IF RECTIFICATION OF THE EXISTING SURFACE IS NEEDED TO AVOID A TRIPPING HAZARD.
 - 7.1.11. CONFIRM DESIGN GRADES HAVE BEEN CHECKED PRIOR TO POURING, LAYING OR INSTALLING ANY HARD SURFACE MATERIALS OVER PREPARED BACKFILL.
 - 7.1.12. REPORT ANY GRADES THAT CONTRADICT BEST CONSTRUCTION PRACTICES IMMEDIATELY TO THE CONTRACT ADMINISTRATOR (I.E. WATER FLOWS TOWARDS A BUILDING OR IS GOING TO PUDDLE IN AN AREA, OR AN AREA OF SURFACE APPEARS FLAT). DO NOT PROCEED UNTIL SLOPES AND DESIGN HAVE BEEN CLARIFIED.
 - 7.1.13. PROVIDE ANY SURVEY SHOTS OR SPOT GRADE CHECKS AS REQUESTED BY CONTRACT ADMINISTRATOR.
 - 7.1.14. REFER TO CIVIL ENGINEERING DRAWINGS AND GEOTECHNICAL REPORT FOR ADDITIONAL HARDSCAPE REQUIREMENTS.
- 7.2. CONCRETE PAVING
 - 7.2.1. PROVIDE A MOCK-UP AS NOTED ABOVE. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
 - 7.2.2. ENSURE CONCRETE PAVING MAINTAINS THE SAME CONTROL AND EXPANSION JOINT PATTERNS AS SHOWN IN DESIGN DRAWINGS.
 - 7.2.3. IN AREAS WITHOUT CUSTOM CONTROL OR EXPANSION JOINT PATTERNING, PROVIDE:
 - 7.2.4. EXPANSION JOINTS EVERY 9.0M MAXIMUM ON CENTRE.
 - 7.2.5. CONTROL JOINTS EVERY 3.0M MAXIMUM ON CENTRE.
 - 7.2.6. CONFIRM LOCATIONS WITH CONSULTANT PRIOR TO COMMENCING FORMWORK.
 - 7.2.7. ALL HORIZONTAL FLAT CONCRETE TO HAVE A MEDIUM BROOM FINISH UNLESS NOTED OTHERWISE.
 - 7.2.8. CONCRETE THAT IS REINFORCED MUST BE REVIEWED PRIOR TO POURING. ENSURE REBAR IS 'CHAISED' AND SUSTAINED IN AN UPRIGHT POSITION.
 - 7.2.9. REFER TO CIVIL ENGINEERING DRAWINGS FOR CONCRETE PAVING REQUIREMENTS FOR SIDEWALKS AND LETDOWNS.
 - 7.2.10. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

8. WALLS

- 8.1. GENERAL REQUIREMENTS
 - 8.1.1. PROVIDE MOCK-UP FOR REVIEW OF FORM, QUALITY AND FINISH PRIOR TO INSTALLING ADDITIONAL WORK. REFER TO SPECIFICATIONS.
 - 8.1.2. MOCK-UPS TO INCLUDE A SAMPLE OF JOINT QUALITY, INCLUDING ANY FILLERS, EPOXIES OR SEALANTS SPECIFIED.
 - 8.1.3. ENSURE JOINT EPOXIES AND SEALANTS SPECIFIED ARE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS.
 - 8.1.4. MOCK-UPS TO INCLUDE ANY GEO-GRID OR SUPPORTING ANCHOR SYSTEM REQUIREMENTS. SUBMIT MATERIAL PRODUCT INFORMATION FOR APPROVAL PRIOR TO COMMENCING MOCK-UP.
 - 8.1.5. INSTALL FILLERS (I.E. MORTAR, GROUT) OR SEALANTS A MINIMUM 48 HOURS PRIOR TO REVIEW OF SITE MOCK-UPS TO ENSURE COLOUR IN PRODUCTS HAS SET TO TRUE FINISH.
 - 8.1.6. ENSURE REINFORCING HAS BEEN REVIEWED BY CONSULTANT STRUCTURAL ENGINEER.
 - 8.1.7. ENSURE THAT TRENCHING HAS BEEN REVIEWED AND ACCEPTED PRIOR TO BACKFILLING OF MATERIALS.
 - 8.1.8. ENSURE BACKFILL MATERIALS ARE AS PER SPECIFICATIONS.
 - 8.1.9. PROVIDE SIEVE TESTS AND AFFILIATED SUBMITTALS OF ALL SANDS, GRANULARS AND BACKFILL MATERIALS FOR APPROVAL PRIOR TO ORDER AND INSTALLATION.
 - 8.1.10. REPORT ANY ISSUES THAT CONTRADICT BEST CONSTRUCTION PRACTICES IMMEDIATELY TO THE CONTRACT ADMINISTRATOR. DO NOT PROCEED UNTIL DESIGN HAS BEEN CLARIFIED.
 - 8.1.11. PROVIDE ANY SURVEY SHOTS OR SPOT GRADE CHECKS AS REQUESTED BY CONTRACT ADMINISTRATOR.
 - 8.1.12. REFER TO CIVIL ENGINEER, STRUCTURAL ENGINEER AND ELECTRICAL ENGINEER'S DRAWINGS FOR ADDITIONAL REQUIREMENTS, AS WELL AS GEOTECHNICAL REPORT. REPORT DISCREPANCIES IMMEDIATELY TO CONTRACT ADMINISTRATOR.
 - 8.1.13. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
- 8.2. SEGMENTED CONCRETE WALLS:
 - 8.2.1. PROVIDE A MOCK-UP. REFER TO SPECIFICATIONS.
 - 8.2.2. PROVIDE SUBMITTALS AS PER SPECIFICATIONS.
 - 8.2.3. CONFIRM PRODUCT COLOUR AND FINISH PRIOR TO PREPARING MOCK-UP.
 - 8.2.4. GEO-SYNTHETIC SUPPORT: ENSURE PRODUCT IS REVIEWED PRIOR TO ORDER. CONFIRM SIZE AND DEPTH OF MATERIAL. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS. IMMEDIATELY CONTACT CONTRACT ADMINISTRATOR IF BACKFILL DEPTH OR MATERIAL SHOWN IN MANUFACTURER'S SPECIFICATIONS CONTRADICTS REQUIREMENTS SHOWN IN CONSULTANT'S DRAWINGS OR GEOTECHNICAL REPORT.
 - 8.2.5. REBAR SUPPORT: ENSURE REBAR IS REVIEWED BY CONSULTANT PRIOR TO MORTAR SACKING OR ALTERNATE FORM OF CONCEALMENT.
 - 8.2.6. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

9. METALS

- 9.1. SUBMIT SHOP DRAWINGS FOR METAL WORKS (I.E. FENCES, ATTACHMENT PLATES, SKATE DETERRENTS). REFER TO SPECIFICATIONS.
- 9.2. TREAT METAL WORK FOR PROTECTION FROM CORROSION AND ABRASION. STEEL TO BE GALVANIZED OR STAINLESS. ALUMINUM TO BE ANODIZED. THIS APPLIES TO FASTENERS.
- 9.3. ENSURE ANCHOR PLATES AND AFFILIATED FASTENER JOINING MATERIALS MEET FLUSH BETWEEN JOINING SURFACES WITHOUT GAPS, UNLESS OTHERWISE SPECIFIED.
- 9.4. COMPLETE METAL BONDING (I.E. WELDING, SOLDERING) SUCH THAT WORK IS TREATED FOR PROTECTION AND WILL NOT CORRODE.
- 9.5. CONCEAL BONDING WORK IN THE FINISHING OF THE METAL WORK.
- 9.6. ENSURE SMOOTH FINISH WITH SANDING OR OTHER APPLICABLE HANDWORK NEEDED TO PROVIDE SMOOTH AND CONSISTENT APPEARANCE.
- 9.7. INSTALL A GROUNDING ROD FOR ALL VERTICAL METAL ELEMENTS TALLER THAN 1800MM IN HEIGHT.
- 9.8. ENSURE SHOP DRAWINGS WITH PICKETS OR RAILINGS COMPLY WITH BC BUILDING CODE REQUIREMENTS (I.E. RAILING HEIGHT, PICKET SPACING).
- 9.9. POWDERCOAT APPLICATIONS: ENSURE METAL IS PRETREATED (I.E. GALVANIZED) OR ALTERNATE PROTECTION PROCESS PRIOR TO POWDER COATING. CONFIRM VIA SHOP DRAWING.
- 9.10. REFER TO PROJECT SPECIFICATIONS FOR FURTHER INFORMATION.

10. WOOD

- 10.1. SUBMIT SHOP DRAWINGS FOR WOOD WORKS (I.E. BENCHES AND DECKING). REFER TO SPECIFICATIONS.
- 10.2. SUBMIT ONE (1) SAMPLE OF THE WOOD TYPE SPECIFIED FOR THE PROJECT FOR CONFIRMATION OF COLOUR AND FINISH PRIOR TO FABRICATION AND INSTALLATION.
- 10.3. ENSURE WOOD DOES NOT CRACK OR SPLINTER WITH FASTENER CONNECTIONS. PRE-DRILL AND COUNTERSINK AS NEEDED TO PROVIDE SMOOTH CONNECTIONS, UNLESS SPECIFIED OTHERWISE.
- 10.4. ENSURE WOOD IS FREE OF SPLINTERS, SLIVERS, AND INCONSISTENCIES.
- 10.5. ENSURE WOOD IS FREE OF DEFECTS THAT COULD IMPACT STRUCTURAL INTEGRITY.
- 10.6. ENSURE WOOD HAS NO EXPOSED SHARP EDGES. SAND SMOOTH UNLESS SPECIFIED OTHERWISE.
- 10.7. TREAT CUTS WITH SPECIFIED WOOD PRESERVATIVE SOLUTION OR APPROVED ALTERNATE.
- 10.8. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

11. DRAINAGE

- 11.1. SUBMIT SHOP DRAWINGS FOR REVIEW OF ALL SPECIFIED DRAINAGE FEATURES. THIS APPLIES TO PRE-MANUFACTURED PRODUCTS AND CUSTOM DETAILS. INCLUDE INSTALLATION GUIDES WHEN AVAILABLE BY MANUFACTURER.

12. SITE FURNISHINGS

- 12.1. SUBMIT SHOP DRAWINGS FOR REVIEW OF ALL SPECIFIED SITE FURNISHINGS. THIS APPLIES TO PRE-MANUFACTURED PRODUCTS AND CUSTOM DETAILS. INCLUDE COLOUR AND FINISH INFORMATION WITH DRAWINGS, INCLUDING INFORMATION ON ALL FASTENERS. INCLUDE INSTALLATION GUIDES WHEN AVAILABLE BY MANUFACTURER.

13. SOFT LANDSCAPES

- 13.1. SOFT LANDSCAPE SUPPLY, SUBMITTALS, PREPARATION AND EXECUTION TO COMPLY WITH CANADIAN LANDSCAPE STANDARD (BRITISH COLUMBIA). FULL DOCUMENT APPLIES.
- 13.2. ENSURE CONTRACTOR INSTALLING SOFT LANDSCAPES HAS A CURRENT COPY OF THE CANADIAN LANDSCAPE STANDARD (BRITISH COLUMBIA) PRESENT ON SITE.
- 13.3. SUBMIT REQUEST FOR REVIEW BY CONSULTANT OF SITE SOFT LANDSCAPE FINE GRADING PRIOR TO INSTALLATION OF SOD OR SEED.
- 13.4. PLANTS AND TREES:
 - 13.4.1. PROVIDE CONSULTANT WITH OPPORTUNITY TO REVIEW PLANT STOCK AT NURSERY PRIOR TO SHIPMENT TO SITE. CONSULTANT RESERVES RIGHT TO REJECT STOCK ON SITE WHEN INCONSISTENT FROM NURSERY SAMPLE STOCK. PROVIDE CONSULTANT OPPORTUNITY TO REVIEW TREES AT NURSERY AND TAG PREFERRED TREE STOCK FOR THE PROJECT THAT COMPLIES WITH DRAWING SIZE, SPECIES, AND FORM. ONE (1) WEEK NOTICE IS REQUIRED FOR NURSERY REVIEW.
 - 13.4.2. GROWING MEDIUM TO BE "LEVEL 2 GROOMED, 2P" AS PER CHART T-6.3.5.1 IN CHAPTER 6 OF THE CANADIAN LANDSCAPE STANDARD. GROWING MEDIUM DEPTHS AS PER CONSTRUCTION DETAILS.
 - 13.4.3. SUBMIT GROWING MEDIUM REPORT FOR REVIEW PRIOR TO ORDER OR INSTALLATION. REPORT TO MATCH TABLE 6.3.5.3 "PROPERTIES OF GROWING MEDIA FOR LEVEL 2 'GROOMED' AREAS". ADDITIONAL GROWING MEDIUM REPORT REQUIREMENTS ARE PROVIDED IN PROJECT SPECIFICATIONS.
- 13.5. MULCH:
 - 13.5.1. TO BE COMPOSTED BARK, BROWN (NOT RED) IN COLOUR.
 - 13.5.2. MULCH TO BE COMPLIANT WITH CANADIAN LANDSCAPE STANDARDS, PAGE 132, TABLE T-10.1.
 - 13.5.3. A ONE (1) LITRE MULCH SUBMITTAL IS REQUIRED FOR APPROVAL PRIOR TO PURCHASE AND INSTALLATION. DEPTH OF MULCH TO BE 75MM AFTER SETTLEMENT WITH COMPLETE COVERAGE.
 - 13.5.4. PROVIDE MULCH RING OF 1.2M DIAMETER AND COMPLIANT WITH BC LANDSCAPE STANDARDS FOR EACH NEW TREE.
 - 13.5.5. PROVIDE CONTINUOUS MULCH FOR SHRUB AND GROUND COVER BEDS SO THAT PLANTS HAVE 100% COMPLETE COVERAGE OF ROOT ZONES. COMPLETE FROM PLANT TO PLANT.
 - 13.5.7. DO NOT BURY PLANTS WITH MULCH. KEEP MULCH AWAY FROM SHRUB STEMS AND TREE TRUNKS.
- 13.6. LAWNS:
 - 13.6.1. SUBMIT SEED CERTIFICATES FOR REVIEW PRIOR TO PURCHASE. SEED MIX TO BE "CHAFFER BEETLE RESISTANT LAWN MIX" UNLESS SPECIFIED OTHERWISE. ENSURE SEED IS NO. 1 TURFGRASS AND NO 1. CANADIAN SEED AS PER CANADIAN LANDSCAPE STANDARD (BRITISH COLUMBIA). UNLESS OTHERWISE SPECIFIED, GROWING MEDIUM TO BE "LEVEL 2 GROOMED, 2P" AS PER CHART T-6.3.5.1 IN CHAPTER 6 OF THE CANADIAN LANDSCAPE STANDARD. MINIMUM 150MM DEPTH REQUIRED FOR INSTALLATION UNLESS NOTED OTHERWISE.
 - 13.6.3. SUBMIT GROWING MEDIUM REPORT FOR REVIEW PRIOR TO ORDER OR INSTALLATION. REPORT TO MATCH TABLE 6.3.5.3 "PROPERTIES OF GROWING MEDIA FOR LEVEL 2 'GROOMED' AREAS". ADDITIONAL GROWING MEDIUM REPORT REQUIREMENTS ARE PROVIDED IN PROJECT SPECIFICATIONS.
 - 13.6.4. ENSURE AREAS AT EDGE OF LIMIT OF CONSTRUCTION ARE APPROPRIATELY BLENDED TO MEET EXISTING UNDISTURBED LAWNS. PROVIDE A MINIMUM 50MM IMPORTED GROWING MEDIUM TO BLEND PROPERLY. PROVIDE ADDITIONAL GROWING MEDIUM AS NEEDED.
 - 13.6.5. COMPLETE ESTABLISHMENT (MINIMUM TWO CUTS) REQUIRED AS PER CANADIAN LANDSCAPE STANDARD (BRITISH COLUMBIA).
- 13.7. THE CONSULTANT MAY REQUEST, AT THE CONTRACTOR'S EXPENSE, UP TO TWO TESTS OF GROWING MEDIUM IF SUSPECTED INCONSISTENCIES APPEAR. TESTS SAMPLES WILL BE SUBMITTED TO PACIFIC SOIL ANALYSIS INC. IN RICHMOND BC. SUITE 5 11720 VOYAGUER WAY, RICHMOND, BC. V6X 3G9 OR ANOTHER APPROVED TESTING AGENCY.
- 13.8. ESTABLISHMENT MAINTENANCE AND WATERING: REFER TO SECTION 3.0 OF THESE LANDSCAPE NOTES. REFER TO EXTERIOR MAINTENANCE SPECIFICATION.
- 13.9. WARRANTY: REFER TO SECTION 3.0 OF THESE LANDSCAPE NOTES.
- 13.10. REFER TO SPECIFICATIONS AND DRAWINGS FOR ADDITIONAL INFORMATION.

File: G:\Projects\32000\32000\32345_RDO_N_Jack_Bagley_Park_Redevelopment\02_CADD\00_Drafting\201_Production_Sheets\32345_SH_Cover.dwg

PLOT DATE: October 5, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD
A	75% DETAILED DESIGN	2021-04-26	JO	AR
B	95% DETAILED DESIGN/ BP	2021-07-12	JO	AR
C	ISSUED FOR TENDER/ REISSUED FOR BP	2021-09-17	JO	AR
D	ISSUED FOR TENDER	2021-10-05	JO	AR



**JACK BAGLEY PARK REDEVELOPMENT
LANDSCAPE NOTES**

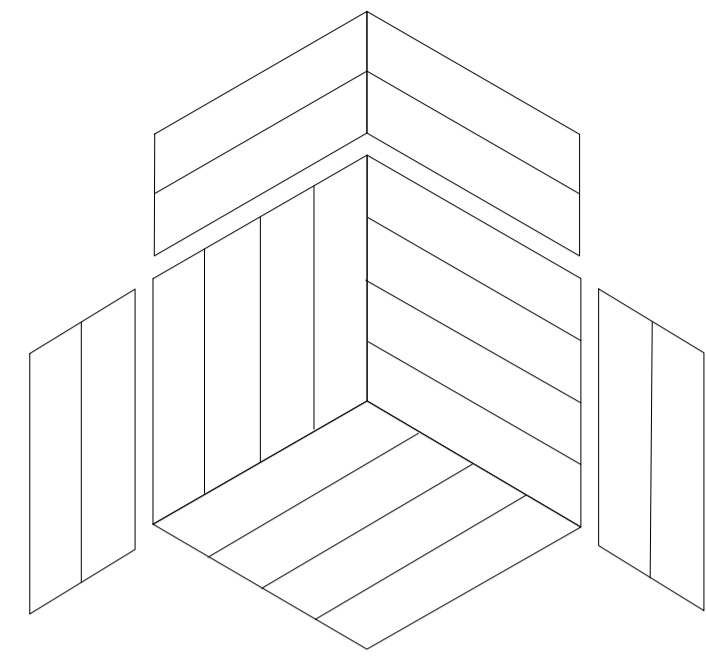
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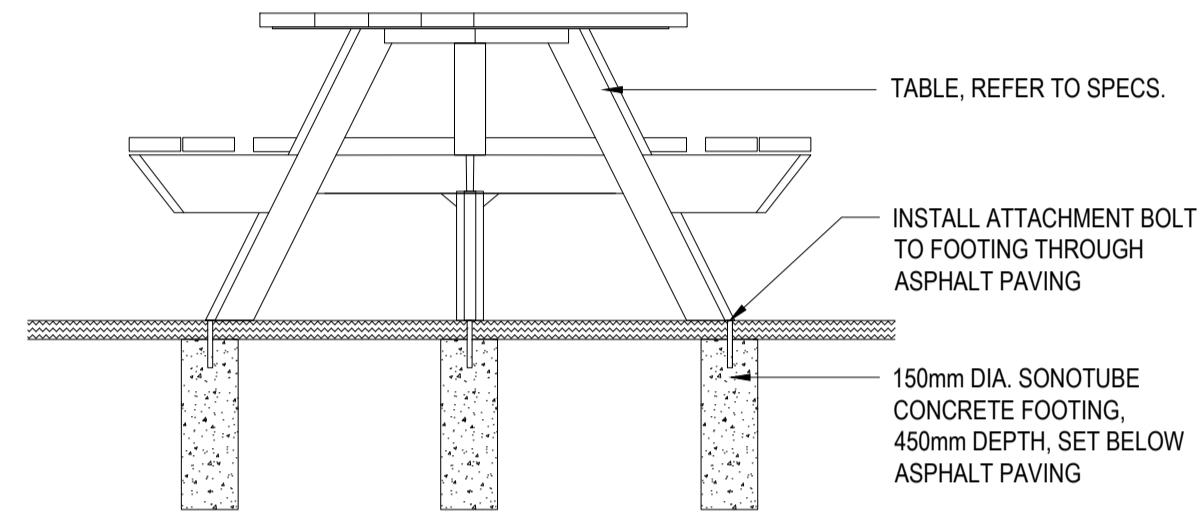
ISSUED FOR TENDER DESIGN NO.

SCALE	DATE	Oct-21	DWG. NO.
DRAWN BY	JO	DESIGN BY	AR
CHECKED BY	AR	APPROVED BY	AR
			REV. D

32345



TOP VIEW

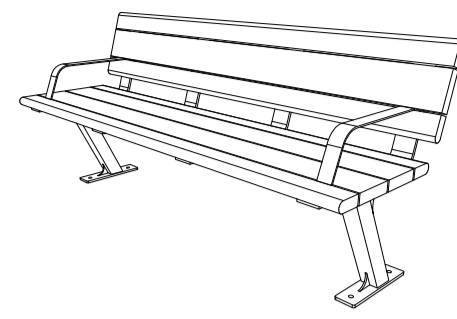


SIDE ELEVATION

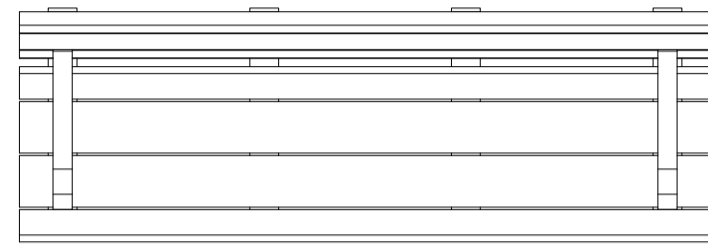
SUPPLIER: WISHBONE
MAKE: BAYVIEW HEXAGONAL PICNIC TABLE W/C
MODEL: BVHPTWC-84

1 PICNIC TABLE
L-10 PLAN - SECTION - ELEVATION

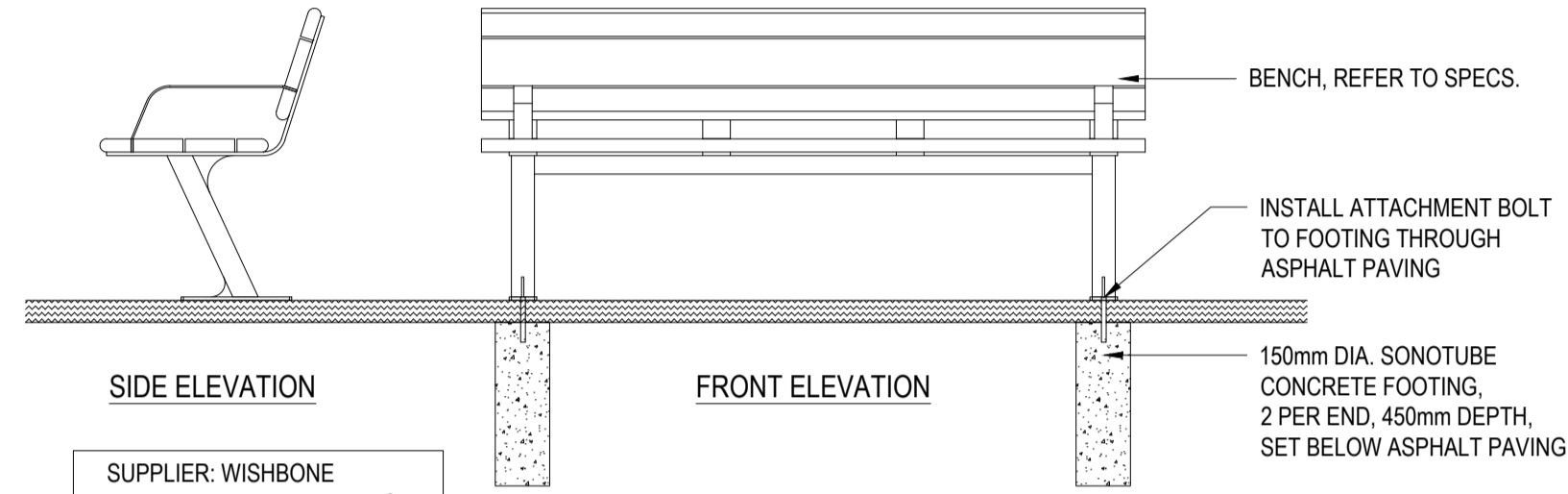
NTS



ISOMETRIC VIEW



TOP VIEW



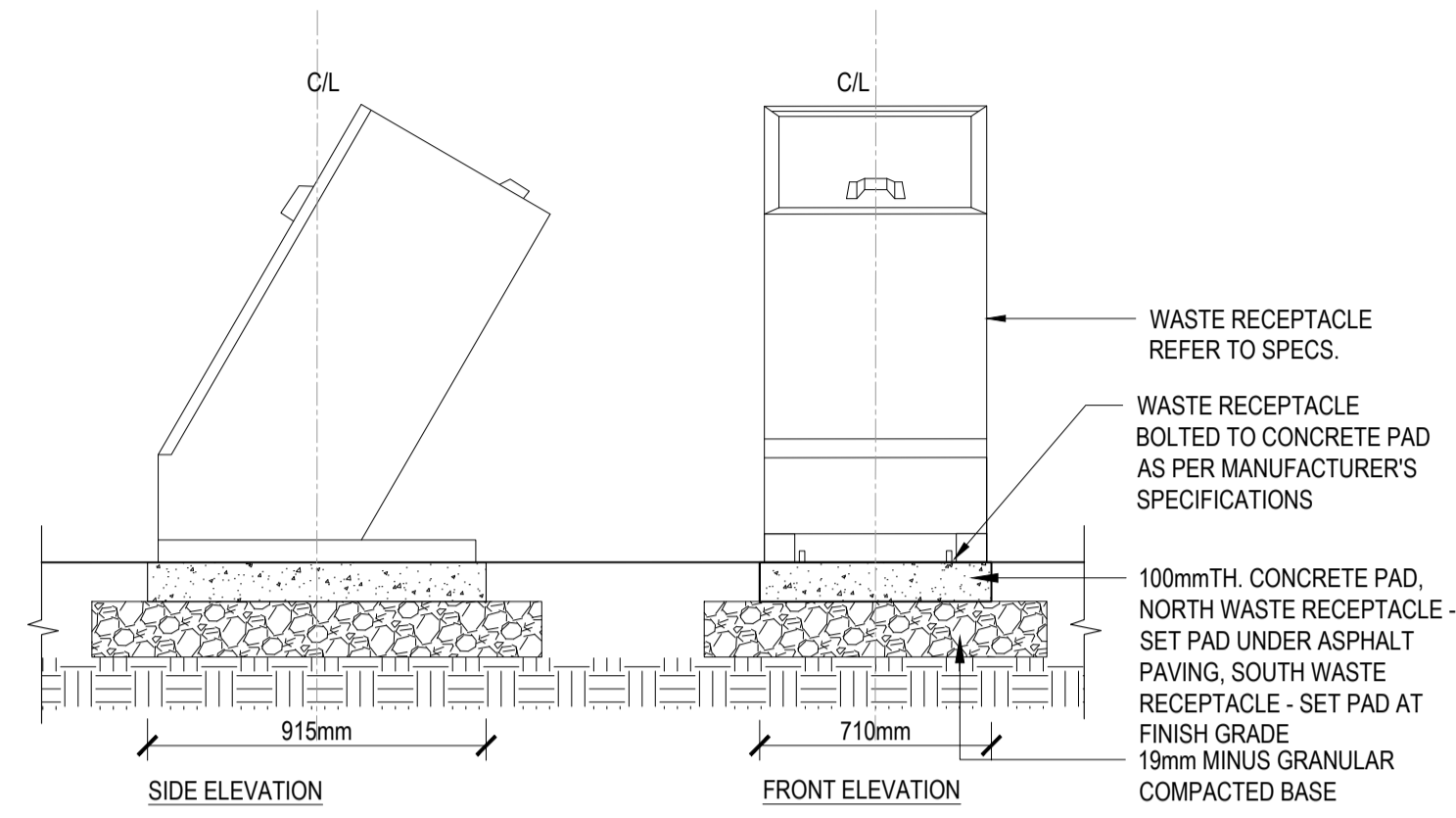
SIDE ELEVATION

FRONT ELEVATION

SUPPLIER: WISHBONE
MAKE: BAYVIEW PARK BENCH
MODEL: BV-6 WITH ARMRESTS

2 BENCH
L-10 PLAN - SECTION - ELEVATION

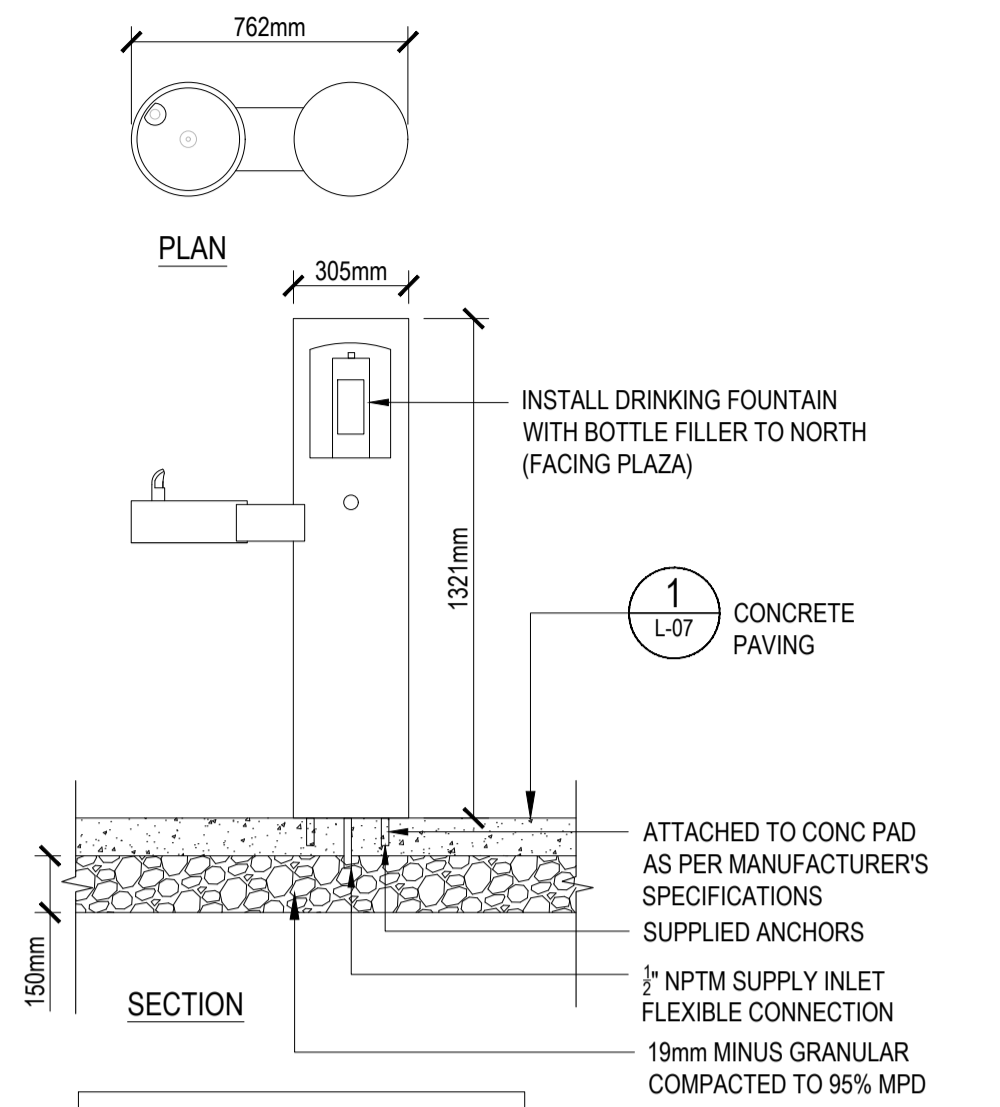
NTS



SUPPLIER: HAUL-ALL
MAKE & MODEL: HBIS-STANDARD SP-HBIS-N

3 WASTE RECEPTACLE
L-10 ELEVATION

SCALE 1:20



SUPPLIER: MURDOCK
MAKE: GY SERIES
MODEL: GYM74
NOTES: STOP VALVE NOT PROVIDED - VALVE SPECIFICATIONS: MINIMUM/ MAXIMUM PRESSURE 30 TO 100 PSI

4 DRINKING FOUNTAIN
L-10 ELEVATION

SCALE 1:20

PLOT DATE: October 5, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD
A	75% DETAILED DESIGN	2021-04-26	JO	AR
B	95% DETAILED DESIGN/ BP	2021-07-12	JO	AR
C	ISSUED FOR TENDER/ REISSUED FOR BP	2021-09-17	JO	AR
D	ISSUED FOR TENDER	2021-10-05	JO	AR



JACK BAGLEY PARK REDEVELOPMENT
DETAILS - FURNISHINGS



#503, 4190 Loughheed Hwy, Burnaby, B.C. V5C 6A8
T: (604)293-2096 F: (604)293-2698

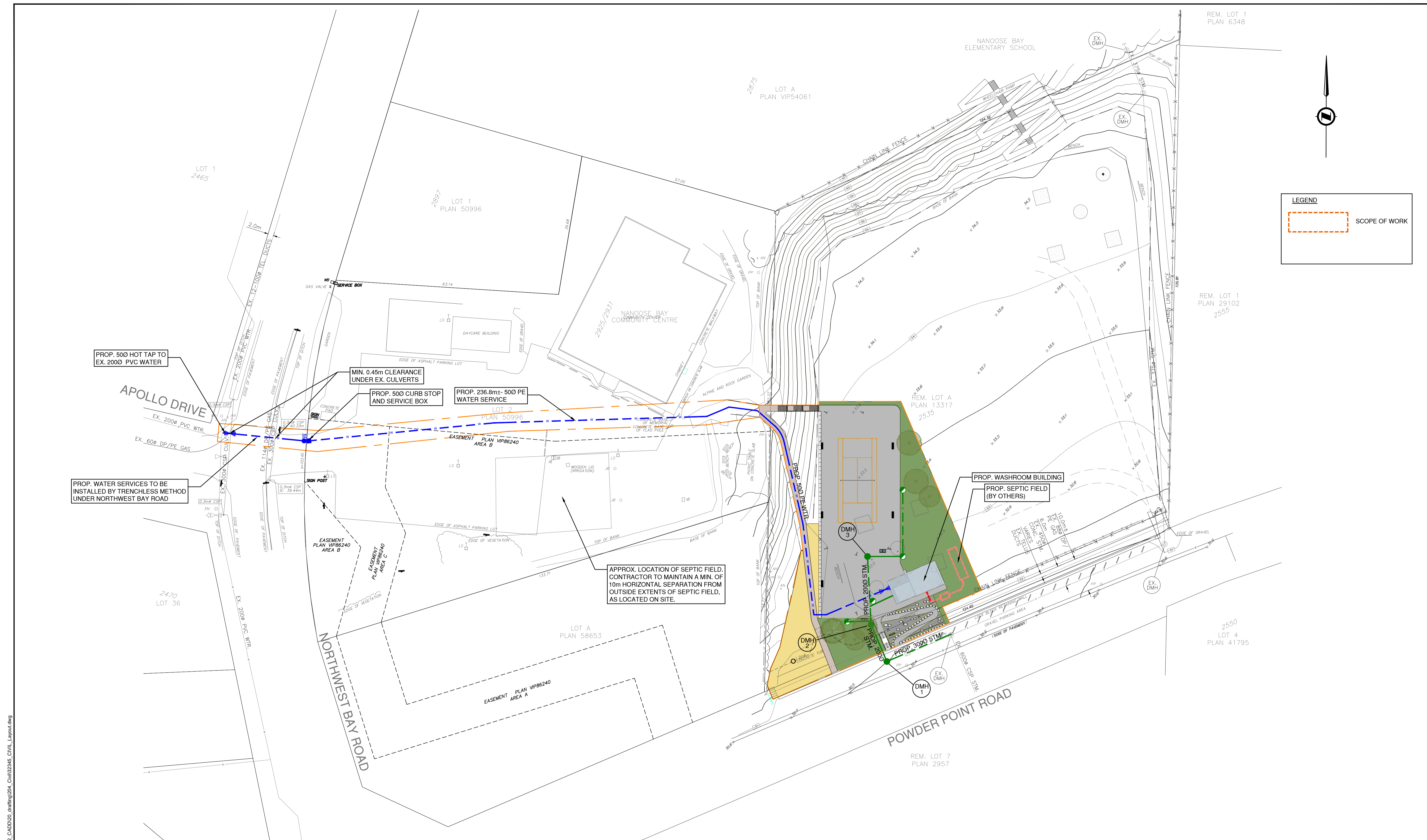
ISSUED FOR TENDER DESIGN NO.

SCALE	DATE	DATE	DWG. NO.
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DRAWN BY: JO	DESIGN BY: AR		OF 37
CHECKED BY: AR	APPROVED BY: AR		REV. D

32345

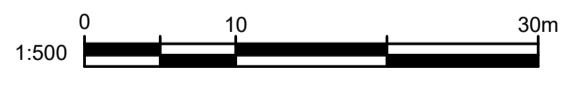
DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: C:\Projects\32300\32300\32300\32345_RDen_Jack_Bagley_Park_Redevelopment\02_CADD\00_Drafting\201_Production_Sheets\32345_SH_Details.dwg



LEGEND

— SCOPE OF WORK



PLOT DATE: September 17, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD	OWNER
A	75% DETAILED DESIGN	2021-04-12	NL	IM	
B	95% DETAILED DESIGN/BP	2021-07-13	NL	IM	
C	ISSUED FOR TENDER/ REISSUED FOR BP	2021-09-17	NL	IM	



JACK BAGLEY PARK REDEVELOPMENT

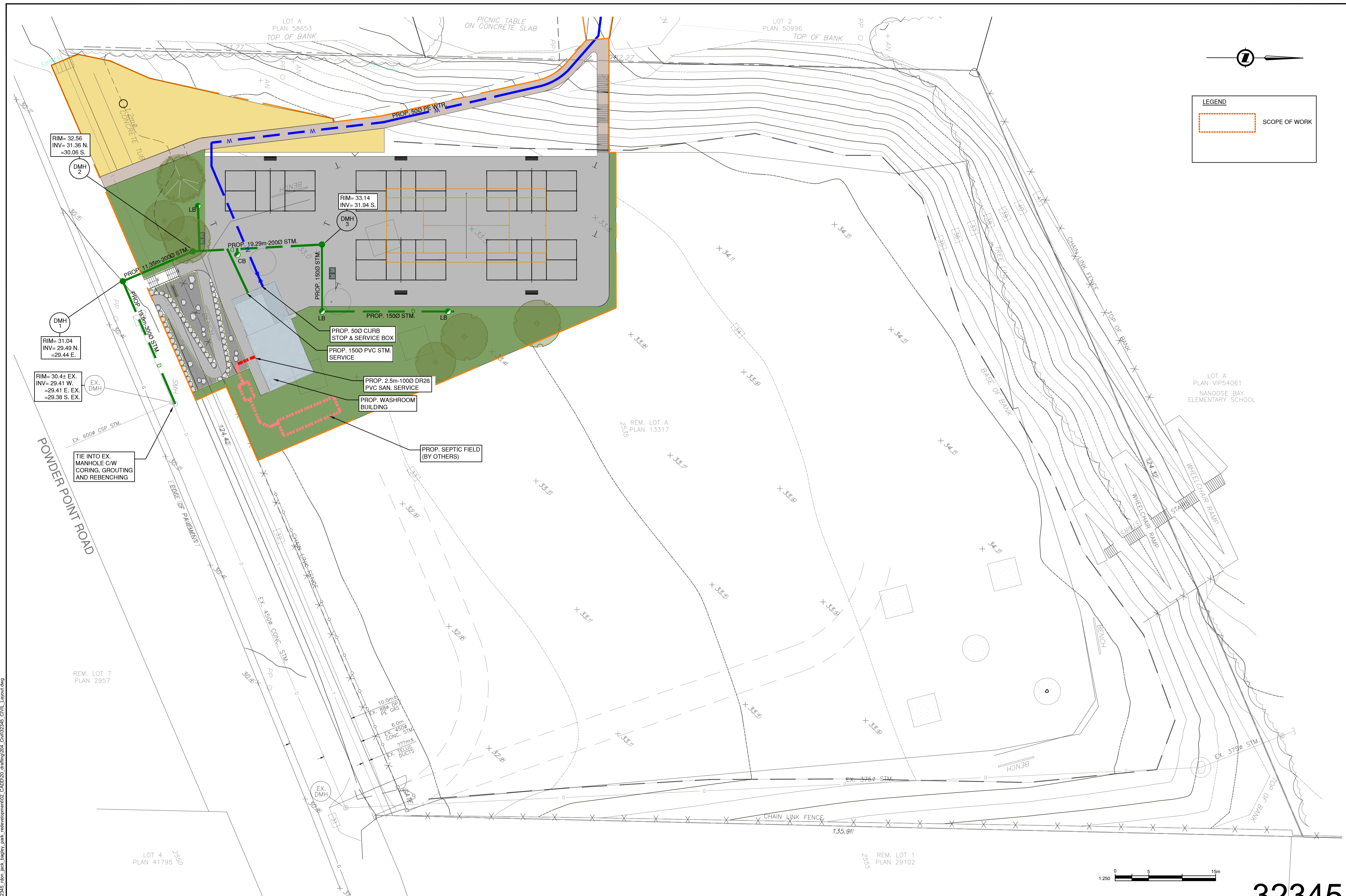
CIVIL SITE SERVICING PLAN 1



SCALE	1:500	DATE	Sep-21	DWG. NO.
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CHECKED BY	IM	APPROVED BY	IM	OF 37
				REV. C

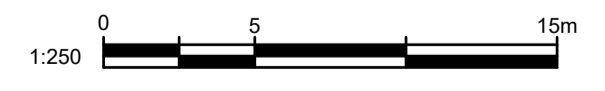
ISSUED FOR TENDER/ REISSUED FOR BP DESIGN NO.

32345



LEGEND

SCOPE OF WORK



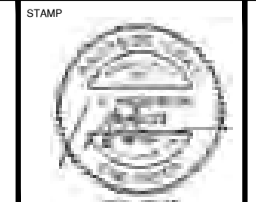
PLOT DATE: September 17, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD	OWNR
A	75% DETAILED DESIGN	2021-04-12	NL	IM	
B	95% DETAILED DESIGN/BP	2021-07-13	NL	IM	
C	ISSUED FOR TENDER/ REISSUED FOR BP	2021-09-17	NL	IM	



JACK BAGLEY PARK REDEVELOPMENT

CIVIL SITE SERVICING PLAN 2



#201, 3999 Herring Drive, Burnaby, B.C. V5C 6P9
T: (604)629-2696 F: (604)629-2698

SCALE	1:250	DATE	Sep-21	DWG. NO.
DRAWN BY	NL	DESIGN BY	IM	C-02
CHECKED BY	IM	APPROVED BY	IM	37

32345

GENERAL NOTES:

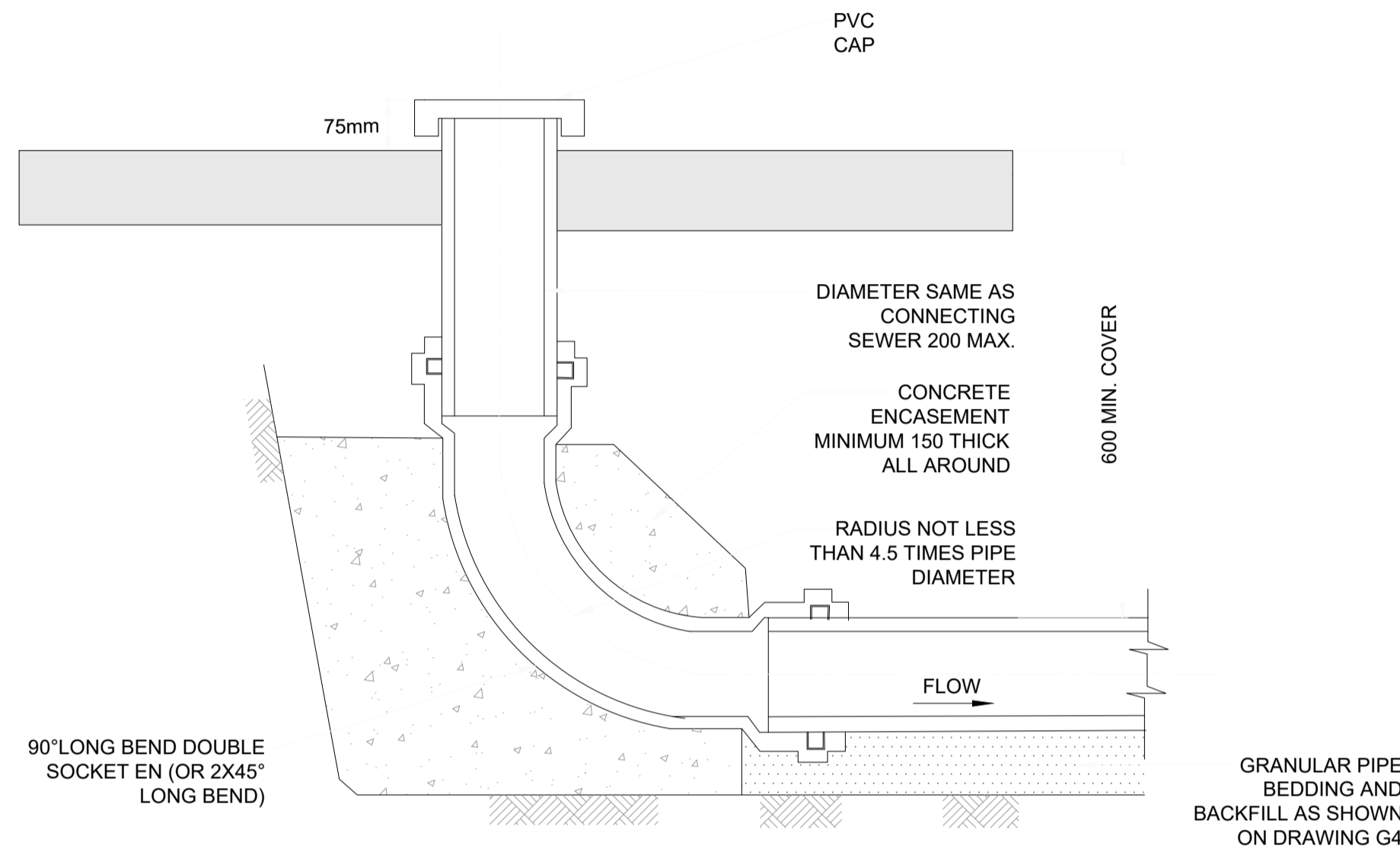
1. THE CONTRACTOR SHALL OBTAIN ALL PERMITS TO UNDERTAKE THE WORKS FROM APPLICABLE AUTHORITIES.
2. ALL DAMAGED OR DISTURBED AREAS OUTSIDE OF THE WORK ZONE TO BE REPAIRED OR REPLACED TO EXISTING OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE.
3. ALL SHOP DRAWINGS AND MATERIAL SPECIFICATIONS TO BE PROVIDED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION OR ORDERING. FABRICATION OR ORDERING SHALL NOT PROCEED WITHOUT REVIEWED SHOP DRAWINGS.
4. ALL DIMENSIONS IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE. ALL ELEVATIONS ARE GIVEN IN METERS (m) UNLESS NOTED OTHERWISE. COORDINATES ARE GROUND LEVEL (UTM NAD 83) AND ALL ELEVATIONS ARE TO GEODETIC DATUM.
5. ANY ALTERNATIVES TO SPECIFIED MATERIALS TO BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT SURVEY.

STORM AND SANITARY NOTES:

1. MINIMUM COVER ON SERVICES AND LEADS TO BE 0.6m. MINIMUM COVER ON STORM MAINS TO BE 1.2m.
2. CATCHBASIN LEADS TO HAVE MINIMUM 2.0% GRADE. CATCHBASIN LEAD TO BE 150Ø DR28 PVC.
3. ALL LAWN BASIN LEADS AND SERVICE CONNECTIONS TO BE 100Ø DR28 PVC UNLESS NOTED OTHERWISE ON THE DRAWINGS. LAWN BASIN AND SERVICE CONNECTION LEADS TO HAVE A MINIMUM 1.0% GRADE.
4. ALL SANITARY SERVICE CONNECTIONS TO BE 100Ø DR28 PVC UNLESS NOTED OTHERWISE. SANITARY SERVICE CONNECTIONS TO HAVE A MINIMUM 2.0% GRADE.
5. ALL CONNECTIONS TO NEW PIPES SHALL BE ACCOMPLISHED WITH MANUFACTURED WYE BRANCHES. SERVICE CONNECTIONS FOUND AFTER STORM MAIN INSTALLATION AND ALL CONNECTIONS TO EXISTING PIPES SHALL BE ACCOMPLISHED WITH INSERT A-TEE, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
6. ALL COUPLERS FOR PIPES UNDER 200Ø TO BE MADE WITH STAINLESS SHEAR BAND TYPE.
7. ALL NEW STORM MAIN OVER 200Ø TO BE VIDEO INSPECTED.
8. ALL STORM MANHOLES ARE TO HAVE 500mm SUMPS UNLESS NOTED OTHERWISE

WATER NOTES:

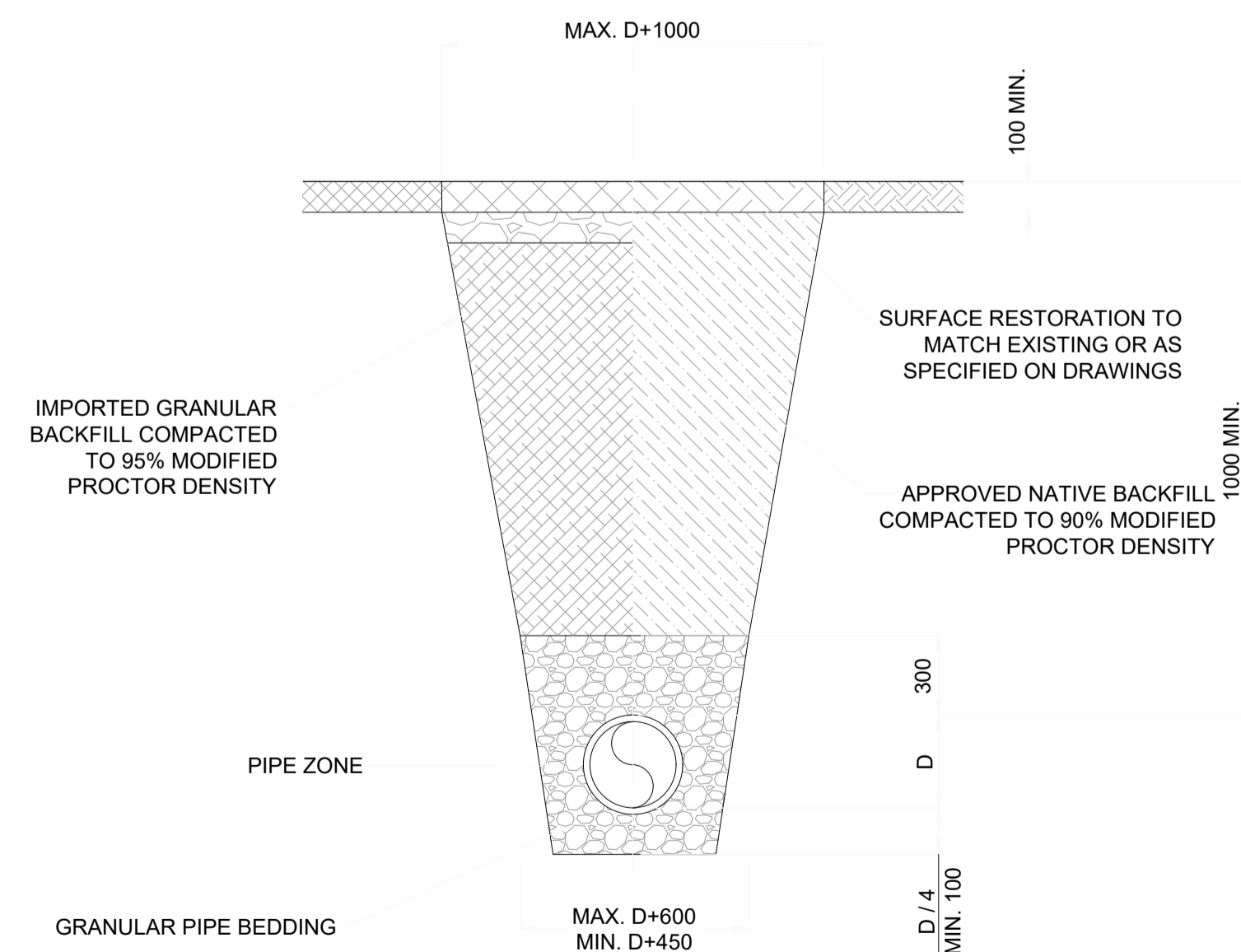
1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE MASTER MUNICIPAL CONSTRUCTION DOCUMENT AND STANDARD DETAIL DRAWINGS (MMCD 2009), PLATINUM EDITION AND THE REGIONAL DISTRICT OF NANAIMO (RDN) SPECIFICATIONS AND DETAILED DRAWINGS UNLESS OTHERWISE NOTED.
2. MINIMUM COVER OVER WATER SERVICES TO BE 1.00m UNLESS OTHERWISE NOTED.
3. ALL SERVICE CONNECTIONS TO BE POLYETHYLENE TUBING, PRESSURE CLASS 200. SERVICE CONNECTIONS TO BE 25mm DIAMETER UNLESS NOTED OTHERWISE.
4. ALL WATERMAIN JOINTS WITHIN 3.0m HORIZONTAL OR 0.45m VERTICAL SEPARATION FROM SANITARY OR STORM DRAIN MAINS AND WHERE NOTED ON THE DRAWINGS TO BE PROTECTED BY SHRINK WRAP OR PETROLEUM TAPE.
5. MAXIMUM BEND RADIUS TO ½ x MANUFACTURER'S SPECIFICATIONS.
6. THE CONTRACTOR IS NOT TO OPERATE THE WATER SYSTEM (INCLUDING OPERATING ANY VALVES), ANY WATER SHUT DOWNS ARE TO BE COORDINATED WITH THE ENGINEER AND RDN WATER OPS.
7. CONNECTIONS TO LIVE AND EXISTING WATER SYSTEMS ARE TO BE MADE UNDER THE SUPERVISION OF THE ENGINEER AND RDN.
8. ALL TIE-IN LOCATIONS AND ELEVATIONS ARE TO BE CONFIRMED IN THE FIELD BY THE CONTRACTOR.
9. ALL NEW WATER SERVICES TO UNDERGO PRESSURE AND LEAKAGE TEST WITH A MINIMUM APPLIED PRESSURE OF 1380 Kpa FOR 2 HOURS AS PER AWWA C605.
10. ALL NEW WATER SERVICES TO BE DISINFECTED AND FLUSHED AS PER AWWA C651.



SANITARY / STORM TERMINAL CLEANOUT

SCALE: NTS

ROAD, LANES AND WALKWAYS (TYPICAL) BOULEVARDS AND EASEMENTS (TYPICAL)



UTILITY TRENCH

SCALE: NTS

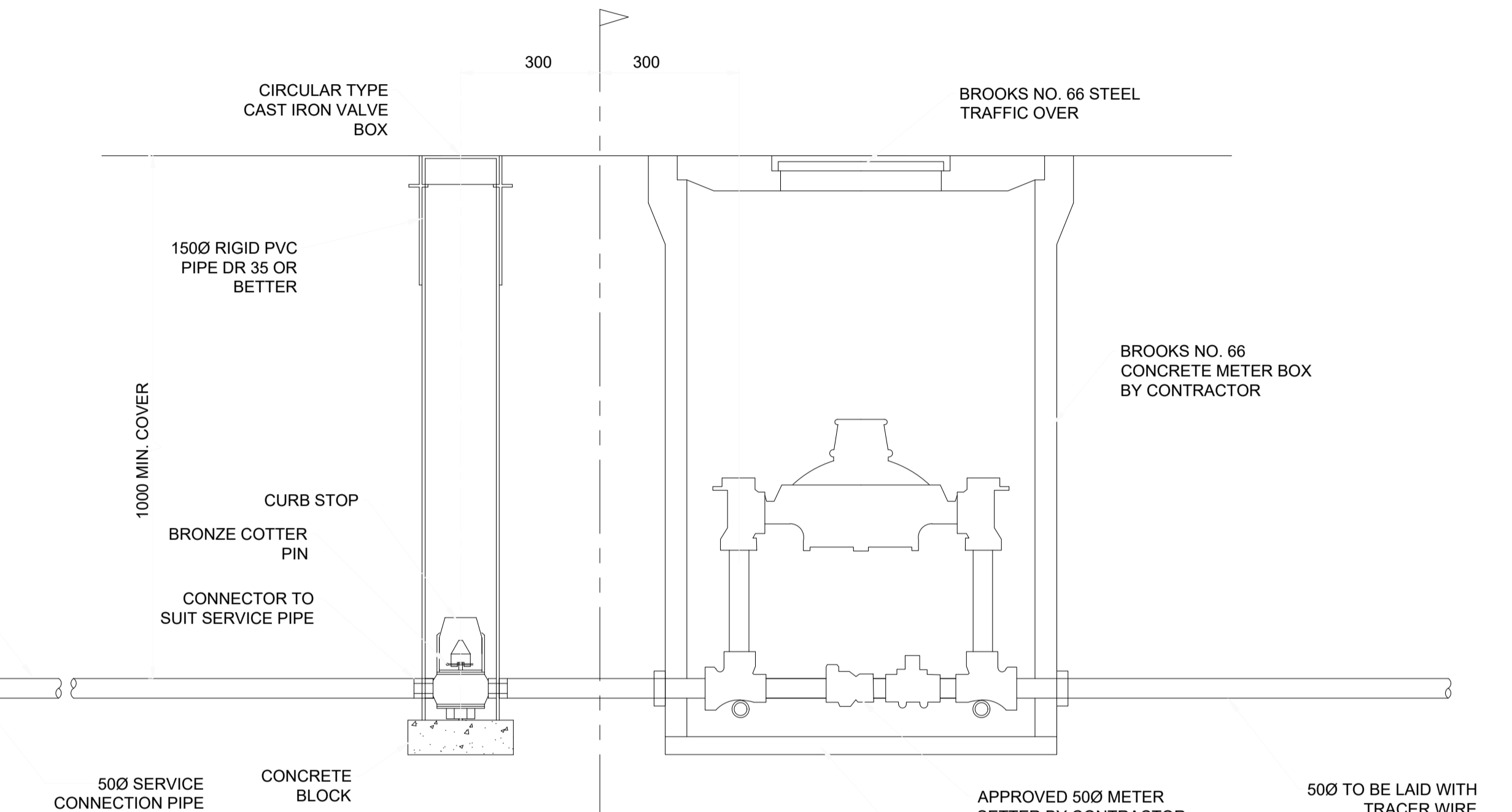
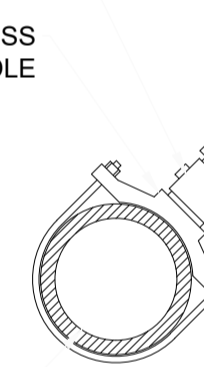
WATER SERVICES TO BE INSTALLED BY TRENCHLESS METHOD UNDER NORTHWEST BAY ROAD

HORIZONTAL "GOOSE NECK" IN UNIFORM GRADIENT SECTION

CORPORATION STOP

DOUBLE STRAP STAINLESS STEEL SADDLE

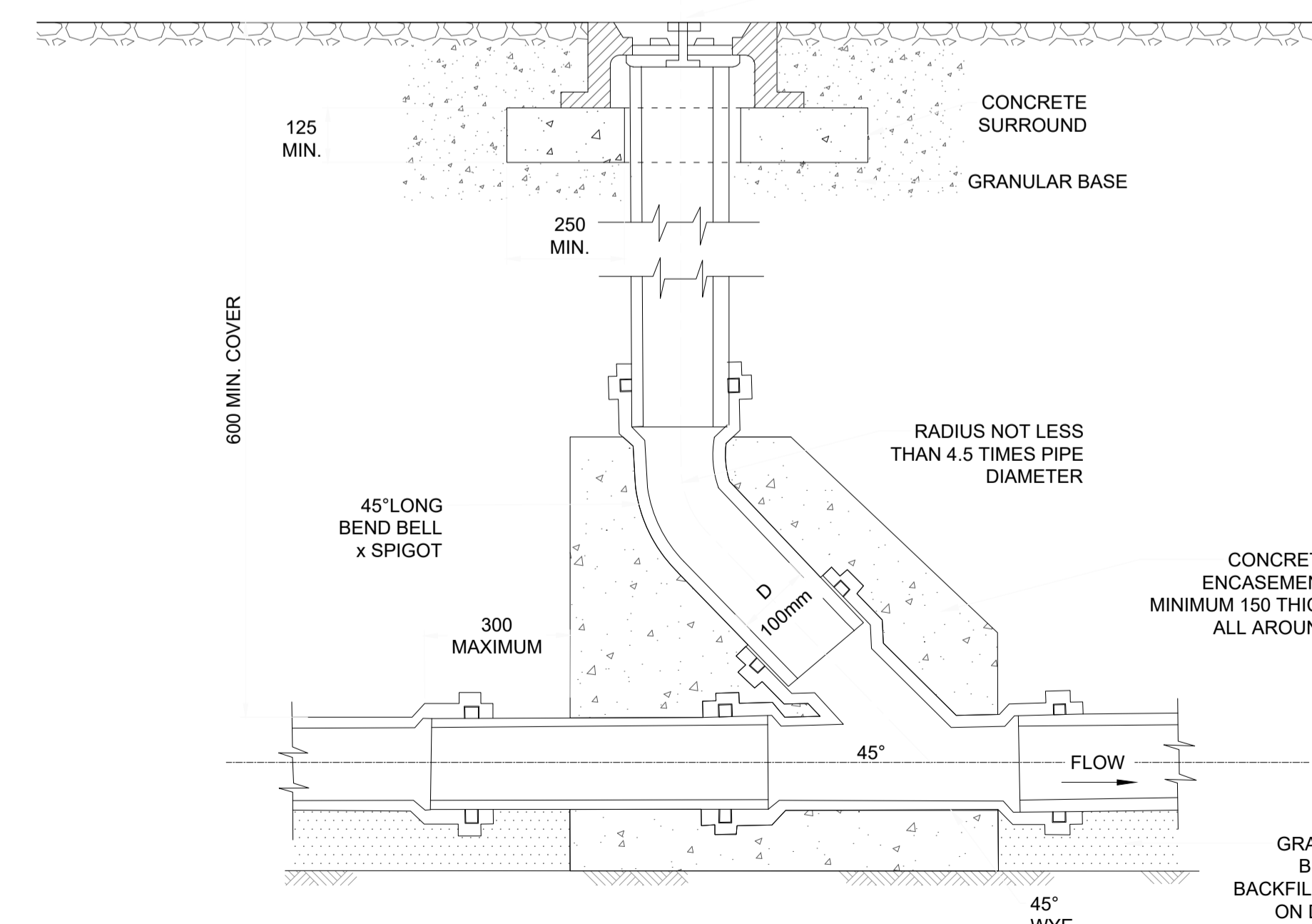
EX. 200Ø PVC WATER



WATER SERVICE CONNECTION CURB STOP VALVE

SCALE: NTS

DOBNEY 200 CLEANOUT



SANITARY/ STORM MID BLOCK CLEANOUT

SCALE: NTS

ISSUED FOR TENDER/ REISSUED FOR BP

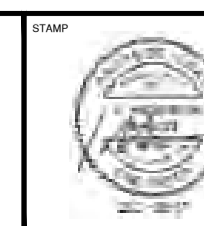
DESIGN NO.

32345

REV NO	REVISIONS	DATE	DRAWN	APPRD	OWNER
A	75% DETAILED DESIGN	2021-04-26	NL	IM	
B	95% DETAILED DESIGN/BP	2021-07-13	NL	IM	
C	ISSUED FOR TENDER/ REISSUED FOR BP	2021-09-17	NL	IM	



JACK BAGLEY PARK REDEVELOPMENT
NOTES AND DETAILS

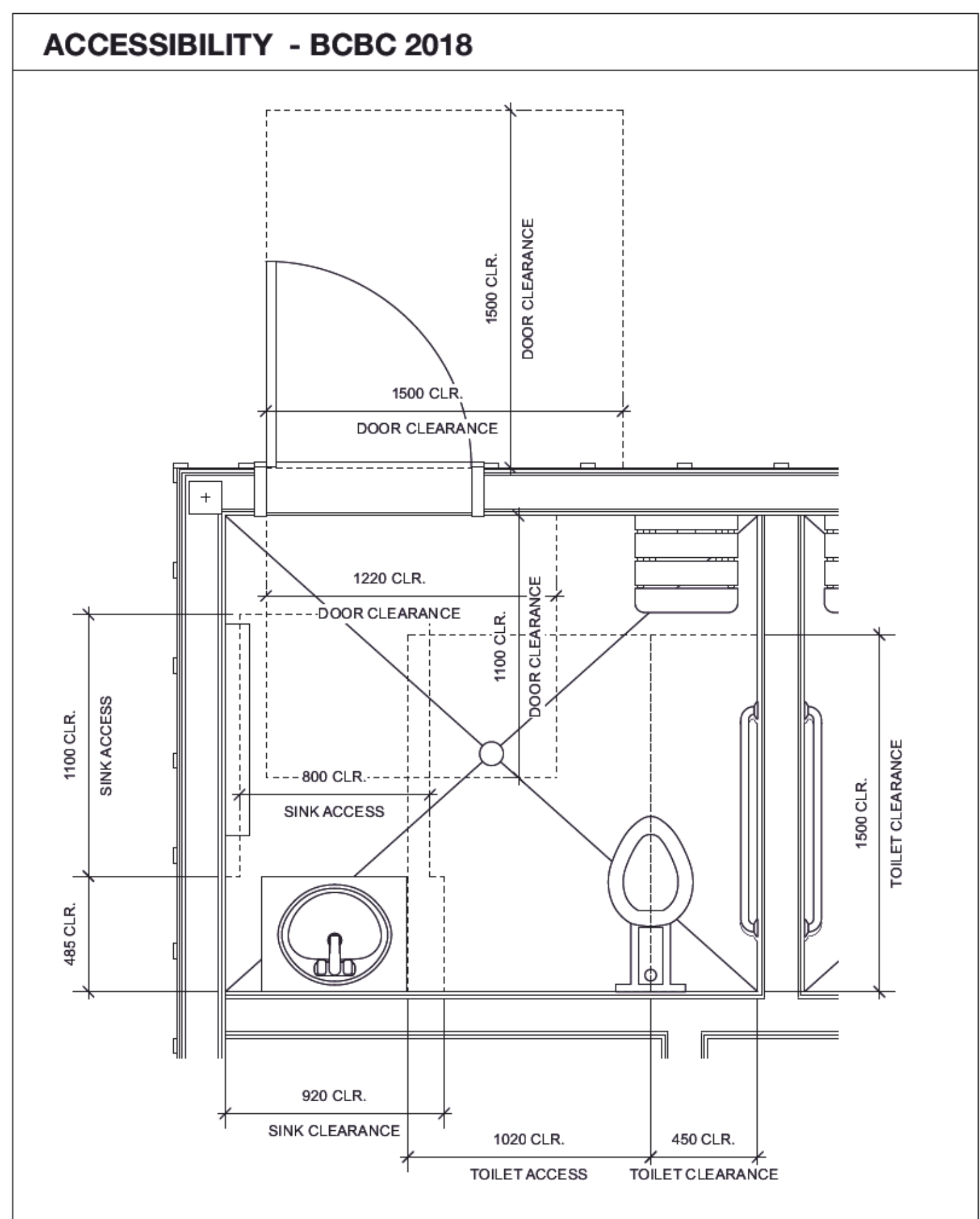


#201, 3999 Hanning Drive, Burnaby, B.C. V5C 6P9
T: (604)629-2696 F: (604)629-2698

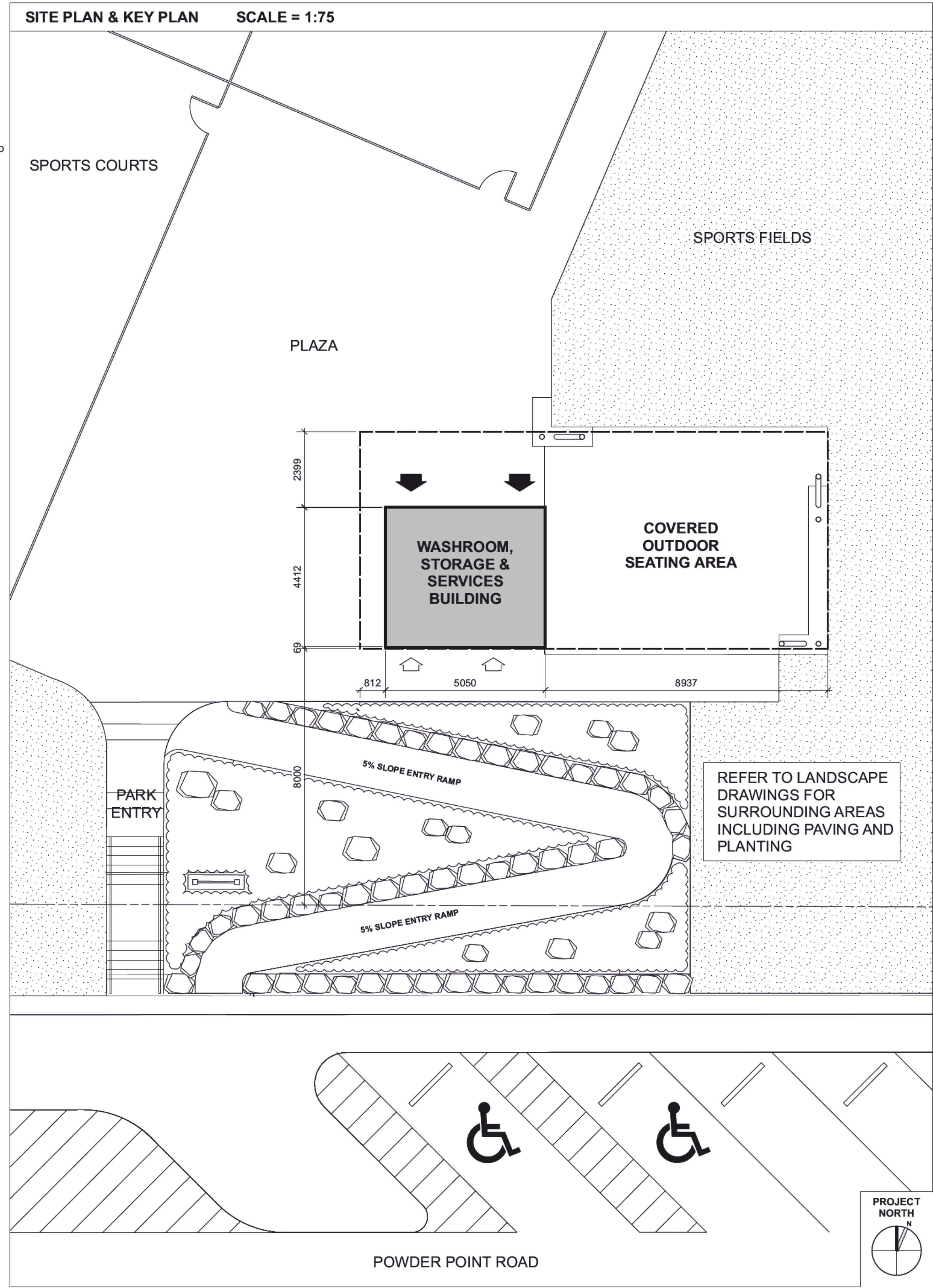
SCALE	AS SHOWN	DATE	Sep-21	DWG. NO.
DRAWN BY	NL	DESIGN BY	IM	C-03
CHECKED BY	IM	APPROVED BY	IM	OF 37
				REV. C

PROJECT DATA		
Street Address	2535 Powder Point Rd	
	Nanoose Bay, BC V9P 9E9	
Major Occupancy	Accessory to Group A Division 4	
Floor Level	1 Level	
Parking	Street parking	
Building Area	243 sf (22.6 sm)	
Building Height	4m 3s	
Dist. to Lot Line	North	112 m
	East	78 m
	South	8 m
	West	40 m
Building Separation	N/A	
OCCUPANT LOAD (BCBC 2018 - 3.1.17.1)		
Room	Net Floor Area	Occupant Load
Interior		
Washroom 1	4.5 m2	1
Washroom 2	4.5 m2	1
Service Room	3.4 m2	1
Storage Room	4.9 m2	1
TOTAL INTERIOR		4
Exterior		
Covered Outdoor Area (non-fixed seats and tables)	60.9 m2	64 (0.95 m2/person)
TOTAL EXTERIOR		64
CODE REQUIREMENTS (BCBC 2018)		
Part	Requirement	Criteria
Table 3.1.3.1	No rated fire separations	Between A-4 Major Occupancies
3.2.2.35	Sprinklers not required; roof can be heavy timber construction	Group A Division 4; Occupant Load < 1500; limiting Distance > 6m

SHEET LIST		
SHEET NO.	DRAWING TITLE	SCALE
ARCHITECTURAL		
A1.00	PROJECT DATA & SITE PLAN	1:75 @ ARCH D
A1.01	FLOOR PLAN	1:25 @ ARCH D
A1.02	ROOF PLAN	1:25 @ ARCH D
A1.10	REFLECTED CEILING PLAN	1:25 @ ARCH D
A2.01	BUILDING SECTIONS	1:25 @ ARCH D
A3.01	BUILDING ELEVATIONS	1:25 @ ARCH D
A3.02	BUILDING ELEVATIONS	1:25 @ ARCH D
A4.01	INTERIOR ELEVATIONS	1:20 @ ARCH D
A5.01	DETAILS	1:4 @ ARCH D
A5.02	DETAILS & FINISH SCHEDULE	1:4 @ ARCH D
A6.01	SCHEDULES	AS NOTED @ ARCH D



NAME	SYMBOLS	NAME	SYMBOLS
DRAWING TITLE	# DRAWING TITLE Scale #:#:#	DETAIL REFERENCE	X/XX.XX
SECTION MARKER	ELEVATION MARKER	GRID LINE	1
INTERIOR ELEVATION DETAIL REFERENCE	1 WINDOW TAG (###) 4 (A###) 2 DOOR TAG (###) 3	PLAN ELEVATION MARKER	###
ELEVATION MARKER	00.000	REVISION NUMBER	#
NOTES	1	ROOM NUMBER	00-000
NORTH ARROW		HEIGHT MARKER	375 TOC
		ASSEMBLY TYPE	XXX
		BUILDING GRADE	NEW GRADE 00.000 EXISTING GRADE 00.000 TO W.
		EGRESS	PRIMARY EXIT SECONDARY EXIT



Project
JACK BAGLEY PARK REDEVELOPMENT NANAIMO BC

Owner / Client
 REGIONAL DISTRICT OF NANAIMO

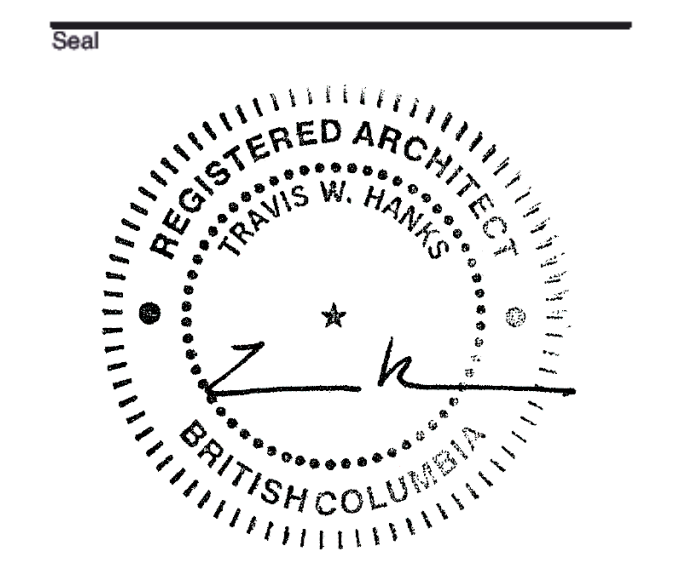
Architect



Consultant

Consultant Team

Issues / Revisions	
DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP



Sheet Title
PROJECT DATA & SITE PLAN

Project ID 2004 Drawn JR Checked TH

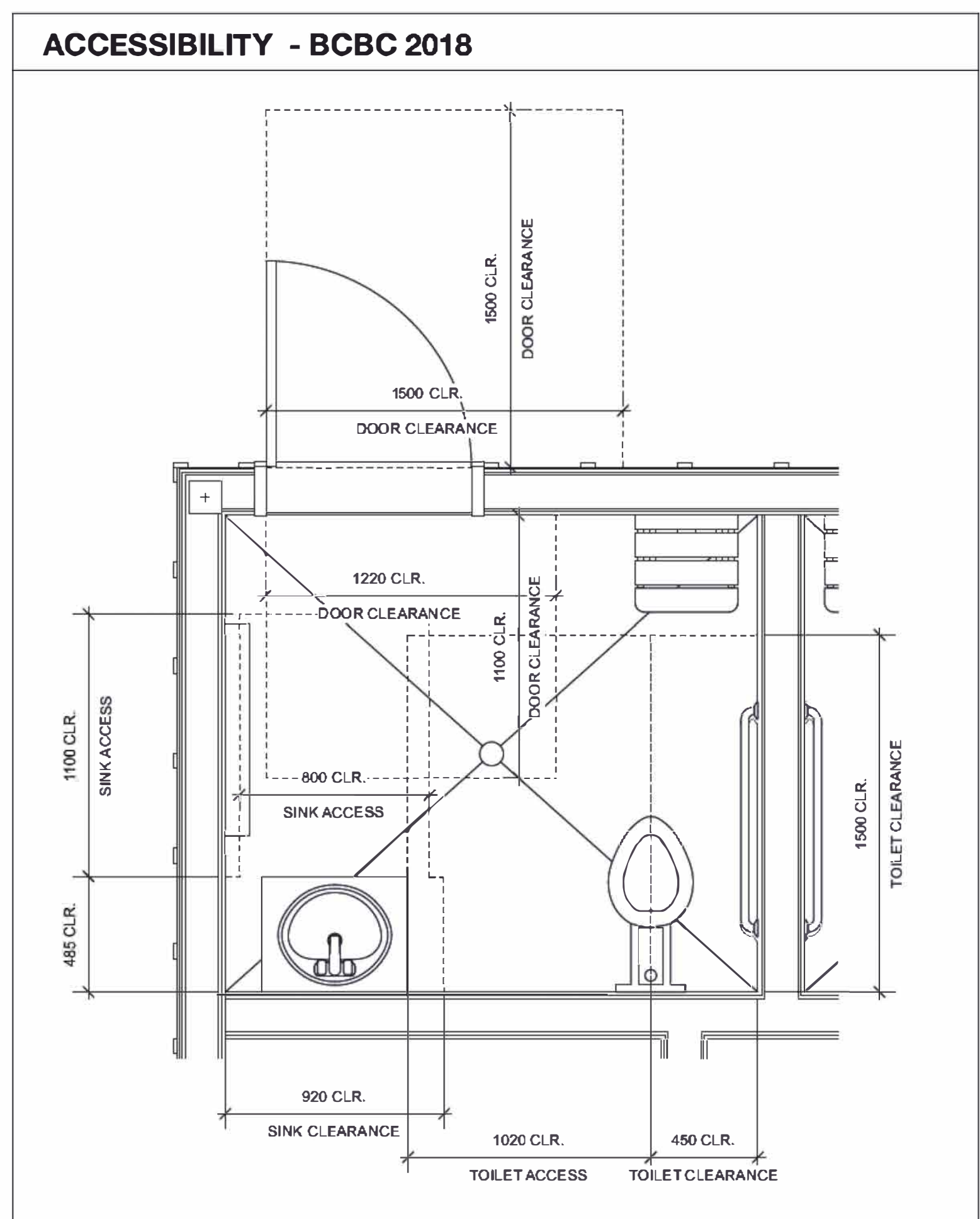
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Sheet No.

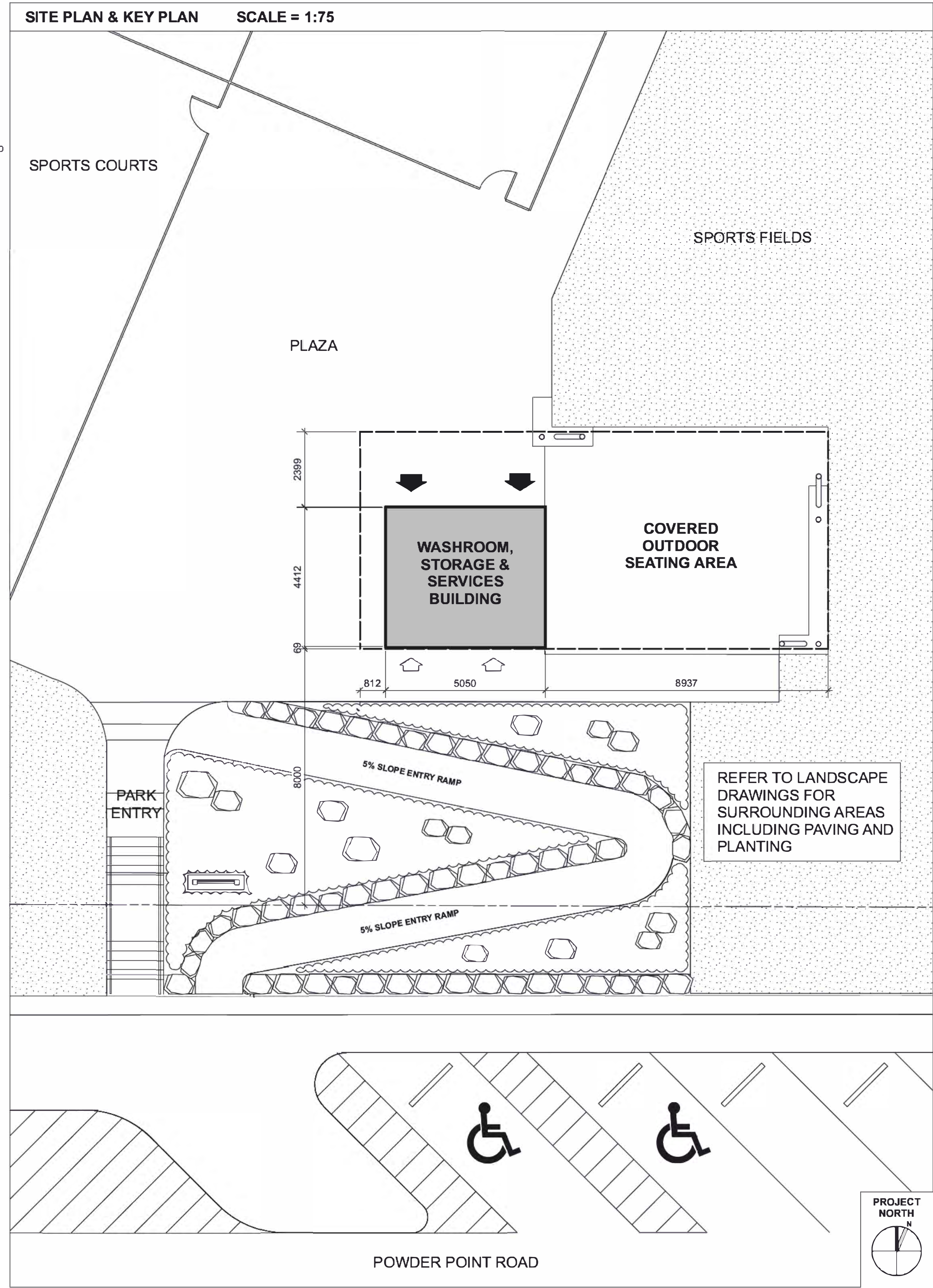
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	Nanoose Bay, BC V9P 9E9	
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	East	78 m
	South	8 m
	West	40 m
Building Separation	N/A	
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Room	Net Floor Area	Occupant Load
Interior		
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Washroom 2	4.5 m2	1
Service Room	3.4 m2	1
Storage Room	4.9 m2	1
TOTAL INTERIOR		4
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Part	Requirement	Criteria
Table 3.1.3.1	No rated fire separations	Between A-4 Major Occupancies
3.2.2.35	Sprinklers not required; roof can be heavy timber construction	Group A Division 4; Occupant Load < 1500; limiting Distance > 6m

SHEET NO.	DRAWING TITLE	SCALE
ARCHITECTURAL		
A1.00	PROJECT DATA & SITE PLAN	1:75 @ ARCH D
A1.01	FLOOR PLAN	1:25 @ ARCH D
A1.02	ROOF PLAN	1:25 @ ARCH D
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A2.01	BUILDING SECTIONS	1:25 @ ARCH D
A3.01	BUILDING ELEVATIONS	1:25 @ ARCH D
A3.02	BUILDING ELEVATIONS	1:25 @ ARCH D
A4.01	INTERIOR ELEVATIONS	1:20 @ ARCH D
A5.01	DETAILS	1:4 @ ARCH D
A5.02	DETAILS & FINISH SCHEDULE	1:4 @ ARCH D
A6.01	SCHEDULES	AS NOTED @ ARCH D



NAME	SYMBOLS	NAME	SYMBOLS
DRAWING TITLE	# DRAWING TITLE Scale: #/###	DETAIL REFERENCE	X/XX.XX
SECTION MARKER	ELEVATION MARKER	GRID LINE	1
INTERIOR ELEVATION DETAIL REFERENCE	1 WINDOW TAG 4 (A.#.#.#) 2	PLAN ELEVATION MARKER	(##.###)
	3 DOOR TAG	REVISION NUMBER	(##.#)
ELEVATION MARKER	00.000	ASSEMBLY TYPE	XXX
NOTES	1	BUILDING GRADE	NEW GRADE 00.000 00.000 TO W.
	1	EXISTING GRADE	00.000 00.000 TO W.
NORTH ARROW		EGRESS	PRIMARY EXIT ##m SECONDARY EXIT



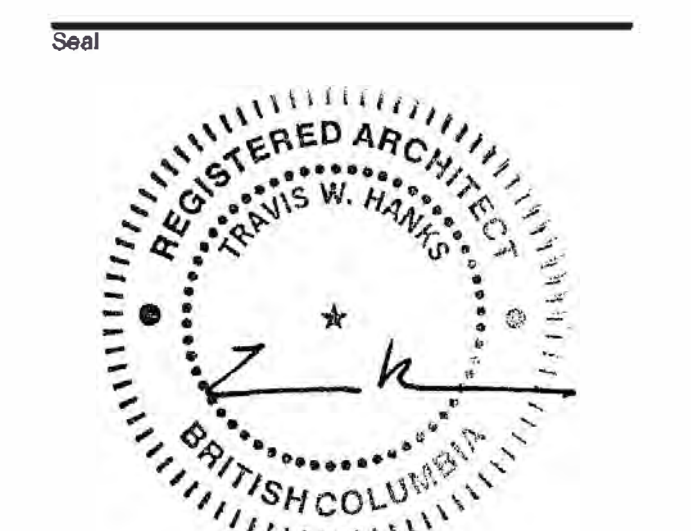
Project
JACK BAGLEY PARK REDEVELOPMENT NANAIMO BC
 Owner / Client
 REGIONAL DISTRICT OF NANAIMO
 Architect



Consultant

Consultant Team

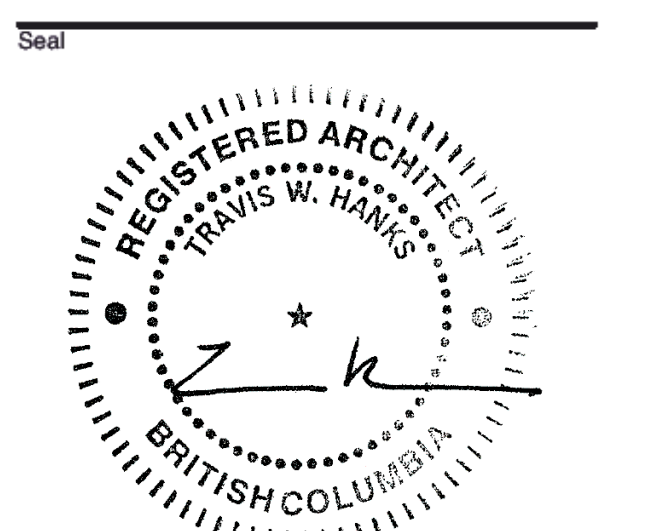
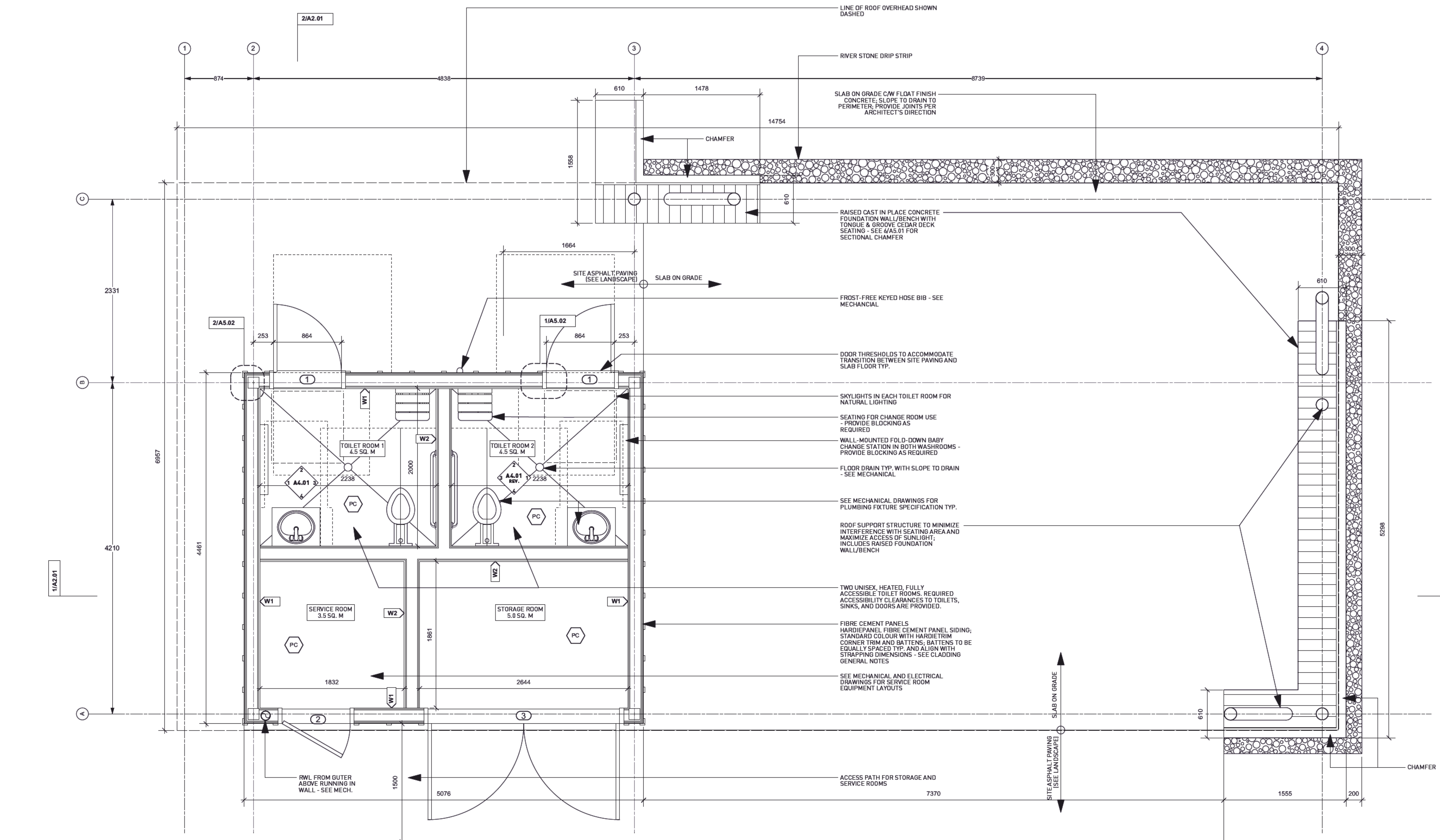
DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER



Sheet Title
PROJECT DATA & SITE PLAN
 Project ID: 2004 Drawn: JR Checked: TH
 Scale: AS NOTED Date: SEPTEMBER 17, 2021
 Sheet No.

A1.00

Issues / Revisions	
DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER



Sheet Title
FLOOR PLAN

Project ID	Drawn	Checked
2004	JR	TH
Scale	Date	
AS NOTED	SEPTEMBER 17, 2021	
Sheet No.		

1 PLAN
 Scale: 1:25

A1.01

ROOFING GENERAL NOTES

- All roofing products to be installed per manufacturer's requirements and to Canadian Roofing Contractor's Association (CRCA) and Roofing Contractor's Association of British Columbia (RCABC) standards.
- All Dampproofing and Waterproofing products to conform to Canadian Standards Association (CSA) and Underwriters Laboratories of Canada (ULC) standards, and be tested for compatibility with adjacent materials and products. Roofing membrane materials to be obtained through a single source.
- Contractor to organize a pre-installation meeting one week prior to beginning work, with Contractor, Consultant, installer, and manufacturer's representative (as required) to review coordination of the work, including substrate conditions.
- Provide Submittals of all products and components of the work including data sheets, performance criteria, and finish.
- Provide Manufacturer's Certificate certifying that products meet or exceed requirements. Submit Manufacturer's field report indicating installation procedures and quality control of application.
- Provide Manufacturer's Warranty for a minimum period of 5 years for workmanship and 20 years for material defect, including metal flashing.
- Roofing system to consist of the following components:
 - PRIMER - as recommended by manufacturer to suit substrate and installation conditions.
 - OVERLAY - base layer with vapour retarder.
 - MEMBRANE - multi-ply SBS modified bituminous, thermo-fusible base sheet and interply sheets as required for desired warranty, and tied into flashing details, plus UV resistant granulated cap sheet.
- Installer to provide all accessories as required for a complete and finished installation, including but not limited to sheet metal flashing, penetration flashings, drain pans, vent stack covers, perimeter fire seals, liquid membranes and waterproofing mastic.

Project
**JACK BAGLEY PARK
 REDEVELOPMENT
 NANAIMO BC**

Owner / Client
REGIONAL DISTRICT OF NANAIMO

Architect
**haeccity
 STUDIO ARCHITECTURE INC**

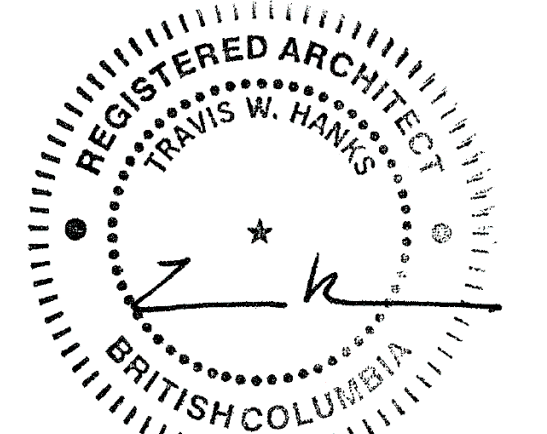
Consultant

Consultant Team

Issues / Revisions

DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER

Seal



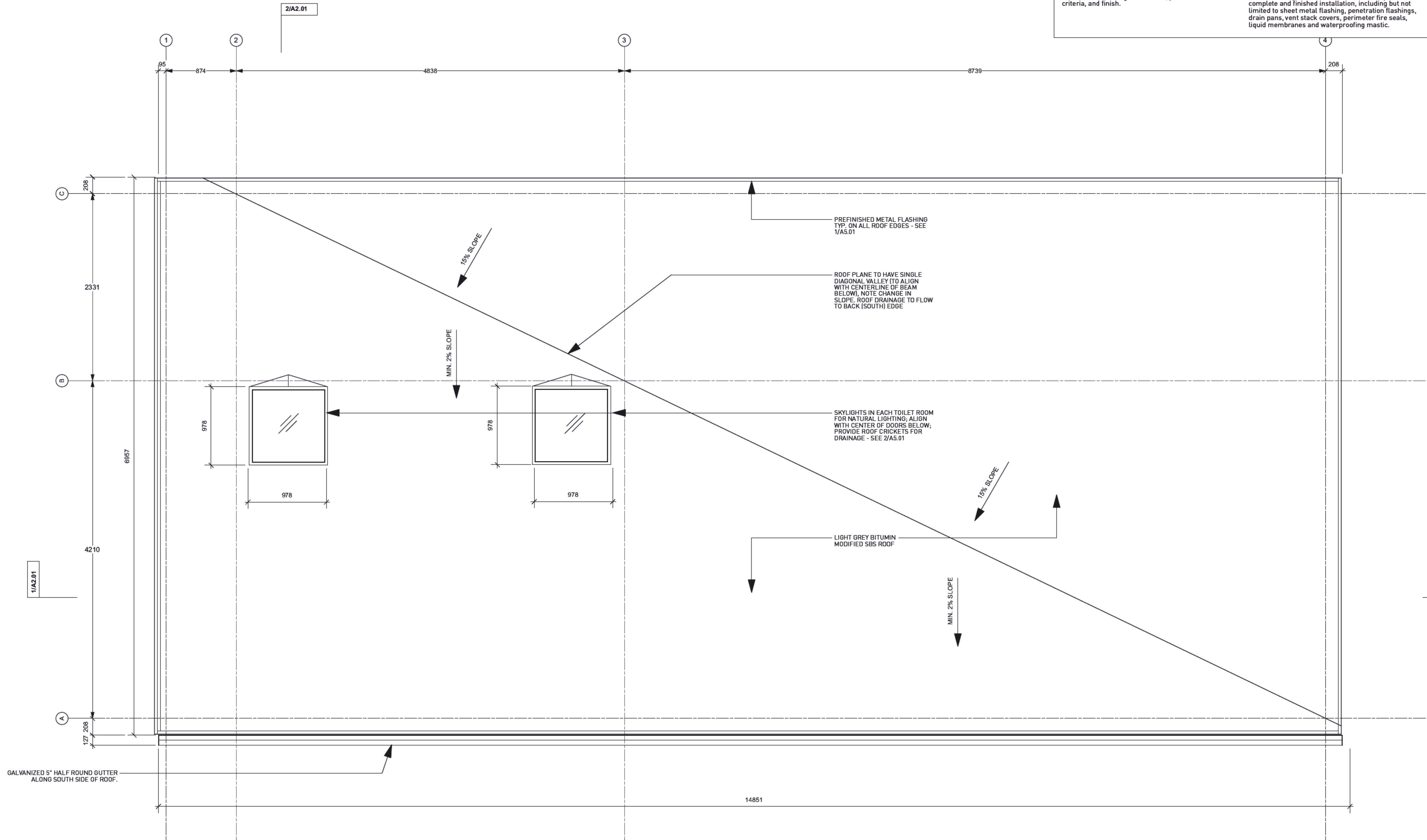
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ROOF PLAN

Project ID: 2004 Drawn: JR Checked: TH

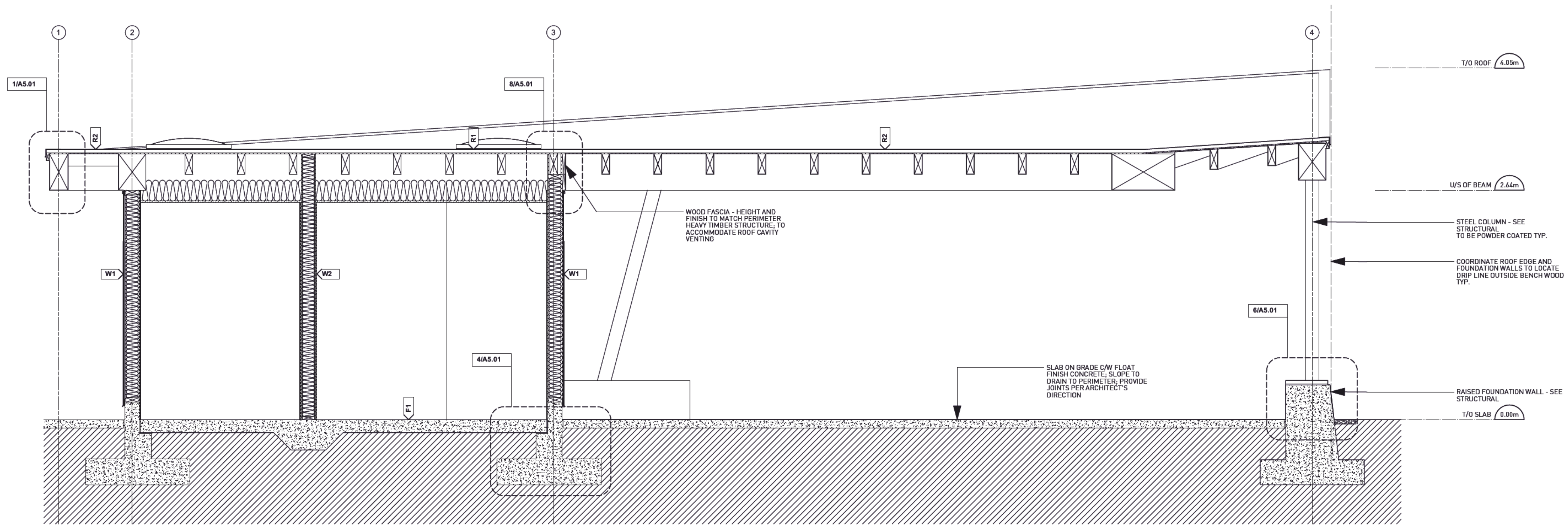
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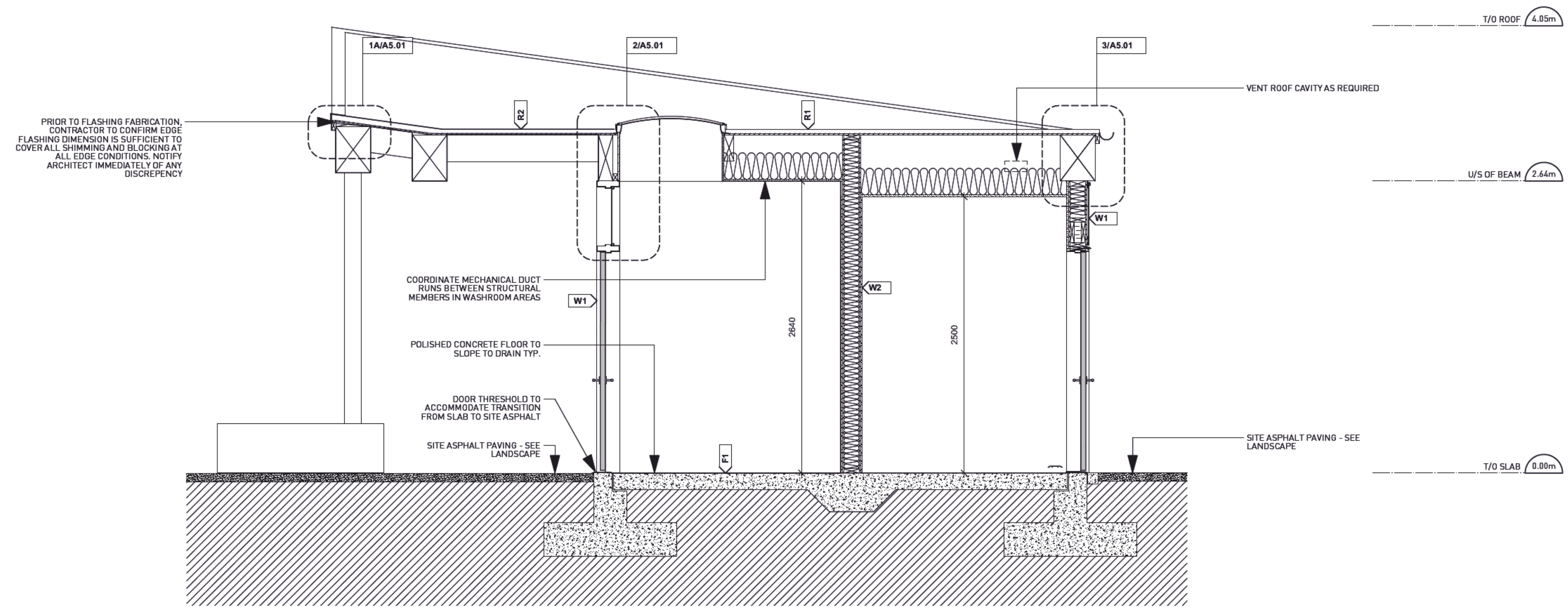
A1.02



1 ROOF PLAN
 Scale: 1:25



1 EAST/WEST BUILDING SECTION
Scale: 1:25



2 NORTH/SOUTH BUILDING SECTION
Scale: 1:25

Project
JACK BAGLEY PARK
REDEVELOPMENT
NANAIMO BC

Owner / Client
REGIONAL DISTRICT OF NANAIMO

Architect



Consultant

Consultant Team

Issues / Revisions

No.	Date YMD	Notes
A	2021-07-07	ISSUED FOR 95% DD
	2021-10-05	ISSUED FOR TENDER



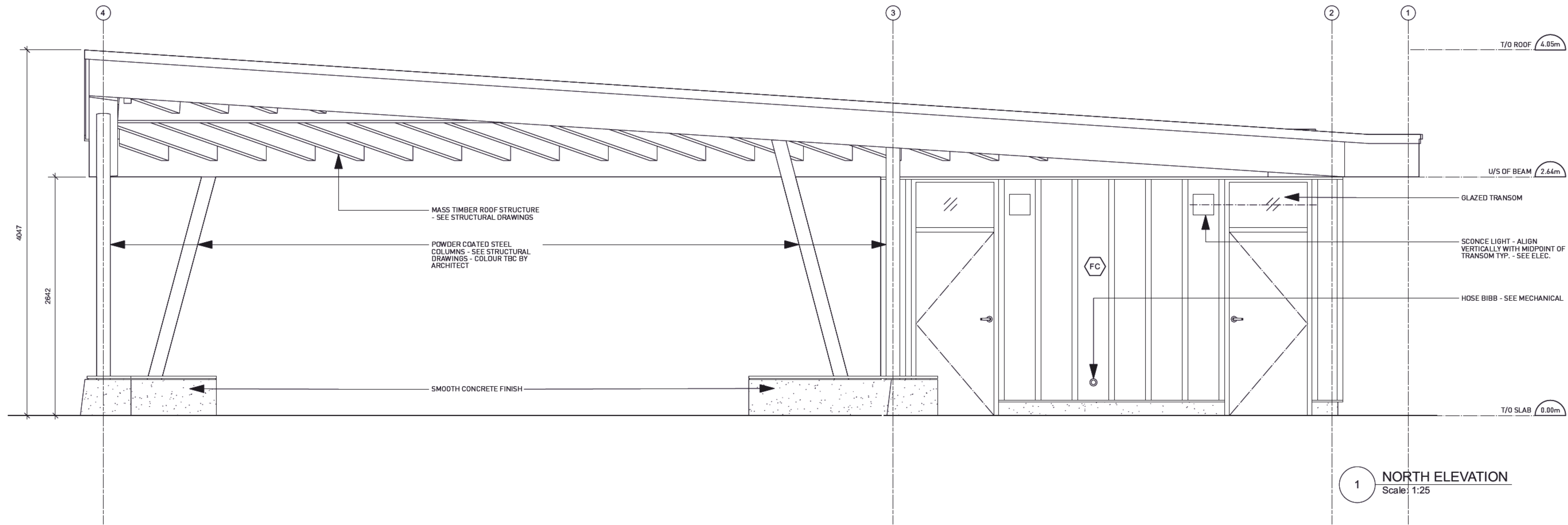
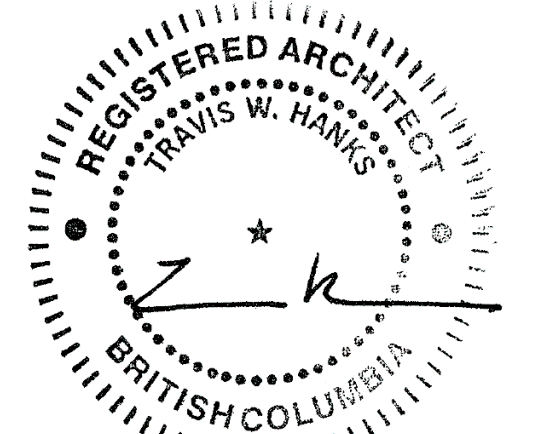
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BUILDING SECTIONS

Project ID	Drawn	Checked
2004	JR	TH
Scale	Date	
AS NOTED	SEPTEMBER 17, 2021	

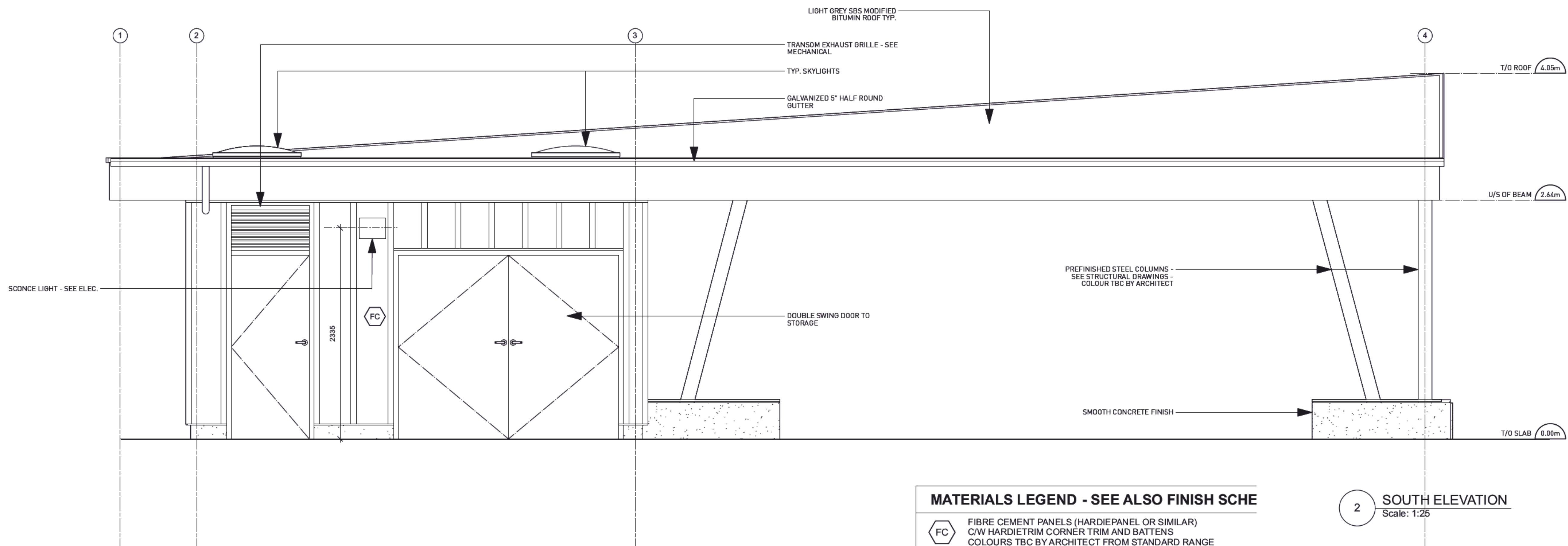
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A2.01

DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER



1 NORTH ELEVATION
 Scale: 1:25



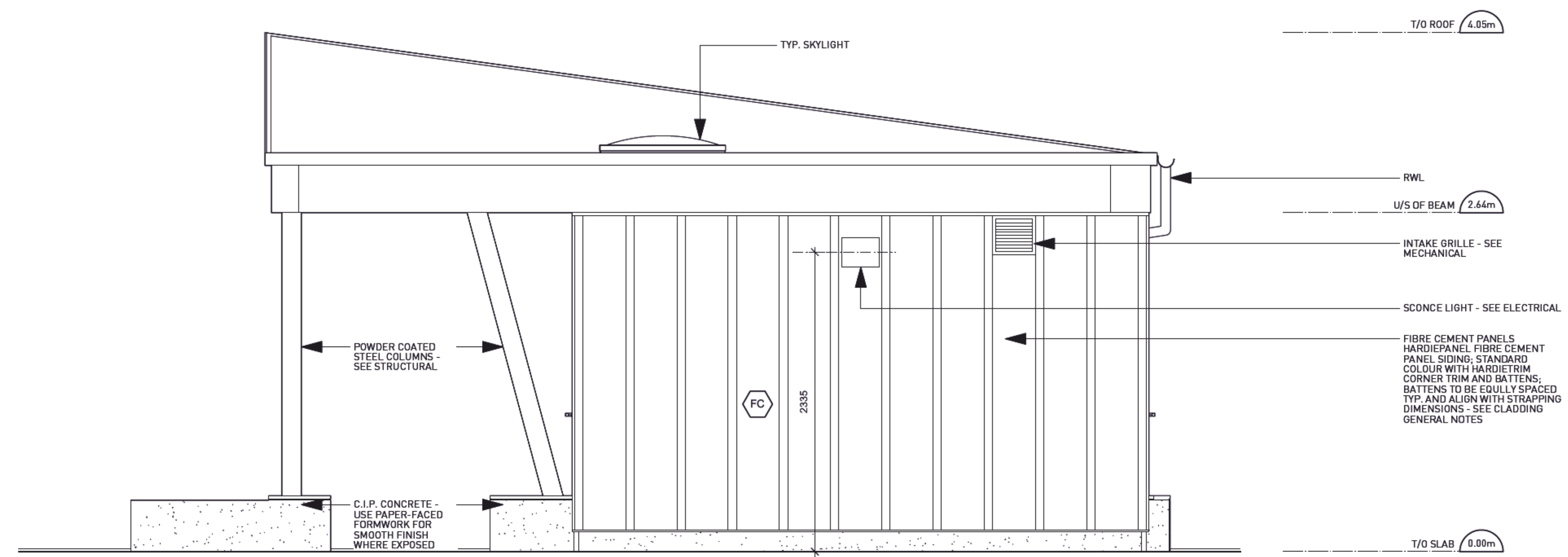
2 SOUTH ELEVATION
 Scale: 1:25

MATERIALS LEGEND - SEE ALSO FINISH SCHE

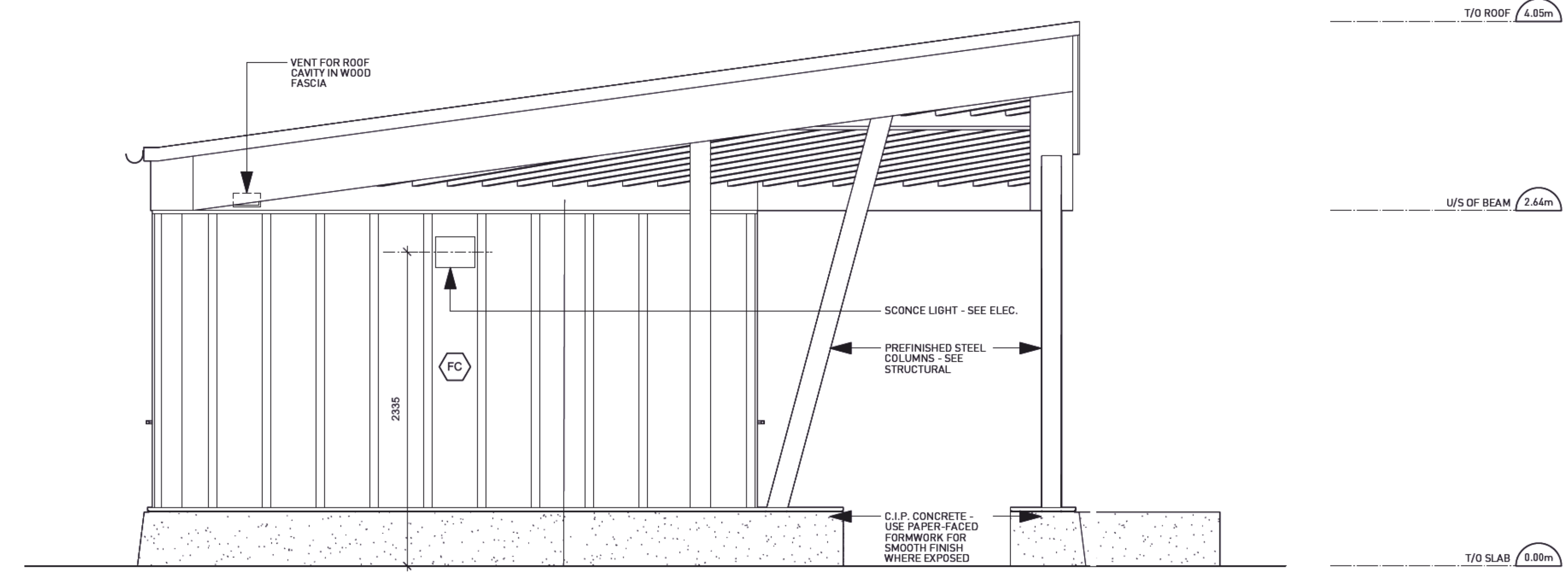
- FC** FIBRE CEMENT PANELS (HARDIPANEL OR SIMILAR)
 C/W HARDIETRIM CORNER TRIM AND BATTENS
 COLOURS TBC BY ARCHITECT FROM STANDARD RANGE
- GW** GYPSUM WALLBOARD, PAINTED
 - IN WASHROOMS - PAPER-FREE MOLD-RESISTANT GREENBOARD
 PAINTED P1 (WALLS) & P2 (CEILING) TYPICAL (SEE FINISH SCHEDL)
- CT** CERAMIC TILE
 C/W TILE COVE BASE AND QUARTER ROUND TRIM

CLADDING GENERAL NOTES

1. Submittals: Submit product data, shop drawings, and samples in accordance with Architect's requirements.
2. Sequencing: Coordinate installation with flashings, fascia, and other adjoining construction to ensure proper sequencing.
3. Quality Assurance: Engage experienced installer with a minimum of 3 years experience who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance. Installation to provide for thermal movement of component materials, movement in wall system, and between wall system and building structure, caused by structural movements, without permanent distortion, buckling, racking of joints, failure of joint seals, undue stress on fasteners, or other detrimental effects.
4. Contractor to coordinate site walk-through and with installer and Architect to review scope and detailing prior to commencing the work.
5. Fibre Cement Board Panels: Panels made from fibre reinforced cement board, free from asbestos fibres. Basis of design: Hardie Panel ColorPlus by James Hardie, Inc. or better.
6. Trim and Battens: Cladding trim and battens basis of design: HardieTrim ColorPlus by James Hardie Inc. or better. Thickness = 3/4", Width = 2 1/2", Texture = Smooth.
7. Fasteners: Corrosion resistant hot dipped galvanized or stainless steel fasteners as recommended by siding manufacturer for materials being fastened to and as follows:
A. Fastening to Wood: Ribbed, bugle head screws of sufficient length to penetrate a minimum of 25 mm into substrate.
B. Fastening to Metal: Ribbed, bugle head screws of sufficient length to penetrate a minimum of 6 mm or 3 - screw threads into substrate.
8. Flashing: Provide pre-finished, galvanized sheet steel flashing and trims in accordance with details and Consultant direction. Colour TBC by Architect.
9. Installation: Ensure air/vapour barrier installation is complete and has been reviewed by the Consultant. Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Install materials in strict accordance with manufacturer's installation instructions.
10. Finishing: Provide accessories and flashing matching colour and texture of adjacent siding, unless otherwise indicated. Site paint exposed cut edges to match colour of board, trim, or plank. Provide manufacturer's standard touch-up kit for each colour provided.
12. Prepare mock-ups of cladding installation for Consultant review.



1 WEST ELEVATION
Scale: 1:25



2 EAST ELEVATION
Scale: 1:25

MATERIALS LEGEND - SEE ALSO FINISH SCHE

	FIBRE CEMENT PANELS (HARDIEPANEL OR SIMILAR) C/W HARDIETRIM CORNER TRIM AND BATTENS COLOURS TBC BY ARCHITECT FROM STANDARD RANGE
	GYPSUM WALLBOARD, PAINTED - IN WASHROOMS - PAPER-FREE MOLD-RESISTANT GREENBOARD PAINTED P1 (WALLS) & P2 (CEILING) TYPICAL (SEE FINISH SCHEDL)
	CERAMIC TILE C/W TILE COVE BASE AND QUARTER ROUND TRIM

Project
**JACK BAGLEY PARK
REDEVELOPMENT
NANAIMO BC**

Owner / Client
REGIONAL DISTRICT OF NANAIMO

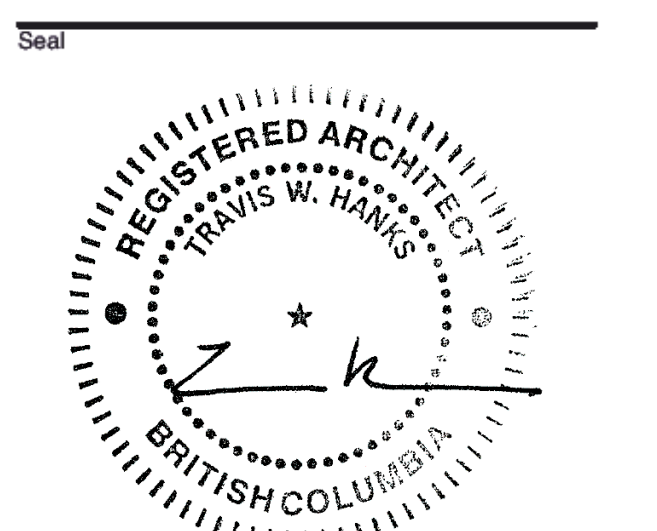
Architect
**haeccity
STUDIO ARCHITECTURE INC**

Consultant

Consultant Team

Issues / Revisions

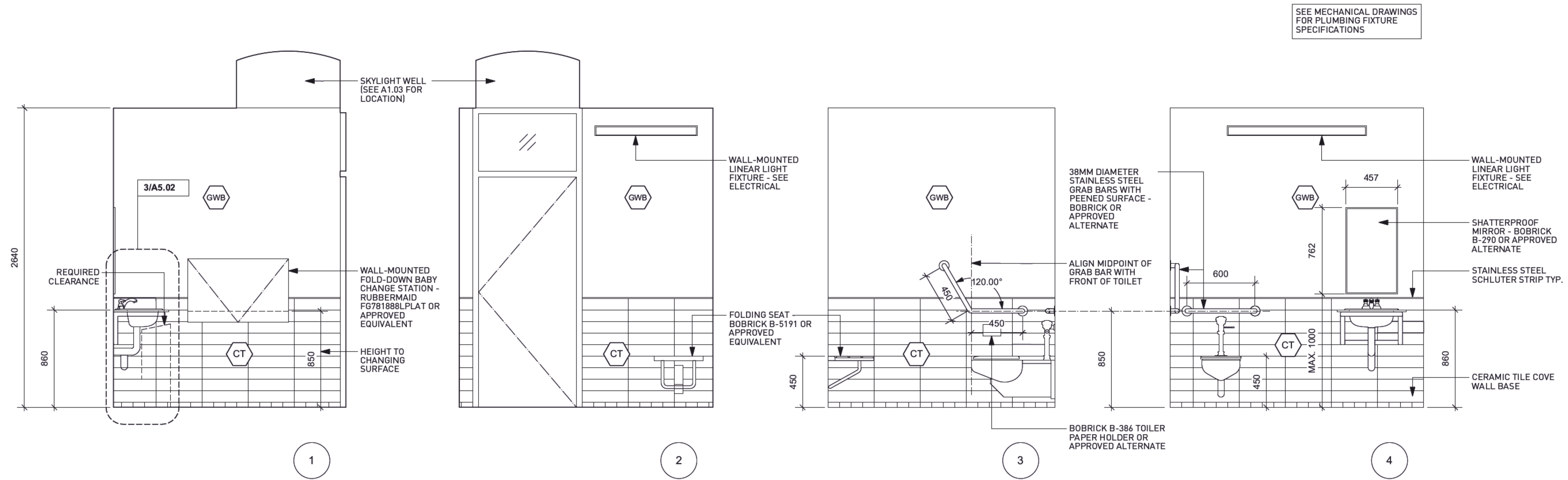
DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER



Sheet Title
BUILDING ELEVATIONS

Project ID	Drawn	Checked
2004	JR	TH
Scale	Date	
AS NOTED	SEPTEMBER 17, 2021	
Sheet No.		

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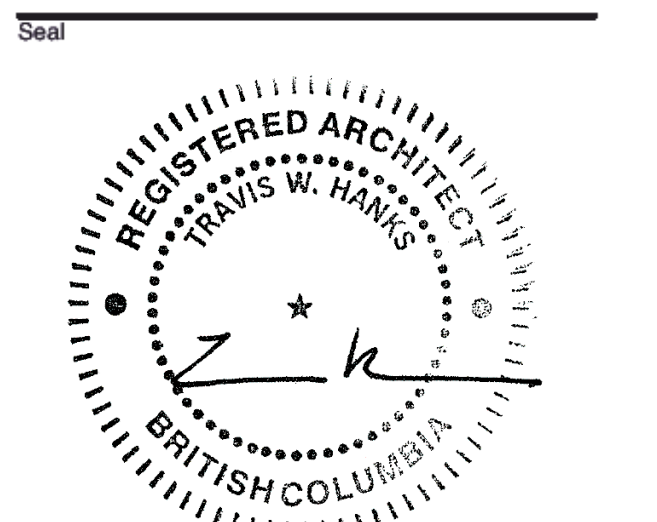


INTERIOR ELEVATIONS
 Scale: 1:20

DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
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MATERIALS LEGEND - SEE ALSO FINISH SCHEDULE

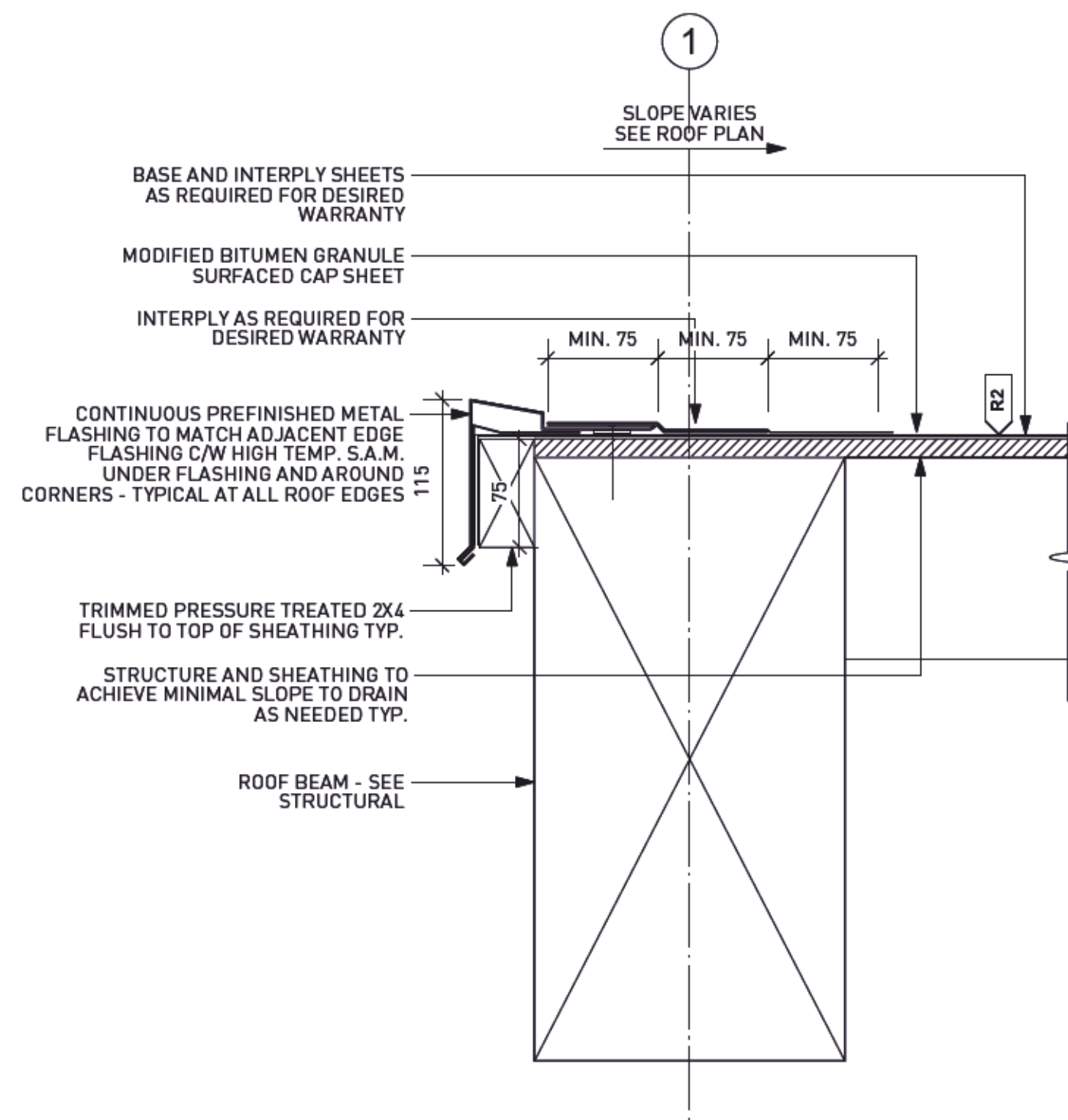
FC	FIBRE CEMENT PANELS (HARDIEPANEL OR SIMILAR) C/W HARDIETRIM CORNER TRIM AND BATTENS COLOURS TBC BY ARCHITECT FROM STANDARD RANGE
GWB	GYPSUM WALLBOARD, PAINTED - IN WASHROOMS - PAPER-FREE MOLD-RESISTANT GREENBOARD TYP. PAINTED P1 (WALLS) & P2 (CEILING) TYPICAL (SEE FINISH SCHEDULE)
CT	CERAMIC TILE C/W TILE COVE BASE AND QUARTER ROUND TRIM



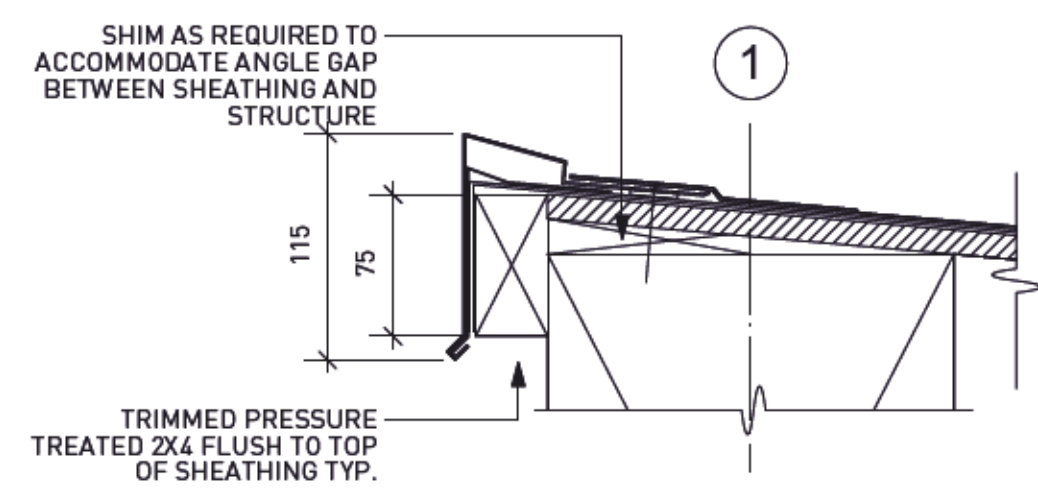
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INTERIOR ELEVATIONS

Project ID	Drawn	Checked
2004	JR	TH
Scale	Date	
AS NOTED	SEPTEMBER 17, 2021	
Sheet No.		

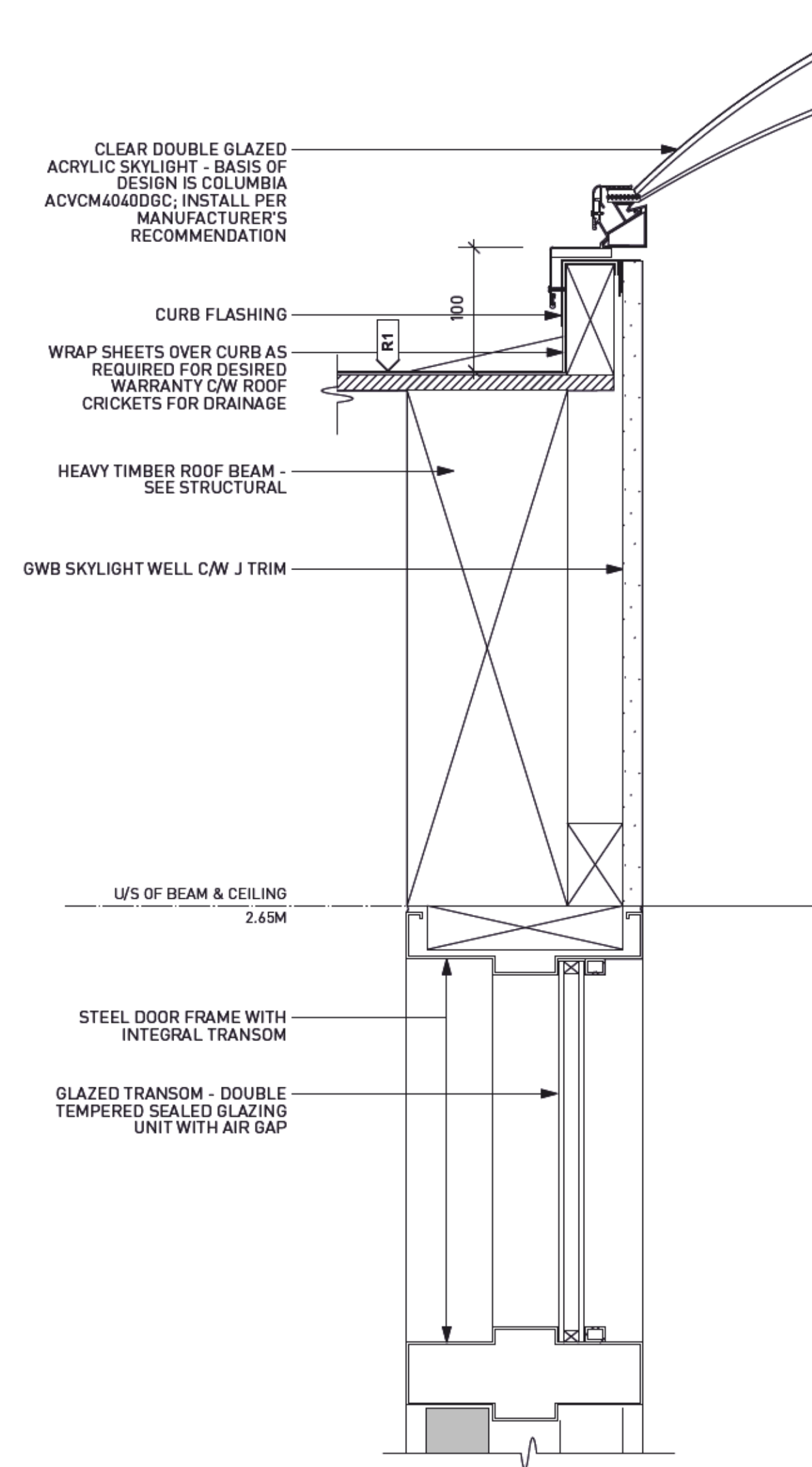
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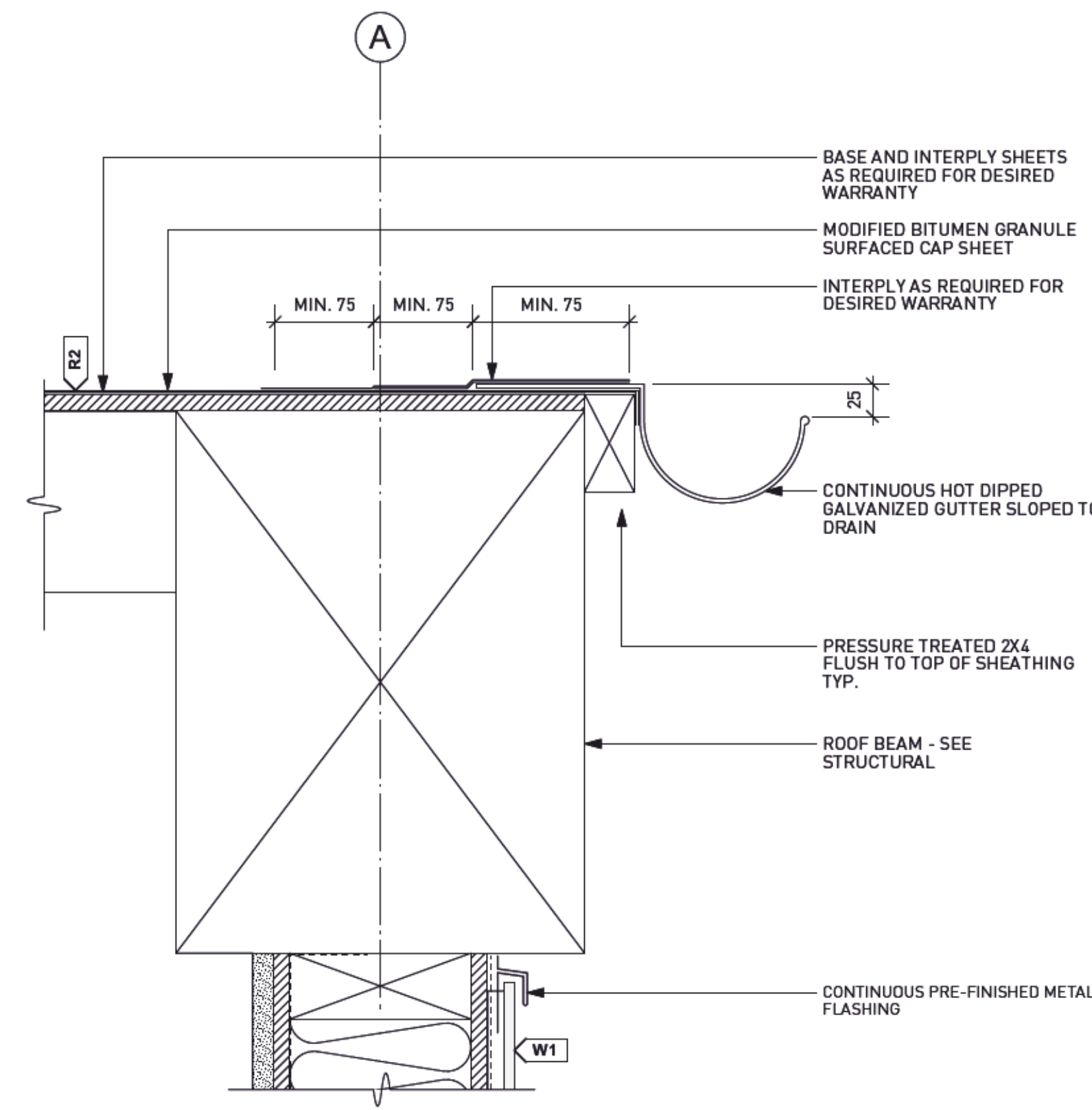
1 ROOF DETAIL
 Scale: 1:4



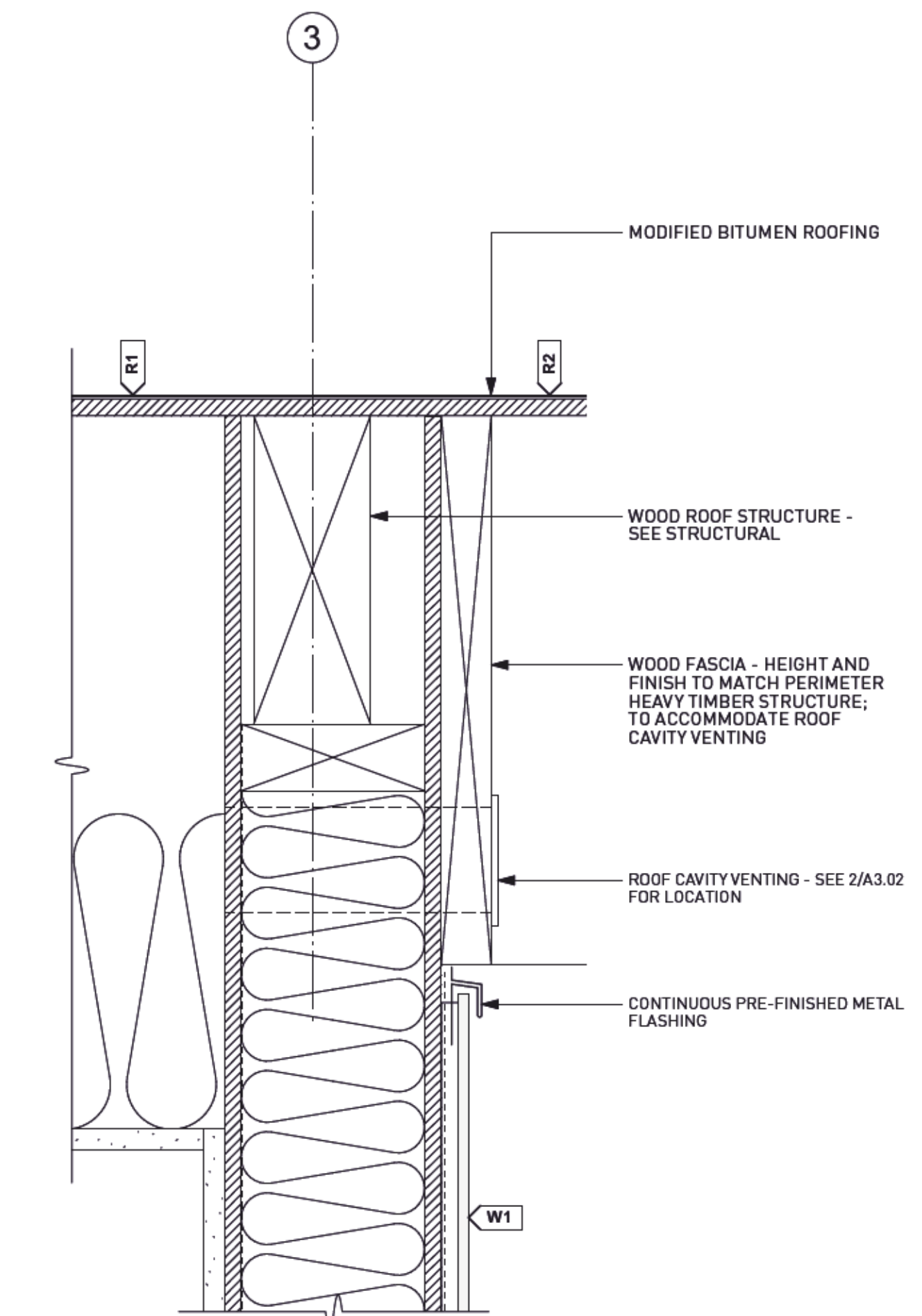
1A ROOF DETAIL @ SLOPE
 Scale: 1:4



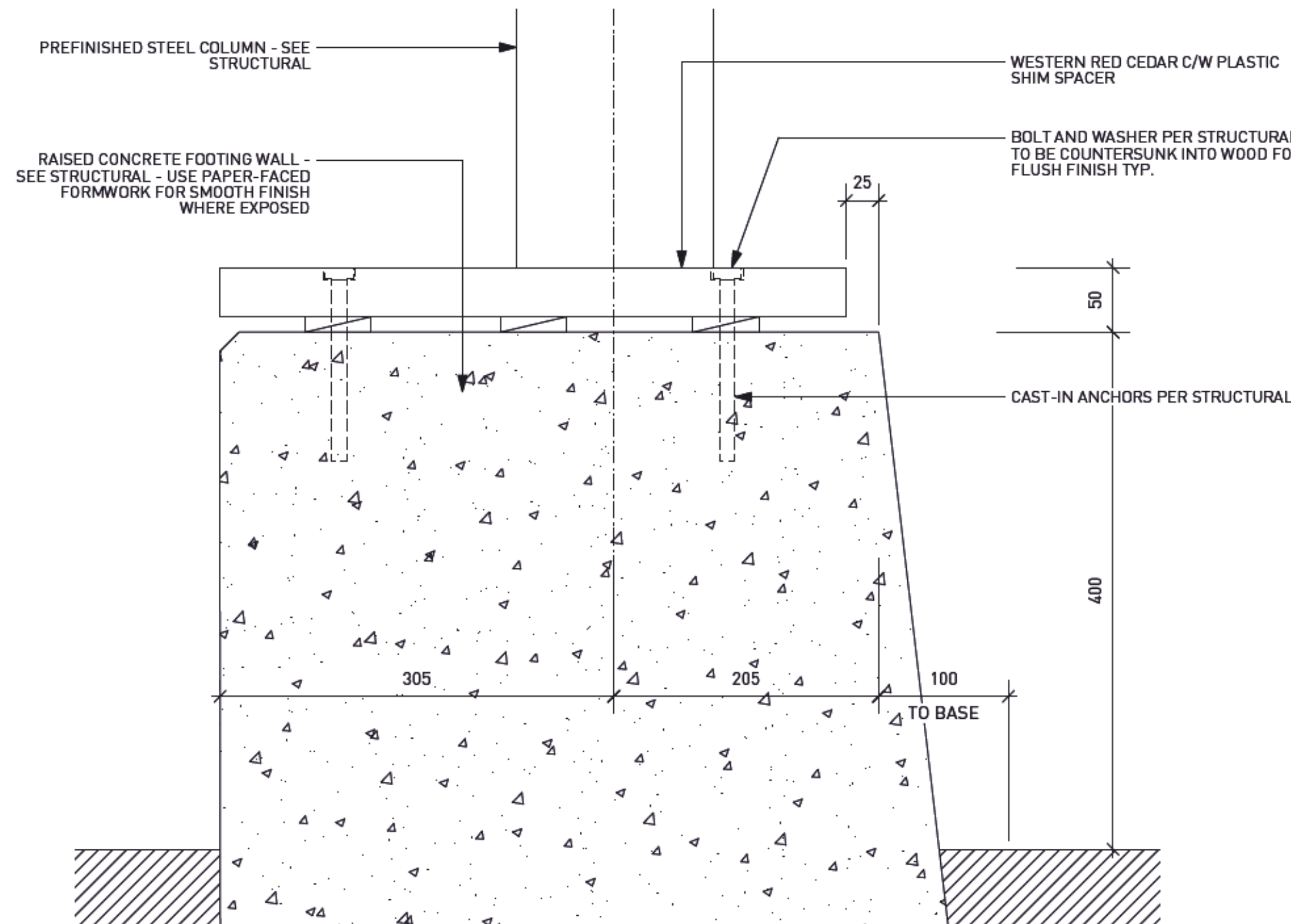
2 SKYLIGHT & DOOR HEADER DETAIL
 Scale: 1:4



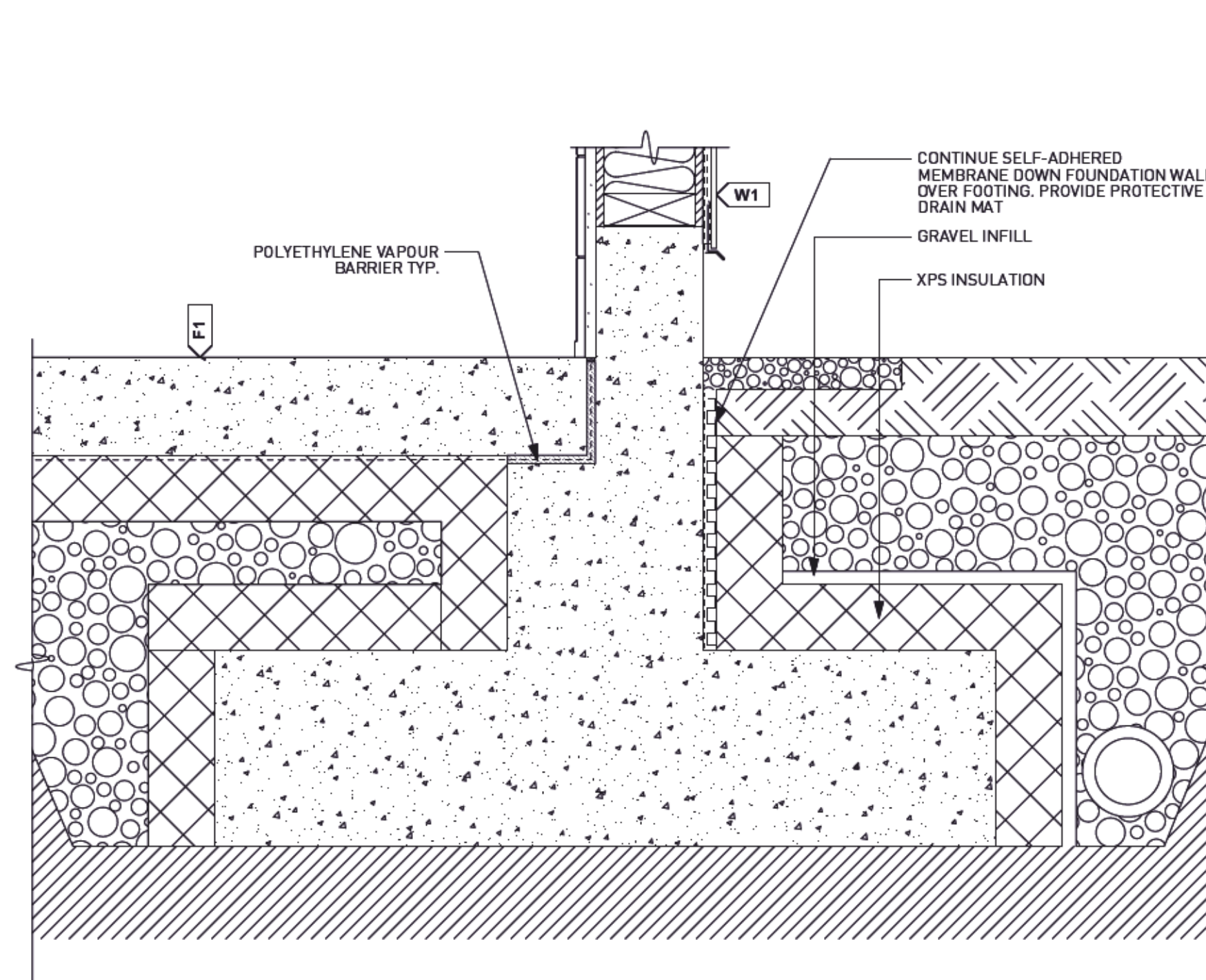
3 GUTTER DETAIL
 Scale: 1:4



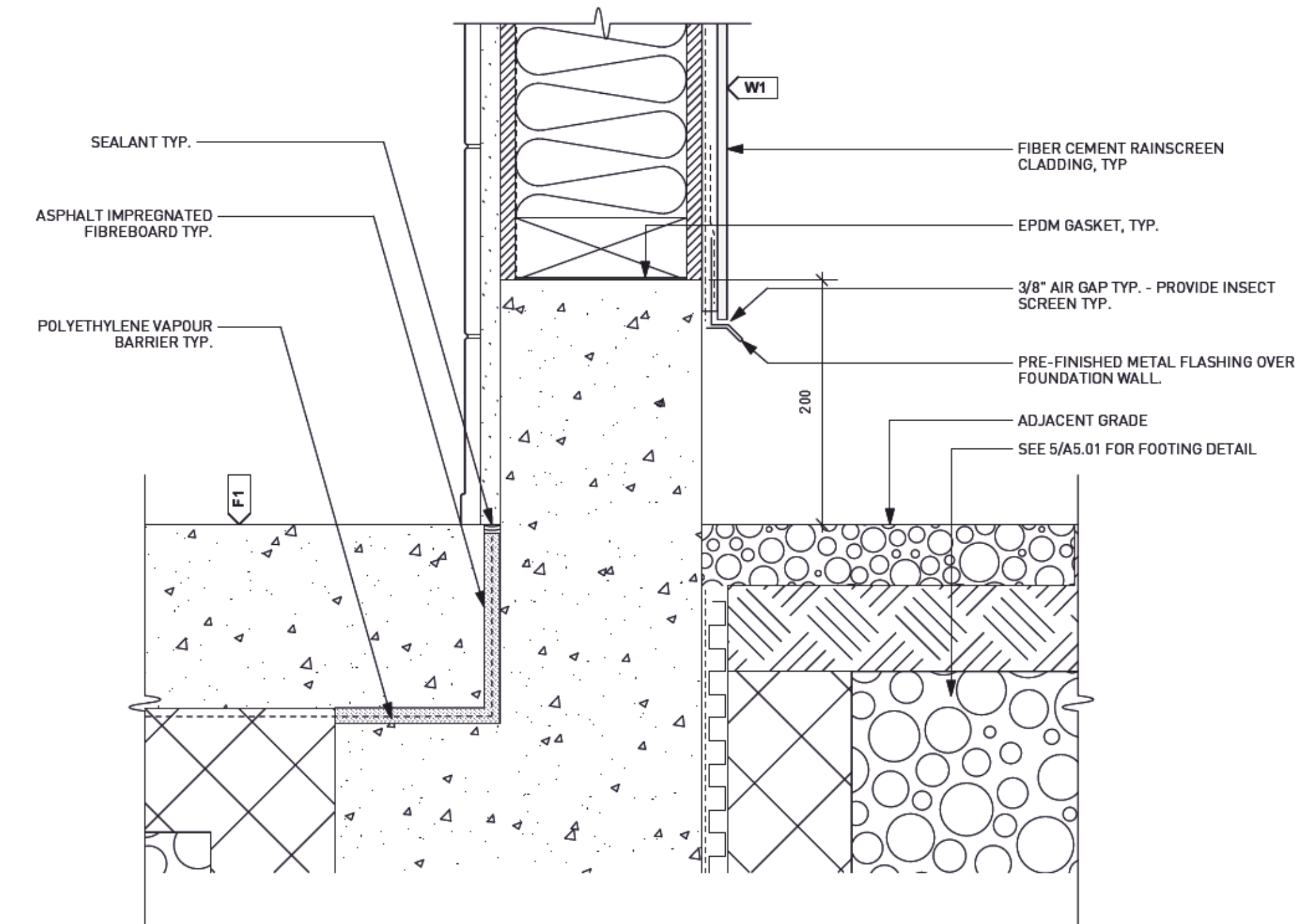
8 FASCIA DETAIL
 Scale: 1:4



6 BENCH DETAIL
 Scale: 1:4

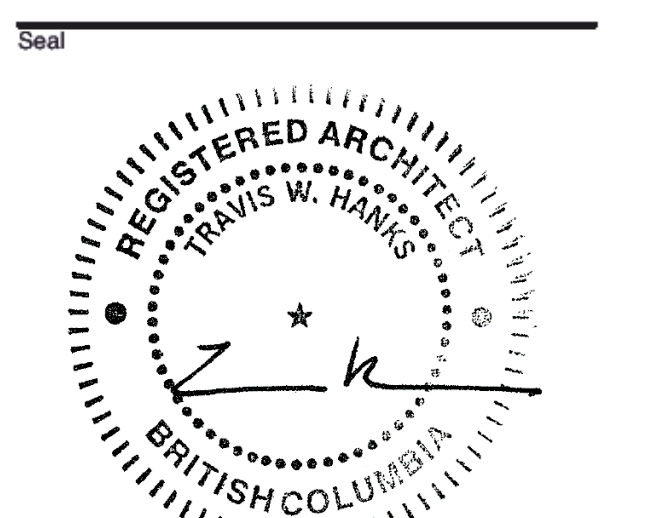


5 FOOTING DETAIL
 Scale: 1:8



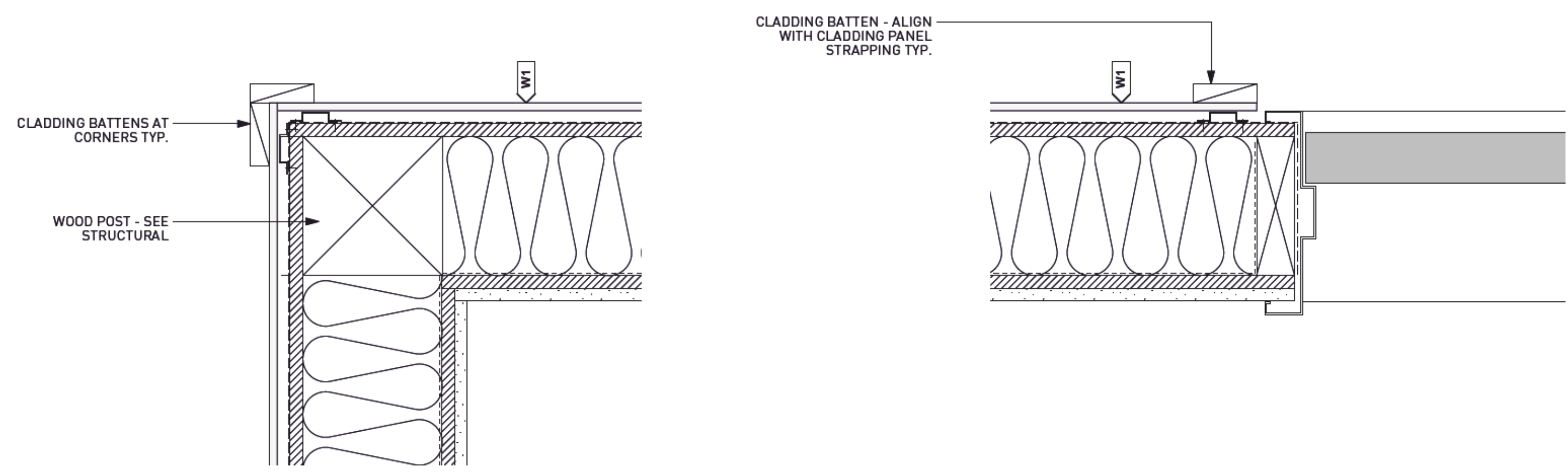
4 WALL BASE DETAIL
 Scale: 1:4

DATE	ISSUE
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2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR BP
2021-10-05	ISSUED FOR TENDER



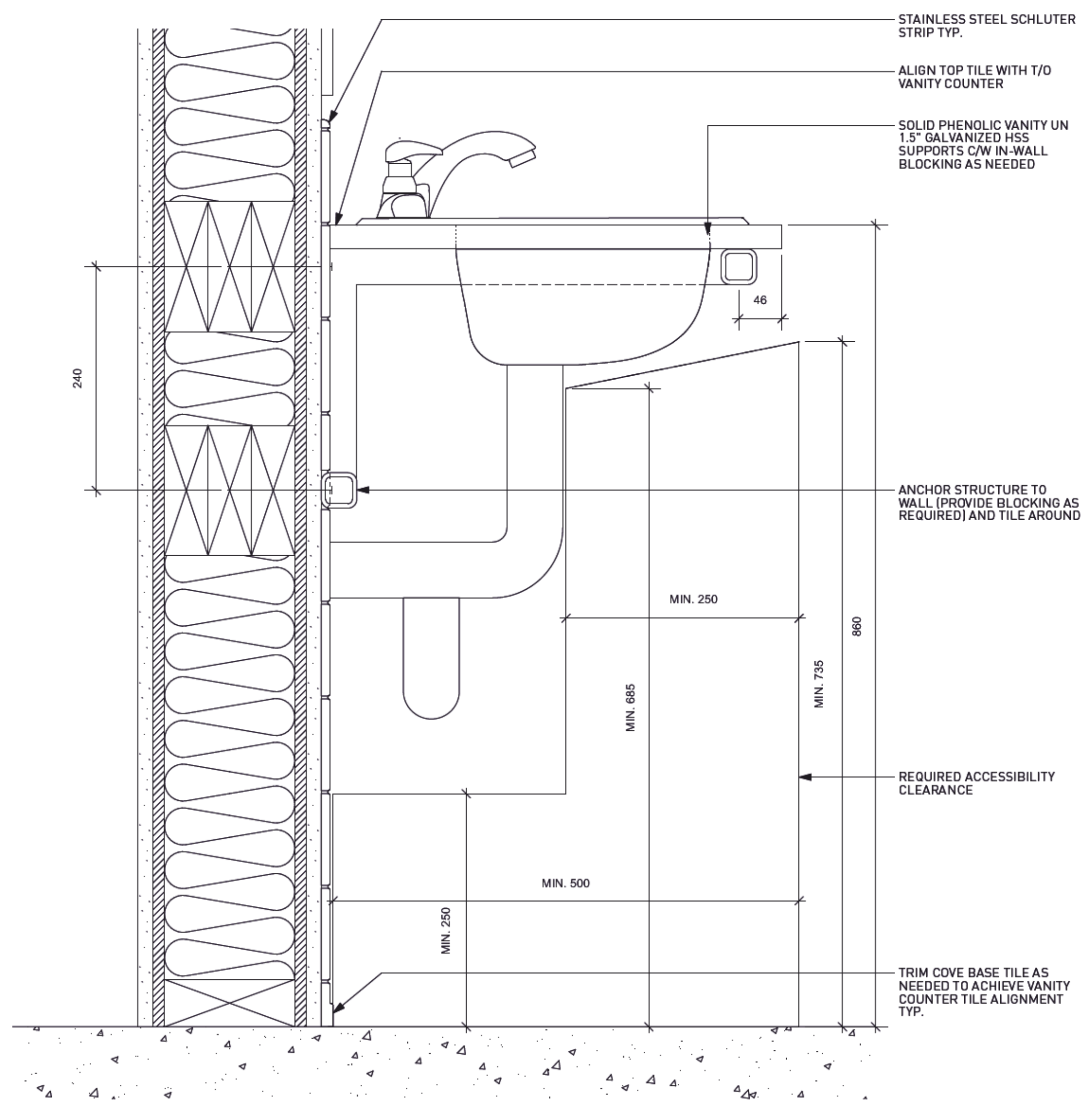
Project ID	Drawn	Checked
2004	JR	TH
Scale	Date	
AS NOTED	SEPTEMBER 17, 2021	
Sheet No.		

A5.01



2 TYPICAL CLADDING DETAIL @ CORNER
 Scale: 1:4

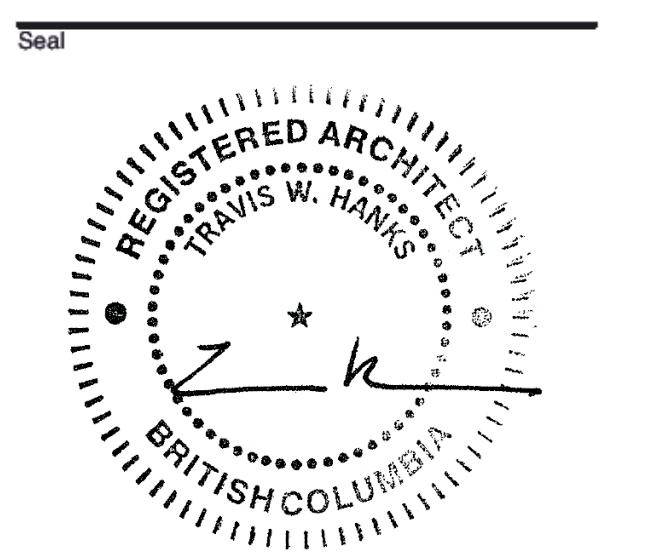
1 DOOR JAMB DETAIL
 Scale: 1:4



3 VANITY DETAIL
 Scale: 1:4

JACK BAGLEY PARK WASHROOM PAVILION									
FINISH SCHEDULE - BASIS OF DESIGN (ALTERNATES BY CLIENT APPROVAL)									
TAG	DESCRIPTION	AREA	CARRIER	PRODUCT	NUMBER	FINISH	COLOUR	THICKNESS	NOTES
CT	CERAMIC TILE	WASHROOMS	DALTILE	COLORMATCH GLAZED VERAMIC		MATTE	FERN 80		4X16 TILES C/W MATCHING 4X4 COVE BASE (TRIMMED AS REQUIRED)
FC	FIBRE CEMENT BOARD PANEL SIDING	EXTERIOR SIDING	THOMAS HARDIE	HARDIR PANEL SMOOTH		COLOUR PLUS SMOOTH	FROM STANDARD SELECTION	5/16"	C/W HARDIETRIM BATTEN BOARDS (STANDARD COLOURPLUS SMOOTH FINISH)
GWB	GYPSUM WALL BOARD	INTERIOR WALLS & CEILING	-	-	-	-	-	SEE ASSEMBLY SCHEDULE	USE PAPER-FREE MOLD-RESISTANT GREENBOARD IN WASHROOMS TYP.
P1	LATEX PAINT	INTERIOR WALLS	BENJAMIN MOORE	-	TBC	EGGSHELL	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P2	LATEX PAINT	INTERIOR CEILINGS	BENJAMIN MOORE	-	TBC	SATIN	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P3	LATEX PAINT	DOORS	BENJAMIN MOORE	-	TBC	SEMI-GLOSS	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
P4	ACRYLIC PAINT	UNDERSIDE OF ROOF SHEATHING	BENJAMIN MOORE	-	TBC	-	STANDARD COLOUR TO BE CONFIRMED	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
PC	POLISHED CONCRETE	FLOOR IN ALL AREAS	-	-	-	VARIES	NATURAL	-	APPLY DENSIFIER WHERE NOTED
SC	SMOOTH CONCRETE	CAST IN PLACE CONCRETE BENCHES	-	-	-	-	-	-	USE PAPER-FACED FORMWORK FOR SMOOTH FINISH
SP	SOLID PHENOLIC	WASHROOM VANITY COUNTER	BOBRICK	SIERRASERIES			STANDARD COLOUR TO BE CONFIRMED	3/4"	SUBMIT SAMPLES FOR ARCHITECT APPROVAL
WS	WOOD STAIN	EXPOSED TIMBER STRUCTURE	SANSIN	ENVIRO STAIN	KP-12UVW		GREY	-	SUBMIT SAMPLES FOR ARCHITECT APPROVAL

Issues / Revisions	
DATE	ISSUE
2021-07-07	ISSUED FOR 95% DD/BP
2021-09-17	ISSUED FOR TENDER RE-ISSUED FOR 8P
2021-10-05	ISSUED FOR TENDER

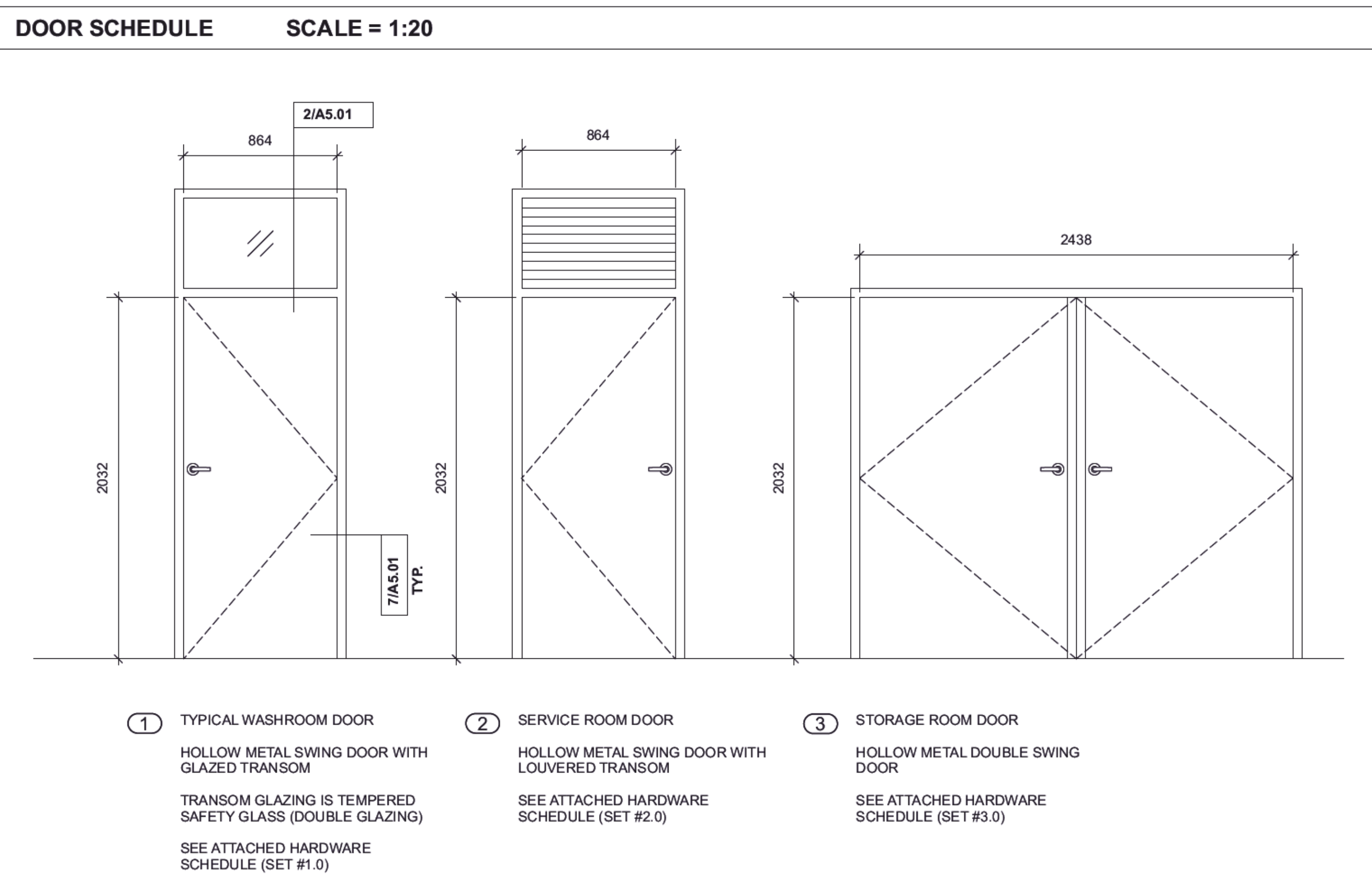


Sheet Title
DETAILS & FINISH SCHEDULE

Project ID	2004	Drawn	JR	Checked	TH
Scale	AS NOTED	Date	SEPTEMBER 17, 2021		
Sheet No.					

A5.02

ASSEMBLY SCHEDULE						
WALL ASSEMBLIES						
WALL TYPE	PLAN	DESCRIPTION	REQUIRED			REMARKS
			FRR	STC	RSI	
W1		EXTERIOR WALL <ul style="list-style-type: none"> 5/16" FIBRE CEMENT BOARD 1/2" ALUMINUM CLIPS AIR-MOISTURE BARRIER 1/2" PLYWOOD (SEE STRUCTURAL) 5 1/2" WOOD STUDS 5 1/2" MINERAL WOOL INSULATION VAPOUR BARRIER 1/2" PLYWOOD (SEE STRUCTURAL) 5/8" TYPE X GYPSUM WALLBOARD 	N/A	N/A	3.60	- INCLUDE BLOCKING AS NEEDED FOR GRAB BAR AND FIXTURE SUPPORT - INTERIOR WALL FINISH AS NOTED IN ELEVATIONS (PAINTED TYP.)
W2		INTERIOR WALL <ul style="list-style-type: none"> 5/8" TYPE X GYPSUM WALLBOARD 1/2" PLYWOOD (SEE STRUCTURAL) 5 1/2" WOOD STUDS 5 1/2" MINERAL WOOL INSULATION VAPOUR BARRIER 1/2" PLYWOOD (SEE STRUCTURAL) 5/8" TYPE X GYPSUM WALLBOARD 	N/A	N/A	N/A	- INCLUDE BLOCKING AS NEEDED FOR GRAB BAR AND FIXTURE SUPPORT - INTERIOR WALL FINISH AS NOTED IN ELEVATIONS (PAINTED TYP.)
ROOF ASSEMBLIES						
R1		MODIFIED BITUMEN ROOF <ul style="list-style-type: none"> MODIFIED BITUMEN 1/2" PLYWOOD SHEATHING WOOD STRUCTURE (SEE STRUCTURAL) 9 1/2" MINERAL WOOL INSULATION VAPOUR BARRIER 5/8" TYPE X GYPSUM WALLBOARD 	N/A	N/A	5.46	- SLOPE STRUCTURE TO ACHIEVE MINIMUM SLOPE TO DRAIN AS NEEDED - GWB CEILINGS TO BE PAINTED TYP.
R2		MODIFIED BITUMEN CANOPY <ul style="list-style-type: none"> MODIFIED BITUMEN 1/2" PLYWOOD SHEATHING WOOD STRUCTURE (SEE STRUCTURAL) 	N/A	N/A	N/A	- SLOPE STRUCTURE TO ACHIEVE MINIMUM SLOPE TO DRAIN AS NEEDED - UNDERSIDE OF SHEATHING TO BE PAINTED (COLOUR TBC BY ARCHITECT)
FLOOR ASSEMBLIES						
F1		FINISHED CONCRETE FLOOR <ul style="list-style-type: none"> 6" POLISHED REINFORCED CONCRETE POLYETHYLENE VAPOUR BARRIER 4" XPS RIGID INSULATION 4" GRAVEL FILL, NO FINES 	N/A	N/A	N/A	- SLOPE TO DRAIN IN WASHROOMS - APPLY CONCRETE DENSIFIER IN WASHROOMS



MATERIALS LEGEND - SEE ALSO FINISH SCHEDULE

	FIBRE CEMENT PANELS (HARDIEPANEL OR SIMILAR) C/W HARDIETRIM CORNER TRIM AND BATTENS COLOURS TBC BY ARCHITECT FROM STANDARD RANGE
	GYPSUM WALLBOARD, PAINTED - IN WASHROOMS - PAPER-FREE MOLD-RESISTANT GREENBOARD TYP. PAINTED P1 (WALLS) & P2 (CEILING) TYPICAL (SEE FINISH SCHEDULE)
	CERAMIC TILE C/W TILE COVE BASE AND QUARTER ROUND TRIM

RCP LEGEND

	LINEAR LIGHT FIXTURE (CEILING/WALL MOUNTED) - SEE ELECTRICAL FOR SIZING		RADIANT HEATING PANEL - SEE MECHANICAL
	SCONCE LIGHT FIXTURE - SEE ELECTRICAL FOR SIZING		AIR DIFFUSER - SEE MECHANICAL
	CANOPY LIGHT FIXTURE - SEE ELECTRICAL FOR POWER ROUTING		AIR VENTILATION - SEE MECHANICAL

GENERAL NOTES					
<p>REGULATORY REQUIREMENTS</p> <p>References and Codes: Perform Work in accordance with 2018 BC Building Code and authorities having jurisdiction including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.</p> <p>Meet or exceed requirements of: 1. Contract documents. 2. Specified standards, codes and referenced documents. 3. Municipalities' requirements</p> <p>REFERENCES 1 Canadian Construction Documents Committee (CCDC) 5B, Agreement Between Owner and Construction Manager for Services and Construction.</p>	<p>QUALITY CONTROL</p> <p>1. Inspections: 1. Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress. 2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work. 3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work. 4. Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not to be in accordance with Contract Documents, correct such Work and pay cost of examination and correction, if such Work is found in accordance with Contract Documents, Consultant shall pay cost of examination and replacement.</p> <p>2. Independent Inspection Agencies: 1. Independent Inspection/Testing Agencies will be selected by Consultant for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner. 2. Provide equipment required for executing inspection and testing by appointed agencies. 3. Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents. 4. If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and reinspection.</p> <p>3. Access to Work: 1. Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants. 2. Co-operate to provide reasonable facilities for such access.</p> <p>4. Procedures: 1. Notify appropriate agency in advance of requirement for tests, in order that attendance arrangements can be made. 2. Submit samples or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work. 3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.</p>	<p>5. Manufacturer's Instructions: 1. Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers. 2. Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions.</p> <p>6. Rejected Work: 1. Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents. 2. Make good other Contractor's work damaged by such removals or replacements promptly. 3. If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Consultant.</p> <p>7. Reports: 1. Submit electronic copies of inspection and test reports to Consultant. 2. Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.</p> <p>8. Tests and Mix Designs: 1. Furnish test results and mix designs as requested. 2. Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.</p> <p>9. Mock-Ups: 1. Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups. 2. Construct in locations acceptable to Consultant or as specified in specific Section. 3. Prepare mock-ups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work. 4. Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed. 5. If requested, Consultant will assist in preparing schedule fixing dates for preparation. 6. Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.</p> <p>10. Equipment and Systems: 1. Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.</p>	<p>CLOSEOUT PROCEDURES</p> <p>1. Inspection and Declaration: 1. Contractor's Inspection: Contractor and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Notify Consultant in writing of satisfactory completion of Contractor's inspection and that corrections have been made. 2. Request Consultant's Field Review. 3. Consultant's Field Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly. 4. Completion: submit written certificate of completion. 5. Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant, and Contractor. If Work is deemed incomplete by Owner and Consultant complete outstanding items and request reinspection. 6. Declaration of Substantial Performance: when Owner and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 5B, General Conditions Article for specifics to application.</p> <p>2. Final Cleaning: 1. Clean work prior to final review by Consultant. 2. When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work. 3. Prior to final review remove surplus products, tools, construction machinery and equipment. 4. Remove waste and debris, including that caused by Owner or other Contractors, and leave Work clean and suitable for occupancy. 5. Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris. 6. Clean lighting reflectors, lenses, and other lighting surfaces. 7. Clean finish, trim, and equipment and ensure specified workmanship and operation. 8. Broom clean and wash exterior walks, steps and surfaces; rake clear other surfaces of grounds. 9. Remove dirt and other disfiguration from exterior surfaces. 10. Sweep and wash clean paved areas. 11. Clean drainage systems. 12. Remove debris and surplus materials from accessible concealed spaces.</p>	<p>CLOSEOUT SUBMITTALS</p> <p>1. Submittals in accordance with Submittal Procedures: 1. Prepare instructions and data using personnel experienced in maintenance and operation of described products. 2. Copy will be returned after final inspection, with Consultant's comments. 3. Revise content of documents as required prior to final submittal. 4. Two weeks prior to Substantial Performance of the Work, submit to the Consultant, one final copy and one digital version of Operations and Maintenance manuals in English. 5. Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work. 6. Furnish evidence, if requested, for type, source and quality of products provided. 7. Defective products will be rejected, regardless of previous inspections. Replace products at own expense. 8. Submit 'redline' marked up construction drawings to the Consultant within 30 days of Substantial Performance and prior to final completion.</p> <p>2. Operations and Maintenance Manual: 1. Organize data as instructional manual. 2. Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets. 3. When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine. 4. Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents. 5. Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents. 6. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment. 7. Text: manufacturer's printed data, or typewritten data. 8. Drawings: provide with reinforced punched binder tab. Bind in with text; folio larger drawings to size of text pages. 9. Contents: a. Provide Table of Contents w/ title of project, date of submission b. Provide contact info of Consultant and Contractor c. Schedule of products and systems, indexed to content of volume. d. For each product or system: list names, contact info of subcontractors and suppliers, including local source of supplies and replacement parts. e. Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation. f. Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. g. Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.</p>	<p>3. Equipment and Systems: 1. Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.</p> <p>4. Materials and Finishes: 1. Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products. 2. Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.</p> <p>5. Spare Parts: 1. Provide spare parts, in quantities specified in individual specification sections.</p> <p>6. Maintenance Materials: 1. Provide maintenance and extra materials, in quantities specified in individual specification sections. 2. Provide items of same manufacture and quality as items in Work. 3. Deliver to site, location as directed; place and store.</p> <p>7. Special Tools: 1. Provide special tools, in quantities specified in individual specification section. 2. Provide items with tags identifying their associated function and equipment.</p> <p>8. Storage, Handling and Protection: 1. Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.</p> <p>9. Warranties and Bonds: 1. Develop warranty management plan to contain information relevant to Warranties. 2. Warranty management plan to include required actions and documents to assure that Owner receives warranties to which they are entitled. 3. Provide list for each warranted equipment, item, feature of construction or system. 4. Assemble approved information in binder and submit upon acceptance of work. 5. Warranty Tag: tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Consultant.</p>

Project
JACK BAGLEY PARK REDEVELOPMENT NANAIMO BC

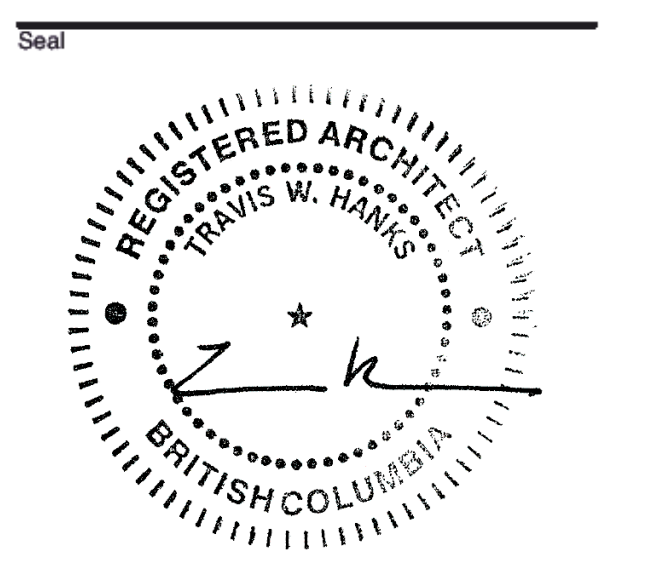
Owner / Client
REGIONAL DISTRICT OF NANAIMO



Consultant

Consultant Team

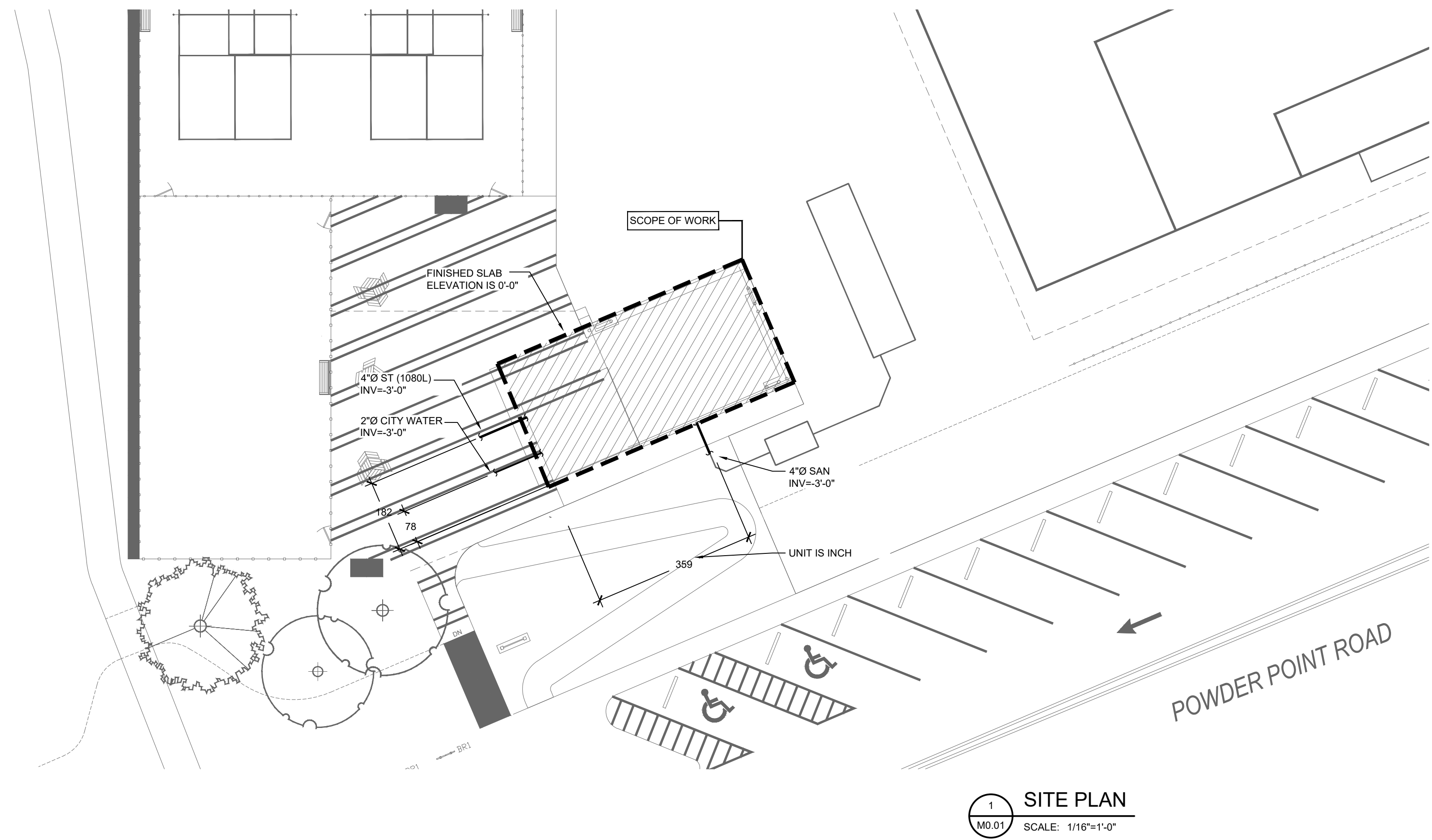
Issues / Revisions
No. Date YMD Notes
A 2021-07-07 ISSUED FOR 95% DD
2021-10-05 ISSUED FOR TENDER



Sheet Title
SCHEDULES

Project ID 2004 Drawn JR Checked TH
Scale AS NOTED Date SEPTEMBER 17, 2021
Sheet No.

A6.00



1 SITE PLAN
 M0.01 SCALE: 1/16"=1'-0"

MECHANICAL ABBREVIATIONS

AFF ABOVE FINISHED FLOOR	ENT ENTERING	MD MOTORIZED DAMPER	SPEC SPECIFICATION
BDD BACKDRAFT DAMPER	ESP EXTERNAL STATIC PRESSURE	MIN MINIMUM	ST STORM MAIN
BFP BACKFLOW PREVENTER	EXH EXHAUST	NFHB NON FREEZE WALL HYDRANT	TA TRANSFER AIR
BHP BREAK HORSEPOWER	FD FLOOR DRAIN	NC NOISE CRITERIA/NORMALLY CLOSED	TBC TO BE CONFIRMED
BTUH BRITISH THERMAL UNIT / HOUR	FE FIRE EXTINGUISHER	NO NORMALLY OPEN	TBD TO BE DETERMINED
CFM CUBIC FEET PER MINUTE	FLA FULL LOAD AMPS	NTS NOT TO SCALE	TD TRENCH DRAIN
CLG CEILING	FLR FLOOR	O/A OUTDOOR AIR	THRU THROUGH
CO CLEANOUT	FT FEET/FOOT	PRV PRESSURE REDUCING VALVE	TYP TYPICAL
CW COMPLETE WITH	GPM GALLONS PER MINUTE	PSI POUNDS PER SQUARE INCH	V VENT
CONT CONTINUATION	HB HOSE BIBB	R/A RETURN AIR	VFD VARIABLE FREQUENCY DRIVE
DCW DOMESTIC COLD WATER	IN INCH	RM ROOM	VTR VENT THROUGH ROOF
DF DRINKING FOUNTAIN	INV INVERT	RWL RAIN WATER LEADER	W WATER MAIN
DHW DOMESTIC HOT WATER	JS JANITOR SINK	S/A SUPPLY AIR	WC WATER CLOSET
DIA DIAMETER	KW KILOWATT	SF SUPPLY FAN	WCO WALL CLEANOUT
DN DOWN	KS KITCHEN SINK	SH SHOWER	
DWG DRAWING	LV LAVATORY	SK SINK DRAIN ABOVE	
E/A EXHAUST AIR	LBS POUNDS	SS STAINLESS STEEL	
ELEC ELECTRICAL	MAX MAXIMUM	SP STATIC PRESSURE	

PIPE SIZING TABLE - AVERAGE PRESSURE LOSS METHOD, TABLE A-2.6.3.1 (2)F BCPC 2018

PIPE MATERIAL	NOMINAL PIPE SIZE (MM)	COLD WATER				HOT WATER (< 140°F)			
		FU	L/S	GPM	VELOCITY (FT/S)	FU	L/S	GPM	VELOCITY (FT/S)
COPPER - TYPE L	15	2.0	0.16	2.5	3.4	2.0	0.15	2.4	3.4
COPPER - TYPE L	20	8.5	0.42	6.6	4.4	8.0	0.38	6.0	4.0
COPPER - TYPE L	25	18.0	0.81	12.9	5.0	14.0	0.65	10.3	4.0
COPPER - TYPE L	30	29.5	1.24	19.6	5.0	23.0	0.99	15.7	4.0
COPPER - TYPE L	40	47.0	1.75	27.7	5.0	34.5	1.40	22.2	4.0
COPPER - TYPE L	50	120.5	3.04	48.2	5.0	81.5	2.43	38.6	4.0
COPPER - TYPE L	65	247.0	4.69	74.4	5.0	172.5	3.75	99.5	4.0

BUILDING LOADS

DESCRIPTION	LOAD	UNITS	PIPE SIZE (MM)
DOMESTIC WATER	80.5	FU	2"Ø
SANITARY	21	FU	4"Ø @ 1%
STORM	1080	LITERS	4"Ø @ 1%

MECHANICAL DRAWING LIST

DRAWINGS NO.	DESCRIPTION	SCALE
M0.01	SITE PLANS, SCHEDULES, GENERAL NOTES & DETAILS	1/16"=1'-0"
M0.02	MECHANICAL SCHEDULES	NOT TO SCALE
M1.00	FOUNDATION PLAN	1/2"=1'-0"
M1.01	PLUMBING PLAN	1/2"=1'-0"
M1.02	HVAC PLAN	1/2"=1'-0"
M2.01	MECHANICAL SPECIFICATION I	NOT TO SCALE
M2.02	MECHANICAL SPECIFICATION II	NOT TO SCALE
M2.03	MECHANICAL SPECIFICATION III	NOT TO SCALE

PROJECT INFORMATION:

2535 POWDER POINT ROAD, NANOOSE BAY, BC

SYMBOL SCHEDULE

PIPING		SYSTEM MONITORING	
NEW		NEW	
— — — — —	DOMESTIC COLD WATER (DCW)	⊖	ROOM TEMPERATURE SENSOR
— · — · — · —	DOMESTIC HOT WATER (DHW)	⊖	FLOW SWITCH
— · — · — · —	DOMESTIC HOT WATER RECIRC. (DHWRC)	⊖	PRESSURE SENSOR
— — — — —	SANITARY VENT	⊖	
— — — — —	SANITARY SEWER ABOVE GRADE	⊖	
— — — — —	SANITARY SEWER BELOW GRADE	⊖	
— — — — —	STORM SEWER ABOVE GRADE	⊖	
— — — — —	STORM SEWER BELOW GRADE	⊖	
— — — — —	PIPE CLEAN-OUT	⊖	
— — — — —	PIPE CLEAN-OUT TO GRADE	⊖	
— — — — —	CONDENSATE DRAIN	⊖	
FITTINGS AND VALVES		DUCTWORK	
→	DIRECTION OF FLOW	⊖	SUPPLY OR OUTDOOR AIR DUCT UP
⊖	PIPE DROP	⊖	SUPPLY OR OUTDOOR AIR DUCT DOWN
⊖	PIPE RISE	⊖	RETURN AIR DUCT UP
⊖	PIPE TEE UP	⊖	RETURN AIR DUCT DOWN
⊖	PIPE TEE DOWN	⊖	EXHAUST AIR DUCT UP
⊖	PIPE UNION	⊖	EXHAUST AIR DUCT DOWN
⊖	ISOLATION VALVE (NORMALLY OPEN)	⊖	TURNING VANES
⊖	ISOLATION VALVE (NORMALLY CLOSED)	⊖	ACOUSTIC INSULATION
⊖	CHECK VALVE	⊖	BALANCING DAMPER (BD)
⊖	BALANCING VALVE	⊖	BACKDRAFT DAMPER (BDD)
⊖	PRESSURE REDUCING VALVE (PRV)	⊖	FIRE DAMPER - VERTICAL (FD)
⊖	STRAINER	⊖	DUCT OR PIPE CAP-OFF
⊖	BACKFLOW PREVENTOR (BFP)	⊖	RETURN OR EXHAUST AIR GRILLE
⊖	PRESSURE GAUGE	⊖	
OUTLETS AND DRAINS		EQUIPMENT TAGS	
⊖	HOSE-BIBB (HB)	⊖	GRILLE TYPE
⊖	FLOOR DRAIN (FD)	⊖	NECK / GRILLE SIZE
⊖	FUNNEL FLOOR DRAIN	⊖	AIR VOLUME (L/s)
⊖	ROOF DRAIN (RD)	⊖	EQUIPMENT / FIXTURE TYPE
		⊖	GENERAL NOTE
		⊖	DRAWING REVISION
		⊖	DETAIL NUMBER
		⊖	DRAWING NUMBER

MECHANICAL MOTORLIST

UNIT NUMBER	QTY	UNIT DESCRIPTION	UNIT LOCATION	ELECTRICAL LOAD				VOLT	PH	EQUIPMENT			STARTER			DISCONNECT			CONTROL			NOTES		
				MCA	FLA	KW	HP			S	I	C	S	I	C	TYPE	S	I	C	S	I		C	TYPE
HRV-1	1	AIR HANDLING UNIT HEAT RECOVERY UNIT	SERVICE ROOM	1.6				240	1	M	M	E	E	E	E	E	E	M	M	M	-	1		
DHWT-1	1	DOMESTIC HOT WATER TANK (ELECTRIC) HOT WATER TANK	SERVICE ROOM			13		240	1	M	M	E	-	-	-	-	E	E	E	M	M	M	PCS	-
UH-1	1	HEATER BASE BOARD HEATER	SERVICE ROOM			0.5		240	1	M	E	E	-	-	-	-	M	M	E	M	M	M	T	-
CP-1	1	CEILING RADIANT HEATER	TOILET ROOM			0.35		240	1	M	E	E	-	-	-	-	E	E	E	M	M	M	T	-
CP-2	1	CEILING RADIANT HEATER	TOILET ROOM			0.35		240	1	M	E	E	-	-	-	-	E	E	E	M	M	M	T	-
CP-3	1	CEILING RADIANT HEATER	STORAGE ROOM			0.35		240	1	M	E	E	-	-	-	-	E	E	E	M	M	M	T	-

SUPPLIER / INSTALL / WIRE CODES:
 MECH = MECHANICAL
 ELEC = ELECTRICAL
 G = GENERAL CONTRACTOR
 S = SUPPLIED BY
 I = INSTALLED BY
 C = CONNECTED BY

STARTER CODES:
 MAN = MANUAL STARTER
 HOA = MAGNETIC STARTER W/ HAND/OFF/AUTO SWITCH W/ AUX CONTACTS
 MAG = MAGNETIC STARTER CW AUX STATUS CONTACTS
 MRR = MOTOR RATED RELAY, 24 VAC COIL & MOTOR PROTECTION SWITCH
 PCS = PACKAGED CONTROL SYSTEM
 VFD = VARIABLE FREQUENCY DRIVE
 RVS = REDUCED VOLTAGE STARTER
 WS = WALL SWITCH
 CP = CONTROL PANEL

CONTROL DEVICE CODES:
 AQUA = PUMP CONTROLLED BY AQUASTAT
 BMS = BLDG MANAGEMENT SYSTEM
 ES = END SWITCH
 ET = LINE VOLTAGE T'STAT
 FA = FIRE ALARM
 FAP = FIRE ALARM PANEL
 FS = FLOW SWITCH
 GS = GAS SENSOR
 H = HUMIDITY SENSOR
 I = INTERLOCK, SEE NOTES
 LIGHT = WIRED TO LIGHT SWITCH
 LS = LEVEL SWITCH
 OS = OCCUPANT SENSOR
 PS = PRESSURE SWITCH
 R. STAT = REVERSE ACTING THERMOSTAT
 TC = TIME CLOCK
 T = LOW VOLTAGE T'STAT OR SENSOR
 TS = TAMPER SWITCH
 VS = VARIABLE SPEED SWITCH
 WS = WALL SWITCH

GENERAL NOTES:
 A. ALL FIRE ALARM DEVICES WIRED BY ELECTRICAL
 B. CONTROL PANELS ARE SHIPPED LOSS & REQUIRE FIELD WIRING
 C. PCS EQUIPMENT REQUIRES SINGLE SOURCE POWER CONNECTION, UNLESS NOTED OTHERWISE
 D. CP, VFD EQUIPMENT REQUIRES POWER WIRING TO AND FROM CONTROL PANEL TO CONTROLLED EQUIPMENT

NOTES:
 1. BY REMOTE CONTROLLER
 2.
 3.
 4.

Issues / Revisions

No.	Date	YMD Notes
1	2020-09-01	ISSUED FOR COORDINATION
2	2021-04-01	ISSUED FOR BP REVIEW SET
3	2021-04-15	ISSUED FOR 75%DD
4	2021-07-08	ISSUED FOR 95%DD/BP
5	2021-09-03	ISSUED FOR BP/TENDER
6	2021-10-05	ISSUED FOR TENDER

Seal

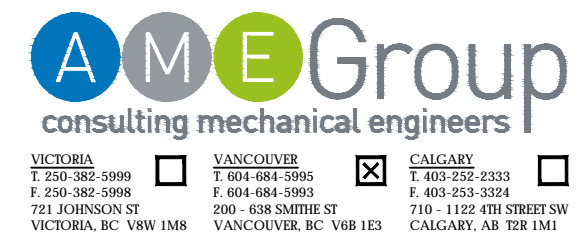
Permit to Practice No: 1000236

J. H. F. CHUNG
 # 45553
 REGISTERED PROFESSIONAL ENGINEER

2021-09-03

Sheet Title
**SITE PLAN, SYMBOL SCHEDULE
 AND GENERAL NOTES**

Project ID: 000b-1039-20 Drawn: BB Checked: MK/JC
 Scale: 1/16"=1'-0" Date: SEP 03, 2021
 Sheet No. **M0.01**



RADIANT CEILING PANEL (ELECTRIC)									
EQUIPMENT TAG	QTY	LOCATION	MANUFACTURER	MOUNTING TYPE	MODEL	HGT CAP (KW)	ELEC (V/PH/Hz)	NOTES	
CP-1	1	TOILET ROOM	BERKO	CEILING	CP372F	0.35	240/1/60	ALL	
CP-2	1	TOILET ROOM	BERKO	CEILING	CP372F	0.35	240/1/60	ALL	
CP-3	1	STORAGE ROOM	BERKO	CEILING	CP372F	0.35	240/1/60	ALL	

NOTES:

- W/ SURFACE MOUNTING FRAME
- COLOUR SELECTED BY ARCHITECT
- W/ P/E SWITCH - FACTORY PREWIRED TO HEATERS
- W/ LINE VOLTAGE WALL T-STAT

DIFFUSERS AND GRILLES					
EQUIPMENT TAG	DESCRIPTION/TYPE	MANUFACTURER	SERVICE	MODEL NUMBER	NOTES
S-1	LOUVERED FACE GRILLE	EH PRICE	SUPPLY	520D	ALL
R-1	LOUVERED FACE GRILLE	EH PRICE	REUTRN	535D	ALL
L-1	EXTRUDED DRAINABLE LOUVER	EH PRICE	O/A & E/A	DE 635	1,2,3

NOTES:

- PROVIDE DIFFUSERS AND GRILLES WITH BORDER STYLES THAT ARE COMPATIBLE WITH ADJACENT WALLS AND CEILING SYSTEMS. REFER TO ARCHITECTURAL DRAWINGS.
- NC LEVELS BASED ON OCTAVE BANDS 2-7 SOUND POWER LEVELS MINUS A ROOM ABSORPTION OF 10 DB, MEASURED PER ASHRAE 70-91.
- FINAL COLOUR OF PRODUCT TO BE SELECTED BY THE ARCHITECT DURING THE SHOP DRAWINGS SUBMITTAL PROCESS.
- C/W OPPOSED BLADE DAMPER

PLUMBING FIXTURE SCHEDULE		
EQUIPMENT TAG	MANUFACTURER / MODEL	DESCRIPTION/TYPE
LAV-1	FRANKE BOWL / WT500C-8	BOWL: WALL HUNG BASIN 18GA TYPE 304 STAINLESS STEEL, BRUSHED FINISH EXPOSED SURFACE - REAR OVERFLOW, FAUCET LEDGE.
	CHICAGO FAUCETS / 797-V1000ABCP 797	19-11/16"(W) x 17-9/16" (L) x 5-7/8"(H).
		FAUCET: TWO HANDLES LAVATORY FAUCET, CHROME PLATED FINISH, LEAD FREE, CAST BRASS BODY, 2.2 GPM VANDAL RESISTANT PRESSURE
		COMPENSATING SOFTFLO AERATOR, 2" METAL VANDAL PROOF CANOPY WING HANDLES WITH BLUE AND RED INDEX BUTTONS
	MCQUIRE - LFH170BV / 8872C P-TRAP	ACCESSORIES: CHROME PLATED FINISH POLISHED BRASS, 1/4 TURN BALL VALVE ANGLE STOPS, 5" HORIZONTAL EXTENSION TUBE, CONVERTIBLE
		1/4 TURN LOOSE KEY HANDLES, ESCUTCHEON AND FLEXIBLE COPPER RISERS, P-TRAP, CHROME PLATED FINISH, HEAVY CAST BRASS BODY W/ SLIP NUT
		W/ CLEANOUT, SEAMLESS TUBULAR WALL BEND.
	WATTS / CA-311 CARRIER	CARRIER: STEEL HANGER PLATE, HEAVY GAUGE EPOXY COATED STEEL OFFSET UPRIGHTS WITH WELDED FEET SUPPORTS, 4" MINIMUM WALL THICKNESS
		FOR ONE UNIT, 6" FINISHED METAL STUD WALL TO BACK OF PIPE SPACE FOR TWO TO SIX UNITS IN A ROW
	LAWLER / TMM-1070 MIXING VALVE	MIXING VALVE: BELOW DECK MECHANICAL WATER MIXING VALVE, BRONZE BODY, TEMP ADJUSTING DIAL, HIGH TEMP THERMOSTATIC LIMIT STOP, SHUT OFF W/ AUTOMATIC RESET WHEN EXCEEDS 120F, INTEGRAL CHECKS.
WC-1		FLOOR MOUNTED TOILET - BACK OUTLET, SATIN FINISH, 14 GA TYPE 304 STAINLESS STEEL SEAMLESS WELD CONSTRUCTION - ELONGATE BOWL
	ACORN / 1685-W-2-FV-HET-1.28-GW	BLOWOUT JET FLUSHING ACTION, INSTALLED ON FINISHED WALL, 80 PSI MAX WORKING PRSSURE, 14"(W) x 24-1/4" (L) x 15" (H).
FD-1	WATTS / FD-100-B	FLOOR DRAIN W/ ROUND HEAVY DUTY STRAINER, EPOXY COATED CAST IRON FLOOR DRAIN W/ ANCHOR FLANGE, REVERSIBLE CLAMPING COLLAR W/ PRIMARY AND SECONDARY WEEPHOLES, ADJUSTABLE HEAVY DUTY ROUND HELL PROOF NICKEL BRONZE STRAINER, AND NO HUB OUTLET.
		QUARTERHORSE 1/4 TURN NON FREEZE WALL HYDRANT W/ INTEGRAL VACUUM BREAKER AND STAINLESS STEEL KEYED BOX
HB-1	JAY R SMITH / 5509QT	

NOTES:

- PROVIDE TEE, ADAPTORS AND FLEX FOR FITTINGS.
- PROVIDE FLOOR FLANGES FOR CONNECTING PIPE DRAINS OFF FIXTURES

DOMESTIC WATER HEATER (ELECTRIC)									
EQUIPMENT TAG	LOCATION	MANUFACTURER	MODEL	INPUT (KW)	MAX FLOWRATE (GPM)	AMPS	POWER (V/PH/Hz)	SHIPPING WEIGHT (LBS)	NOTES
DHWT-1	SERVICE	EEMAX	EEM24013	13	4.8	54	240/1/60	7	ALL

NOTES:

- C/W DRAIN PAN.
- C/W VACUUM RELIEF VALVE.
- C/W COMPRESSION FITTINGS.
- 150 MAX WORKING PRESSURE
- REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.

REDUCED PRESSURE BACKFLOW PREVENTER									
EQUIPMENT TAG	QTY	LOCATION	SERVICE	BACKFLOW PREVENTOR TYPE	MANUFACTURER	MODEL NO.	SIZE (IN)	MAX WORKING PRESS. (PSI)	NOTES
DCVA-1	1	SERVICE	DOMESTIC COLD WATER	DCVA	WATTS	LF007	2	175	ALL
DCVA-2	1	SERVICE	IRRIGATION	DCVA	WATTS	LF007	2	175	ALL

NOTES:

- LEAD FREE (NO EXCEPTIONS)
- PROVIDE AIR GAP CONNECTION FITTING

HEAT RECOVERY UNIT VENTILATOR SCHEDULE									
EQUIPMENT TAG	QTY	LOCATION	MANUFACTURER	MODEL	SUPPLY & EXHAUST SIDE (2 FANS)			ELEC (V/PH/Hz)	NOTES
					AIR FLOW (CFM)	MCA	ESP ("W.G.)		
HRV-1	1	SERVICE ROOM	DAIKIN	VAM300GVJU	240	1.6	0.26	240/1/60	ALL

NOTES:

- C/W WASHABLE FILTER
- 3 SPEED MODE (EX:H:L), DEFROST MODE
- C/W REMOTE CONTROLLER (INDEPENDENT SYSTEM)
- VIBRATION ISOLATION

UNIT HEATER (ELECTRIC)											
EQUIPMENT TAG	QTY	LOCATION	MANUFACTURER	TYPE	MOUNTING TYPE	MODEL	AIR FLOW (CFM)	HGT CAP (MBH)	LINE AMPS (A)	ELEC (V/PH/Hz)	NOTES
UH-1	1	SERVICE ROOM	QMARK	HORIZONTAL	CEILING	MWUH5004	270	17.0	20.9	240/1/60	ALL

NOTES:

- AUTOMATIC FAN DELAY OPERATION
- COLOUR SELECTED BY ARCHITECT
- BUILT IN THERMOSTAT
- HIGH LIMIT THERMAL CUTOUT
- C/W DISCONNECT SWITCH DS-30
- C/W MOUNTING BRACKET KIT

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5	2021-09-03	03	ISSUED FOR BP/TENDER
6	2021-10-05	05	ISSUED FOR TENDER



2021-09-03



Issues / Revisions

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Seal
 Permit to Practice No: 1000236

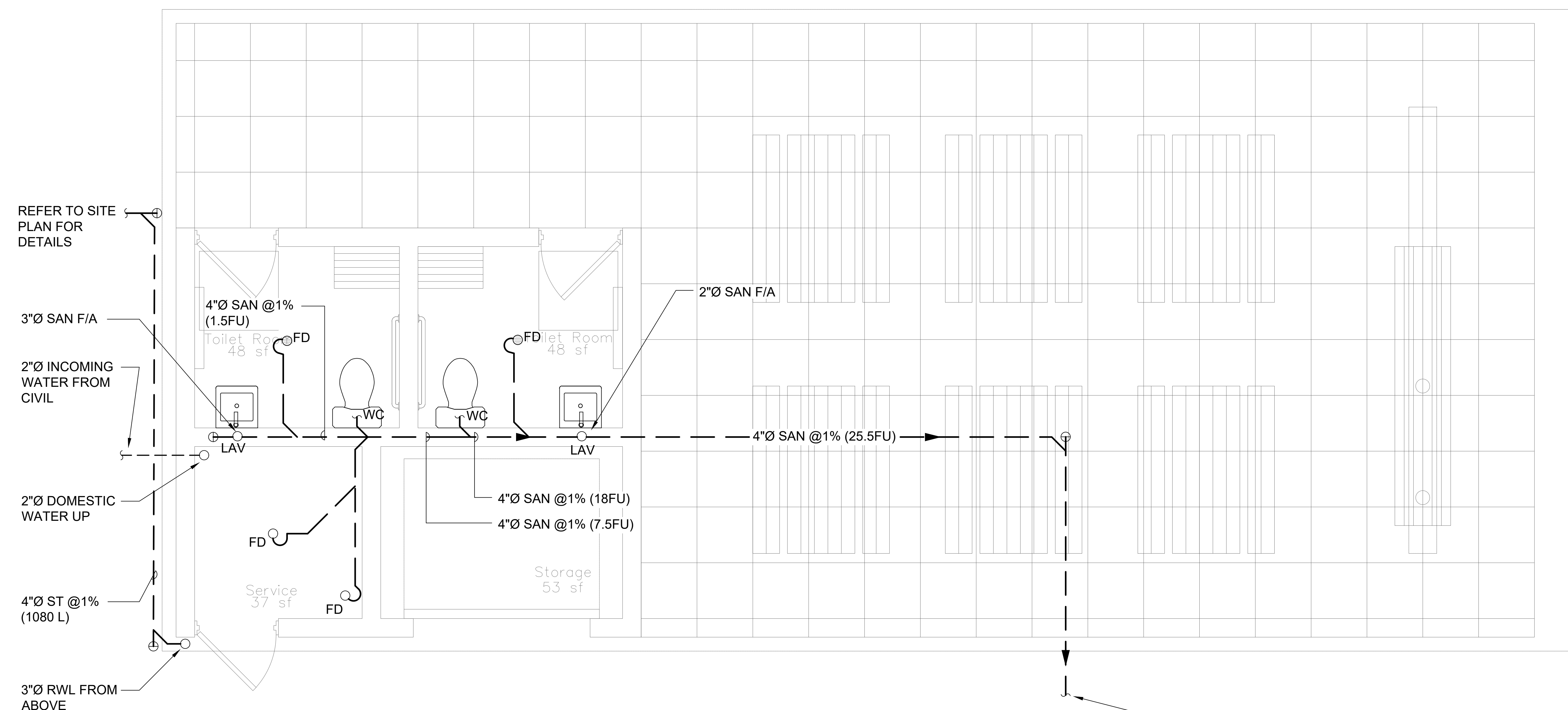


2021-09-03

Sheet Title
 PLUMBING PLAN

Project ID 000b-1039-20	Drawn BB	Checked MK/JC
Scale 1/2" = 1'-0"	Date SEP 03, 2021	
Sheet No.		

M1.01



REFER TO SITE PLAN FOR DETAILS

3"Ø SAN F/A

2"Ø INCOMING WATER FROM CIVIL

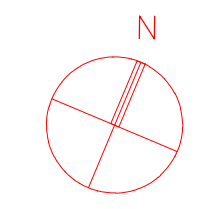
2"Ø DOMESTIC WATER UP

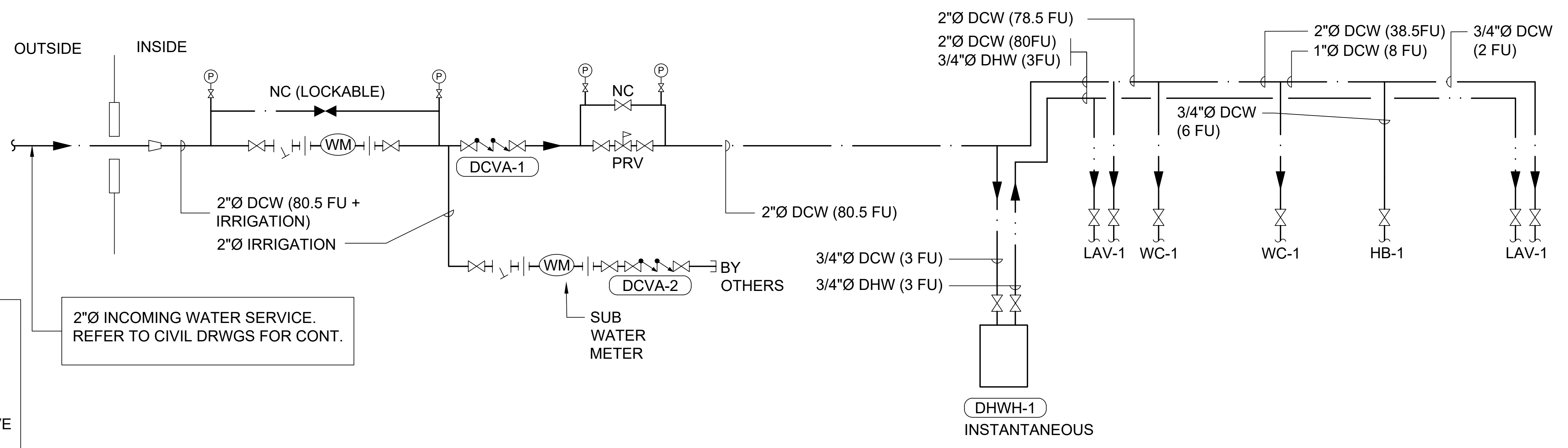
4"Ø ST @1% (1080 L)

3"Ø RWL FROM ABOVE

1 FOUNDATION PLAN
 SCALE: 1/2" = 1'-0"

REFER TO SITE PLAN FOR DETAILS





- GENERAL NOTES:**
1. PROVIDE WATER HAMMER ARRESTORS ON BRANCH SUPPLIES CONNECTED TO GROUP FIXTURES, FLUSH VALVES, AND ALL QUICK-CLOSING DEVICES, AND INSTALL COMPLETE WITH ACCESSIBLE ISOLATION VALVE
 2. REFER TO THE SCHEMATIC FOR PIPE SIZE

2"Ø INCOMING WATER SERVICE. REFER TO CIVIL DRWGS FOR CONT.

2 PLUMBING SCHEMATICS
M1.01 SCALE: NTS

Project
JACK BAGLEY PARK
WASHROOM PAVILION
NANAIMO BC

Owner / Client
REGIONAL DISTRICT OF NANAIMO

Architect



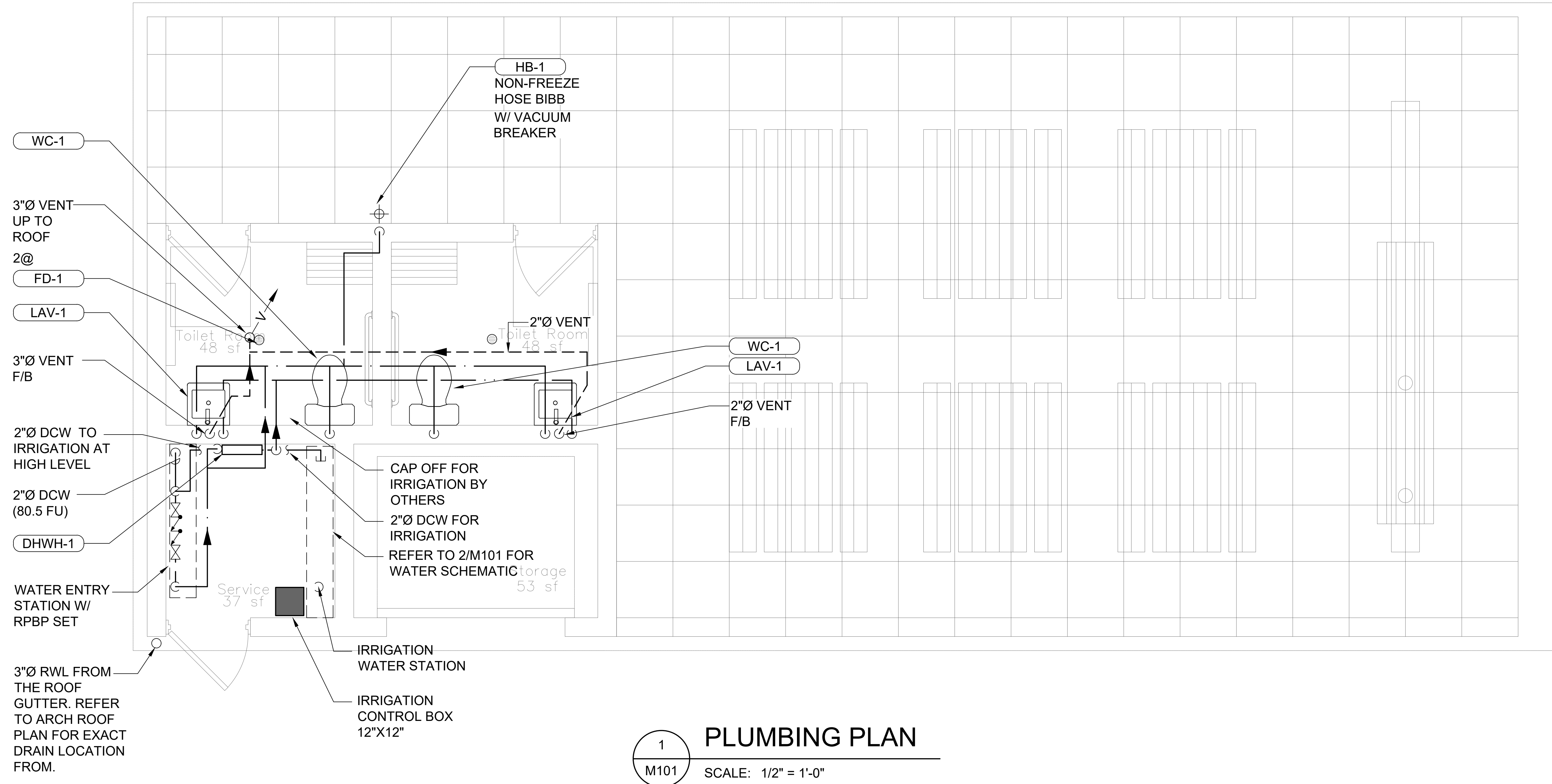
Consultant



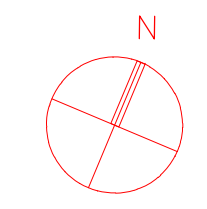
Consultant Team

Issues / Revisions

No.	Date	YMD	Notes
1	2020-09-01		ISSUED FOR COORDINATION
2	2021-04-01		ISSUED FOR BP REVIEW SET
3	2021-04-15		ISSUED FOR 75%DD
4	2021-07-08		ISSUED FOR 95%DD/BP
5	2021-09-03		ISSUED FOR BP/TENDER
6	2021-10-05		ISSUED FOR TENDER



1 PLUMBING PLAN
M101 SCALE: 1/2" = 1'-0"



Seal

Permit to Practice No: 1000236



2021-09-03

Sheet Title

PLUMBING PLAN

Project ID 000b-1039-20 Drawn BB Checked MK/JC

Scale 1/2" = 1'-0" Date SEP 03, 2021

Sheet No.

M1.01

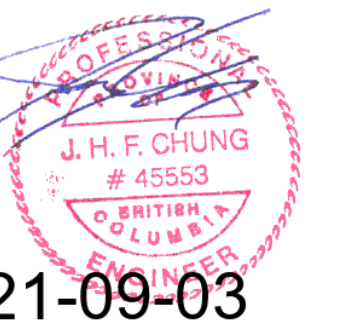


Issues / Revisions

No.	Date	YMD Notes
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5	2021-09-03	ISSUED FOR BP/TENDER
6	2021-10-05	ISSUED FOR TENDER

Seal

Permit to Practice No: 1000236



2021-09-03

Sheet Title

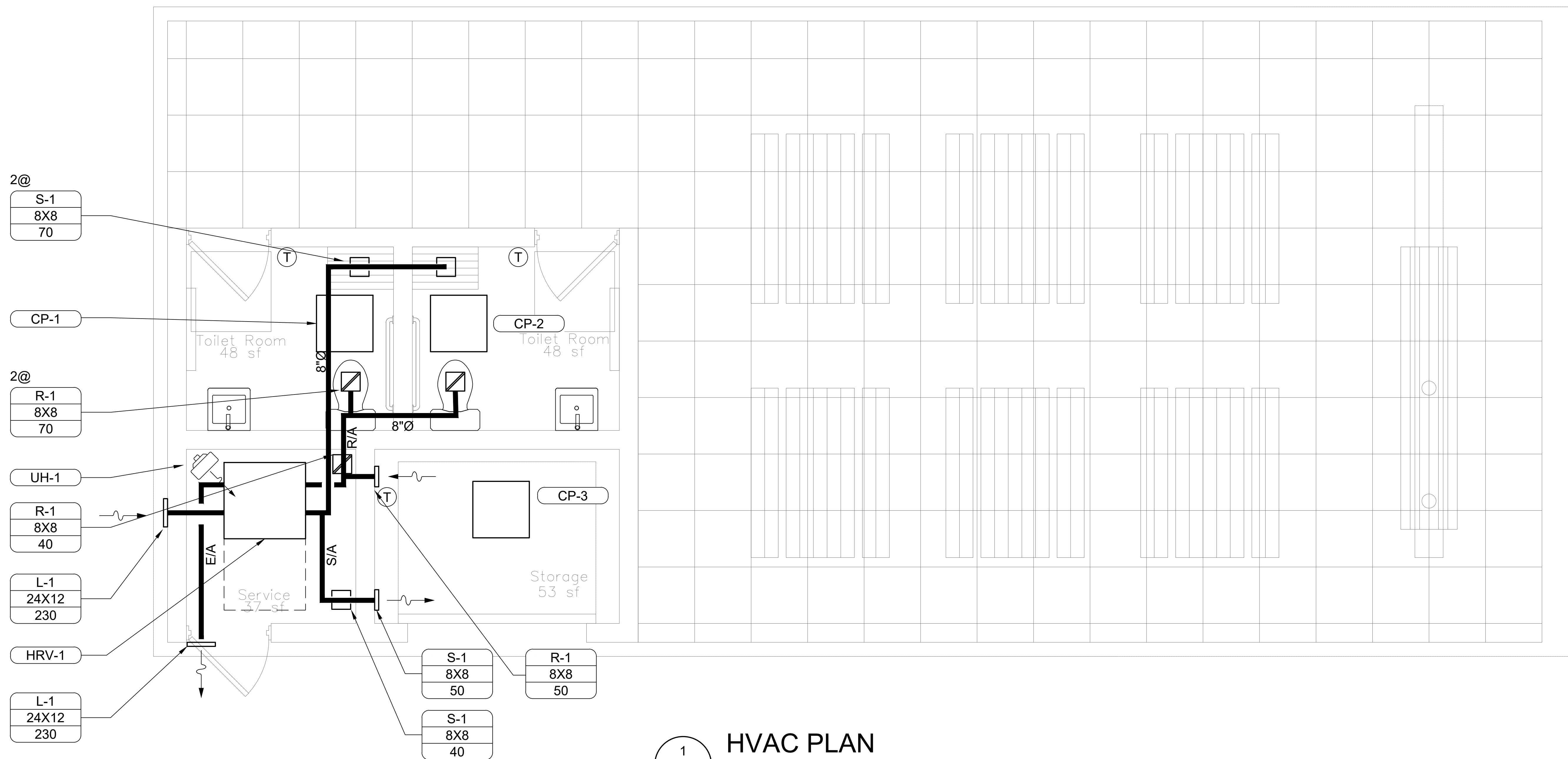
HVAC PLAN

Project ID: 000b-1039-20 Drawn: BB Checked: MK/JC

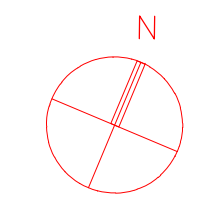
Scale: 1/2" = 1'-0" Date: SEP 03, 2021

Sheet No.

M1.02



1 HVAC PLAN
 SCALE: 1/2" = 1'-0"



COMMON WORKS

1. General

1.1 Code Compliance, Permits and Fees

All work shall comply with current editions of the National, Provincial and Municipal Codes, Standards, Acts and Bylaws and will meet the requirements of the Authority having jurisdiction.

Obtain all permits and pay all fees applicable to the scope of work. Contractor shall arrange for inspections of the work by the authorities having jurisdiction and shall provide certificates indicating Final Approval.

1.2 Tender Price Breakdown

Submit a tender price breakdown within thirty (30) days of tender closing and before first progress claim, in a format agreed to with the Consultant. As a minimum include equipment, materials and labour for Mechanical, Plumbing, Sheet Metal, Fire Protection and Controls.

1.3 Submittals

Comply with Division 1 - Submission and Closeout Procedures and in addition the following:

Closeout Submittals: Provide a minimum of two (2) mechanical operation and maintenance manuals and one digital copy, prepared by the TAB Contractor.

Operation and maintenance manual approved by, and final copies deposited with the Consultant a minimum of 7-days before final inspection.

Operation and maintenance manual to include but not limited to: Layman's description of the systems and associated controls; Operational instructions, servicing, maintenance, operation and trouble-shooting instructions for each item of equipment; Warranties; Equipment manufacturer's performance datasheets indicating point of operation as left after commissioning is complete; Testing, adjusting and balancing reports.

Record Drawings: Consultant will provide 1 set of white prints at contractors cost to mark changes as work progresses and as changes occur. Use different colour waterproof ink for each service. Do not use pencil or black ink. Transfer information weekly to show work as actually installed. Drawings shall be available on a weekly basis for review by the Consultant.

Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

Submit to Consultant for approval and make corrections as directed.

Submit completed CAD record drawings with final Operating and Maintenance Manuals within two (2) weeks of substantial completion. Failure to submit drawings will result in the work being undertaken by the Owner and deducted from the Contractor's hold back amount. Cost to transfer record information onto reproducible media & Auto-CAD disks are this contractor's responsibility. Consultant will release drawings to contractor after signing a copyright form. Should the Contractor choose to utilise this consultant for transferring as built information, allow \$400 / sheet for all drawings in the construction set. This will cover costs for drafting time & printing costs.

1.4 Quality of Work

All work shall be by qualified tradesmen with valid Provincial Trade Qualification Certificates. Spot checks will be made by the Consultant. Work which does not conform to standards may be rejected by the Consultant. The Contractor shall redo rejected work to the accepted standard at no cost to the Owner.

1.5 Metric Conversion

All units are expressed in SI units. On all submittals (shop drawings etc.) use the same SI units as stated in the specification.

Where pipes are specified with metric dimensions and Imperial sized pipes are available, provide equivalent nominal Imperial sized pipe as indicated in the table, and provide at no extra cost adapters to ensure compatible connections to all metric sized fittings, equipment and piping.

When CSA approved SI Metric pipes are provided, the Contractor shall provide at no extra cost adapters to ensure compatible connections between the SI Metric pipes and all new and existing pipes, fittings, and equipment.

EQUIVALENT NOMINAL DIAMETER OF PIPES

15mm = NPS ½

20mm = NPS ¾

25mm = NPS 1

30mm = NPS 1-1/4

40mm = NPS 1-1/2

50mm = NPS 2

65mm = NPS 2-1/2

75mm = NPS 3

100mm = NPS 4

150mm = NPS 6

200mm = NPS 8

The Metric duct sizes are expressed as 25 mm = 1 inch.

1.6 Drawings and Specifications

Should any discrepancy appear between drawings and specifications obtain written clarification from the Consultant during the tender period. Without a written clarification the better quality and/or greater quantity of work or materials shall be estimated, performed and furnished within the tendered price.

1.7 Cutting, Patching and Coring

Provide holes and sleeves, cutting and fitting required for mechanical work. Relocate improperly located holes and sleeves. All work shall be coordinated with other trades.

Obtain written approval from the Structural Consultant before cutting or burning structural members.

1.8 Installation of Equipment

Pipe all equipment drains to building drains except systems containing glycol.

Unions and flanges shall be provided in piping or ductwork to permit easy removal of equipment.

Maintain permanent access to equipment for maintenance.

1.9 Equipment and Materials

Where two or more products of the same type are required, products shall be of the same manufacturer.

Notify the Consultant in writing ten (10) days prior to the tender close, any materials or equipment specified which is not currently available or will not be available for use as called for herein. Failing this, the contract will assume that the most expensive alternate has been included in the tender price.

Approved equivalents and/or alternatives to specified products shall be equal to the specified product in every respect, operate as intended, and meet the space, capacity, and noise requirements outlined.

The Contractor shall be fully responsible for any additional labour and materials required by any trades or other Contractors to accommodate the use of other than specified materials or equipment. The Contractor shall bear any and all costs for design/system modifications to accommodate the "alternate" equipment. Extras will not be approved to cover such work.

1.10 Delivery, Storage and Handling

Store materials and equipment in accordance with the manufacturer's recommendations in a clean, dry, well-ventilated area.

Replace defective or damaged materials with new.

1.11 Access Doors

Provide access doors for maintenance or adjustment of all parts of the mechanical system.

Provide 300 mm x 300 mm minimum size for inspection and hand access.

600 mm x 600 mm minimum size, larger if indicated on drawings, where entry is required and access is difficult.

1.12 Escutcheons and Plates

Provide escutcheons and plates on all piping and ductwork passing through finished walls, floors, and ceilings.

1.13 Guarantee / Warranty

Furnish a written guarantee stating that all work executed in this contract will be free from defective workmanship and materials for a period of one (1) year from the date of Substantial Performance.

1.14 Balancing

The approved balancing agencies are: Western Mechanical; K.D. Engineering, Flotech Mechanical, Blue Collar Group.

The approved balancing agencies are: Big Sky Balancing Co., Enviro-Metrics Technical Services Ltd., Hydro-Air Technical Services, Perfection-Aire Ltd., and Tabtek Air & Hydronics Ltd.

Balance exhaust fans and air outlets to air quantities indicated on the drawings and in this specification. Where outlet quantities are not indicated, divide capacity equally among all outlets.

Submit [two (2) copies] [a PDF copy] of the report to the Consultant within two (2) weeks after substantial completion. Failure to submit the report within the specified time will result in the work being done by the Owner and the costs deducted from final payment.

Balancing shall be performed to the following:

Air-Terminal Outlets ±10%

Air-Central Equipment ±5%

Provide a drop test of all fire dampers and a letter/certificate confirming this work.

Cooperate with the Balancing Agency and make any corrections as required by Balancing Agency.

Provide balancing valves and dampers, pulleys, sheaves etc. as requested by the Balancing Agency and/or necessary to properly adjust or correct the systems to design flows, without additional cost to Owner.

1.15 Commissioning and Demonstration

Be responsible for the performance and commissioning of all equipment supplied and re-used under Divisions 22 and 23 [including [plumbing fixtures,] [and tanks]].

At the conclusion of commissioning, demonstrate the operation of the systems to the consultant and then to the owner's operating staff.

At the completion of the commissioning, testing, balancing and demonstration submit to the consultant a letter certifying that all work specified under this contract is complete, clean and operational in accordance with the specification and drawings.

1.16 Vibration Isolation

Provide neoprene isolators for deflections 6mm (1/4") and under.

Provide either neoprene or steel spring isolators for deflections between 6mm and 12mm (½").

Provide steel spring isolators for deflections of 12mm (½") and over.

Provide adjustable limit stops for spring isolation mounts on equipment with operating weights substantially different from the installed weights

All spring isolators shall be "open spring" unless otherwise stated. Seismically rated housed spring isolators may be used in lieu provided that they meet this project's requirements for seismic restraint.

Select isolators in accordance with equipment weight distribution to allow for an average deflection meeting or exceeding the specified deflection requirements and so that no isolator has a deflection less than 80% of the static deflection specified. A minimum of 4 isolators are required for each piece of equipment, unless specified otherwise.

1.17 Substantial and Total Performance

Prior to requesting an inspection for Substantial Performance, provide a complete list of items, which are deficient.

A certificate of Substantial Performance will not be granted unless the following items are completed and available to the Owner's Consultant:

Final Plumbing Inspection Certificate from the Authority having Jurisdiction.

Final Backflow Prevention test reports for all backflow devices.

Draft Operating/Maintenance Manuals have been submitted for review.

All mechanical systems have been commissioned and are capable of operation with alarm controls functional and automatic controls in operation.

Air and water systems have been balanced with draft report submitted to the Consultant.

Operating and Maintenance demonstrations have been provided to the Owner.

Record drawings have been submitted.

All previously identified deficiencies have been corrected and accepted.

Prior to a Total Performance Inspection provide declaration in writing that substantial performance deficiencies have been corrected and final TAB reports and O&M manuals have been submitted.

The Consultant shall provide one (1) visitation for the purpose of total performance inspection. Subsequent visitations if required shall be at the expense of the Contractor.

2. PRODUCTS

2.1 Acceptable Manufacturers

2.2 Pipe Hangers and Supports

Provide hangers and supports to secure equipment in place, prevent vibration, protect against damage from earthquake, maintain grade, provide for expansion and contraction, and accommodate insulation.

Natorium: All hangers and supports shall be epoxy coated in the Natorium

Provide galvanized hangers and supports for all piping except hangers and supports shall be copper plated or epoxy coated for copper piping.

Toggle hangers and/or strap hangers shall not be used for pipe hangers.

Power actuated fasteners and "drop-in" anchors shall not be used.

Provide ring type hangers for piping up to NPS 1½ and clevis type hangers for piping over NPS 1½.

2.3 Access Doors

Drywall Surface: Extruded aluminum frame with gypsum board inlay and structural corner elements. Hinge to be concealed 2-point hinge, non-corroding with screwdriver operated cam latch.

Tile Surface: Universal design, stainless steel door (16ga) and stainless steel frame (18ga), door flush to frame, rounded safety corners, continuous concealed hinge, screwdriver operated cam latch, #4 satin stainless steel finish.

Plaster Walls and Ceiling: steel door (14ga) and steel frame (14ga), door flush to frame edge, expansion casing bead and 75 mm wide galvanized lath surround recessed 18 mm to receive plaster, continuous concealed hinge, screwdriver operated cam latch, prime coat grey painted finish.

Ductwork: Ultra low leakage type, flat oval design, galvanized steel frame (22ga), double skin galvanized steel door (22 ga) with 25mm insulation fully enclosed in panel, bulb type seal integrally fastened to door, lever cam locks. Provide stainless steel in lieu of galvanized steel in stainless steel ductwork.

Acceptable manufacturers: Maxam, Acudor, Milcor, Can.Aqua, Mifab, Bilco, Baucoplus

2.4 Identification

Identify piping with labels and flow arrows. Provide identification at 15m (50ft) maximum intervals, before and after pipes passing through walls, at all sides of tees, behind access doors. Use Brady B-500 vinyl cloth labels for non insulated pipes and B-350 for insulated pipes.

Provide 20mm (3/4") diameter brass tags, secure to valve stems with key chain. Provide a valve directory at all mechanical rooms, in the O&M manuals and a digital copy cross referenced with any associated controls nomenclature.

Each piece of equipment shall be identified with its equipment schedule identification, e.g. supply fan SF-1, cooling coil CC-1, pump P-1 with lamacoid plates having 6mm (1/4") minimum letter size.


Acceptable manufacturers: Brady

Project
JACK BAGLEY PARK WASHROOM PAVILION NANAIMO BC
Owner / Client


REGIONAL DISTRICT OF NANAIMO

Architect

Consultant

Consultant Team

<small>VICTORIA P. 250.382.5099 F. 250.382.5098 211 BROADVIEW ST VICTORIA, BC V8W 1M8</small>
<small>VANCOUVER P. 604.684.5994 F. 604.684.5995 100-108 HARRIS ST VANCOUVER, BC V6B 1E3</small>
<small>CALGARY P. 403.253.3323 F. 403.253.3324 710-1125 02 STREET SW CALGARY, AB T2R 1M1</small>

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5 2021-09-03 ISSUED FOR BP/TENDER
6 2021-10-05 ISSUED FOR TENDER

Seal

2021-09-03

Sheet Title
MECHANICAL SPECIFICATION I

Project ID	Drawn	Checked
000b-1039-20	BB	MK/JC
Scale	Date	
NOT TO SCALE	SEP 03, 2021	

Sheet No.
M2.01

2.5 Vibration Isolation

Neoprene Washer/Bushing: A one piece molded bridge bearing neoprene washer/bushing. The bushing shall surround the anchor bolt and have a flat washer face to avoid metal to metal contact. Use washer/bushing only on light-weight equipment.

Acceptable manufacturer: Mason HG hemi grommet or equal

Neoprene Pad Isolators: Neoprene or neoprene / steel / neoprene pad isolators. Minimum static deflection 2.5 mm (0.1") or greater.

Acceptable manufacturer: Mason WMSW or equal

Rubber Floor Mounts: Bridge bearing neoprene mountings. Minimum static deflection of 5mm (0.2") or greater and all directional seismic capability.

Acceptable manufacturer: Mason RAA or ND or equal

Spring Floor Mounts: Spring isolators built into a ductile iron or steel housing to provide all directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of 6mm (1/4") travel in all directions before contacting the resilient snubbing collars. Molded neoprene cup or 1/4" (6mm) neoprene acoustical friction pad between the baseplate and the support. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.

Acceptable manufacturer: Mason SSLFH or equal

Spring Hangers: Hangers shall consist of rigid steel frames containing minimum 32mm (1 1/4") thick neoprene elements at the top and a steel spring seated in a steel washer reinforced neoprene cup on the bottom. Provide a combination rubber and steel rebound washer as the seismic upstop for suspended piping, ductwork and equipment. Rubber thickness shall be a minimum of 6mm (1/4"). Colour coded springs, rust resistant, painted box type hangers. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring.

Acceptable manufacturer: Mason HD, HS or equal

Alternate vibration isolation acceptable manufacturers, Korfund, Vibro-Acoustics

1. EXECUTION

3.1 Painting Repairs and Restoration

Do painting in accordance with Division 09 - Interior Painting. Prime and touch up marred finished paintwork to match original. Restore to new condition, finishes which have been damaged.

Clean exposed bare metal surfaces supplied under Divisions 21, 22, 23 and 25. Apply at least one coat of corrosion resistant primer paint to all supports and equipment fabricated from ferrous metal.

3.2 Demonstration

Supply tools, equipment, personnel to demonstrate and instruct the operating, and maintenance personnel in operating, controlling, adjusting, trouble-shooting, and servicing of all systems and equipment during regular work hours, prior to acceptance.

3.3 Firestopping and Smoke Seals

The Owner's Consultant shall conduct mandatory destructive reviews for each type of installation. Destructive testing shall be at the discretion of the Owner's Consultant and Authority having jurisdiction

Allow for destructive testing of 5% of fire stopping applications. Should installations not conform to manufacturer's listed assembly, an additional 25% of installations may be destructively tested and should there be more failures, the contractor will be responsible to remove all fire stopping products and reinstall products correctly, at no additional cost to the project..

Tag all penetrations and every 3 meters of joint seal with printed tags. Tags shall Indicate product, system #, date installed, installed by: (name and phone number of subcontractor) and re-penetrated by & date.

Tags shall state: CAUTION! FIRESTOP - DO NOT REMOVE, PUNCTURE OR DISCONTINUE UNLESS PREPARED TO RE-SEAL IMMEDIATELY WITH SPECIFIED PRODUCT

Comply with manufacturer's instructions for installation of through-penetration joint materials. Where possible, use metal sleeves for floor penetrations to prevent/mitigate the consequences of leakage or flooding.

Perform under this section patching and repairing of firestop caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.4 Pipe Hangers and Supports

Pipe support spacing and hanger rod diameter shall be:

Pipe Size: NPS 1/2 Rod Diameter 9mm (3/8"), Spacing 1.8m (6')

Pipe Size: NPS 3/4 to 1½ Rod Diameter 9mm (3/8"), Spacing 2.4m (8')

Pipe Size: NPS 2 to 2½ Rod Diameter 9mm (3/8"), Spacing 3m (10')

Pipe Size: NPS 3 to 4 Rod Diameter 16mm (5/8"), Spacing 3.6m (12')

3.5 Pipe Pressure Testing

Advise Consultant or project manager 48 hours minimum prior to performance of pressure tests.

Hydrostatic test: 150% of working pressure, but not less than 860 kPa (125 psig). For PP-R piping, do not exceed 1034 kPa (150 psi). For PEX piping, do not exceed 690 kPa (100 psi). Maintain test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

Conduct tests in presence of construction manager or project manager.

Examine all joints for leaks and remake all leaking joints with new materials. Pay costs for repairs or replacement, retesting, and making good. Consultant to determine whether repair or replacement is appropriate.

Insulate or conceal work only after approval and certification of tests by authorities.

Pressure test all gas piping in accordance with CSA B149.1. Purge all piping after pressure tests in accordance with CSA B149.1.

Submit copies of pressure test reports for all sections of piping.

3.6 Access Doors

Provide all access doors required to access work installed by Divisions 21, 22, 23 and 25. Be responsible for coordinating locations, cutting opening and installing panels. Any secondary supports, blocking etc. will be by the ceiling or wall contractor. Ensure that equipment is within view and accessible for operating, inspecting, adjusting, servicing without using special tools.

3.7 Vibration Isolation

Neoprene Washer/Bushing: Isolate variable frequency drive controller using neoprene washer/bushing isolators or soft grommets such that structure borne noise transmission to occupied space is less than airborne noise transmission.

Rubber Floor Mounts: Mount in-line pumps on two (2) rubber floor mount isolators under each support foot. For equipment mounted on a slab on grade mount on rubber floor mount isolators unless otherwise specified. Provide protection of the rubber element from contact with oil in the mechanical room.

Spring Floor Mounts: Isolate all floor or pier mounted equipment on spring floor mount isolators, unless otherwise specified.

Spring Hangers: Locate isolation hangers as near to the overhead support structure as possible. Installation shall permit hanger box or rod to move through a 30 degrees arc without metal to metal contact. All discharge ductwork runs for a distance of 15m (50') from the connected equipment shall be isolated from the building structure by means of spring hangers. Spring deflection shall be a minimum of 19mm (0.75").

DIVISION 22 PLUMBING

1. GENERAL

1.1 Section Scope

Piping, valves and specialties serving building water distribution systems to 1m (36") outside the building and sanitary and storm drain waste and vent piping, equipment and accessories between plumbing fixtures to 1m (36") from the building.

1.2 Cleanouts

Provide sanitary and storm piping cleanouts at all changes in direction, at the ends of all horizontal runs, at the base of every stack, where drains leave the building; where shown on the drawings and in compliance with the local plumbing code, bylaws and ordinances.

Provide caulked or threaded type cleanouts extended to finished floor wall surface.

Provide bolted cover plate clean outs on vertical rainwater leaders only. Ensure ample clearance at clean out for rodding of drainage system.

2. PRODUCTS

2.1 Pipe and Fittings

Sanitary and Storm Drainage, and Vent (above grade) shall be DWV Copper, cast Iron class 4000, PVC-15 schedule 40

Sanitary and Storm Drainage and Vent (below grade inside building to 1m outside) shall be cast Iron class 4000, PVC-DWV schedule 40 or ABS-DWV (solid core) schedule 40.

2.2 Valves

Wherever possible all valves shall be of one manufacturer.

Grooved valves shall be of the same manufacturer as the adjoining couplings.

Provide valves with manufacturer's name and pressure rating clearly marked on outside of body. All valves must be suitable in all respects for service used.

All valves shall have a Provincial CRN number which is current.

Ball Valves 2 NPS and under shall be low lead forged brass body, 2 piece body, full port, chrome plated ball, PTFE seats, blow out proof stem, adjustable packing nut, for domestic water service, class 4140 kPa (600 psi) W.O.G.

Gate Valves 2 NPS and under shall be lead free bronze body, solid wedge disc, bronze or stainless steel trim, non-rising stem, for domestic water service, Class 1380 kPa (200 psi) W.O.G.

Globe Valves 2 NPS and under shall be lead free bronze body, swivel type stainless steel disc, union bonnet, for domestic water service, class 1380 kPa (200 psi) W.O.G.

Check Valves 2 NPS and smaller shall be lead free bronze swing check with bronze disc capable of being reground, Y pattern, suitable for domestic water use, class 1380 kPa (200 psi) W.O.G.

Circuit Setter Valve (for domestic hot water recirculation) shall be screwed, lead free brass, regulating valve suitable for potable water, combination P/T test points with EPT inserts/check valves, drain port, memory stop handle with graduated markings, positive shut off, 1035 kPa @ 93°C (150 psi @ 200°F) rating.

Pressure Reducing Valve NPS 1 and smaller shall be lead free copper silicon alloy body or low lead bronze body, SS integral strainer, renewable SS seat, serviceable inline, built in bypass check valve, suitable for hot and cold water potable water. Rated at maximum inlet pressure of 2100 kPa (305 psi) and 82°C (180°F) temperature.

Pressure Reducing Valve NPS 1-¼ NPS to NPS 2 shall be pilot operated with low flow bypass, diaphragm actuated globe valve, lead free, bronze body or ductile iron to ASTM A536. Lead free bronze, stainless steel or ductile iron internals. All ductile iron components including body and cover shall be lined and coated with epoxy coating.

Backflow Preventers Double Check Valve Assembly (DCVA) shall be 2 NPS and smaller, lead free cast copper silicone alloy body, twin positive seat check modules, captured springs, replaceable check module seats and discs, two isolation valves, test cocks and a bronze strainer. Comply with CSA B64.5 and AWWA C510

Reduced Pressure Backflow Assembly (RPBA) shall be 2 NPS and smaller, lead free cast copper silicone alloy body, pressure differential relief valve, replaceable check module seats and discs, two isolation valves, test cocks and a strainer. Comply with CSA B64.4 and AWWA C511.

Strainers shall be ¼ - 2 NPS threaded ends, bronze body, 1034 kPa (150 psi) rating.

Water Hammer Arrestors shall be bellows type with welded stainless steel nesting bellows or piston style and

stainless steel casing. Air chambers are unacceptable.

2.3 Preformed Pipe Insulation

Preformed insulation, fine fibrous glass or formed mineral fibre pipe insulation with all service jacket vapour retarder (ASJ). ASJ shall be re-enforced with glass fibre, factory applied with pressure sensitive lap closure. Maximum "K" value at 38°C (100°F) = 0.035 W/m.°C (0.24 Btu.in/hr.ft2.°F). Acceptable manufacturers: Manson Insulation, Knauf, Roxul, Johns Manville, Fibrex

Thermocanvas finishing jacket: fire rated, 170g (6 oz.) fire retardant canvas jacket for covering mechanical insulation indoors, 25/50 fire class, plain wave cotton, no dyes.

PVC finishing jacket: white, UV resistant, for indoor or outdoor applications, 25/50 fire class, minimum 0.50 mm (0.02") thick.

Aluminum finishing jacket: 0.51 mm (22 ga.) thick stucco or smooth aluminum jacketing with longitudinal slip joints and 50mm (2") end laps with factory applied protective liner on interior surface.

2.4 Cleanouts

Floor - Unfinished Area: Cast iron floor level cleanout assembly with extra heavy duty, round, adjustable, scoriated, secured cast iron top and no-hub outlet. Suitable for heavy traffic

Floor - Finished Area: General areas shall be cast iron cleanout with extra heavy duty round, adjustable, scoriated, secured nickel bronze top, and no-hub outlet. Foot traffic areas with sheet goods flooring shall be cast iron floor level cleanout assembly with a square adjustable nickel bronze top with 6mm (1/8") tile recess, and no-hub outlet. Carpeted floor area subject to foot traffic shall be cast iron floor level cleanout assembly with round, adjustable, scoriated, nickel bronze top and carpet clamping frame.

Wall - Finished Area shall be concealed drainage line in a finished wall: Cast iron cleanout tee and cast iron countersunk plug with stainless steel round cover and screw.

3. EXECUTION

3.1 Piping

Pipe connections NPS 1½ and less shall be soldered or screwed joint unless noted otherwise. For PEX, use cold expansion fittings installed with tools as recommended by the fitting manufacturer.

Pipe connections NPS 2 shall be screwed joint for liquid systems unless noted otherwise.

Pipe connections NPS 2½ and larger shall be welded or flanged unless noted otherwise.

3.2 Pressure Testing

Advise Consultant or project manager 48 hours minimum prior to performance of pressure tests.

Use only potable water for testing of potable water systems.

Test pressure shall be the greater of 1.5 times maximum system operating pressure or 860 kPa for 8 hours. For PEX piping, do not exceed 690 kPa (100 psi).

Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

Insulate or conceal work only after approval and certification of tests by authorities.

Submit copies of pressure test reports for all sections of piping.

3.3 Valves

Install all valves in accordance with manufacturer's recommendations.

Install valves in accessible locations with stems upright or angled 45° above horizontal unless approved otherwise. Valves must be accessible without removing adjacent piping.

Install control valves with their stems upright unless approved otherwise and with adequate clearance for removal of actuators.

Provide stem extensions on all insulated valves.

Provide full port ball valves in piping 50 mm (2") and smaller and butterfly valves in piping 65 mm (2-½") and larger for shut-off, equipment isolation, throttling, bypass or manual flow control services.

Throttling valves are not to be used for shut-off; additional valves shall be installed for isolation purposes.

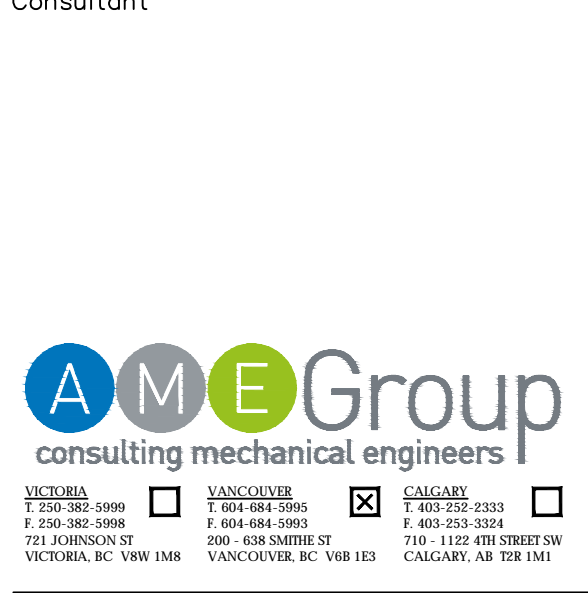
Provide isolation valves at branch take-offs, to isolate each piece of equipment, upstream of all meters, gauges, automatic air vents, and as indicated.

Use silent check valves on discharge of pumps and in vertical pipes with downward flow, and as indicated.

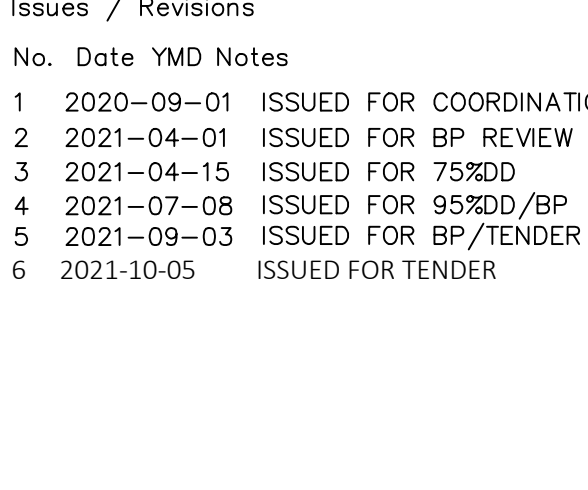
Use circuit setting globe valves complete with lock shield to control flow in circuits, except where balancing cocks are specifically specified.

Project	JACK BAGLEY PARK WASHROOM PAVILION NANAIMO BC
Owner / Client	REGIONAL DISTRICT OF NANAIMO
Architect	

Consultant	
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Consultant Team	
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Issues / Revisions			
No.	Date	YMD	Notes
1	2020-09-01	ISSUED FOR COORDINATION	
2	2021-04-01	ISSUED FOR BP REVIEW SET	
3	2021-04-15	ISSUED FOR 75%DD	
4	2021-07-08	ISSUED FOR 95%DD/BP	
5	2021-09-03	ISSUED FOR BP/TENDER	
6	2021-10-05	ISSUED FOR TENDER	

Seal	
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Permit to Practice No: 1000236	
2021-09-03	
Sheet Title	

Project ID	Drawn	Checked
000b-1039-20	BB	MK/JC
Scale	Date	
NOT TO SCALE	SEP 03, 2021	

Sheet No.	M2.02
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3.4 Piping Insulation Minimum Thickness Schedule (ASHRAE 90.1)

Hot water 41°C to 60°C (106-141°F):

Pipe diameters up to NPS 1¼ = 25mm minimum thickness

Pipe diameters NPS 1-½ and larger = 40mm minimum thickness

Cold water above 5°C (41°F):

All pipe diameters = 25mm minimum thickness

Note: Where the thermal conductivity of a proposed insulation is greater than specified, the thickness will be increased by the ratio of U2/U1.

U2 = proposed insulation “k” value at the table mean rating temperature.

U1 = upper range limit “k” value from the table above.

3.5 Piping Finish Schedule

Indoors concealed; factory finish

Indoors exposed in mechanical room and elsewhere; canvas jacket

Indoors, exposed in utility areas, parkade, etc.; PVC jacket

Outdoors; metal jacket

3.6 Safes, Flashing and Vent Terminals

Provide flexible flashing and metal counter flashing where piping penetrates weather or waterproofed walls and floors.

CPE, Chloraloy 240 lining or lead material may be used at floor drains and cleanouts. Chloraloy shall be solvent welded to manufacturer's installation instructions. Lead shall not be used on roofs where the roofing material is applied by a torch-on method.

Flash floor drains in floors with topping over occupied areas with lead or CPE membrane, a minimum of 300mm (12") clear on sides with minimum 900mm x 900mm (36" x 36") sheet size. Fasten flashing to drain clamp device.

DIVISION 23 HVAC

1. GENERAL

1.1 System Cleaning and Chemical Treatment

Employ services of the existing building's water treatment firm or if there is not one, a firm specializing in hydronic system chemical treatment. This firm shall submit a schedule of work to be performed, chemical types and quantity to be used. At the completion of the chemical treatment a report shall be submitted to outline the work performed and details of procedures to be used by the building operator for continued water quality testing and chemical treatment.

Provide test kits as required along with adequate chemicals and reagents for one year of testing. Appropriate test kits will be provided to properly test each system installed under this contract.

Clean and flush all new hot and cold closed loop water system piping. Provide a certificate for this work.

1.2 Grilles, Louvres and Diffusers

Airflow tests and sound level measurement shall be made in accordance with applicable ADC equipment test codes, ASHRAE Standards and AMCA Standards.

Manufacturer shall certify catalogued performance and ensure correct application of air outlet types.

Outside louvers shall bear AMCA seal for free area and water penetration.

Project Conditions: Review requirements of outlets as to size, finish and type of mounting prior to submitting shop drawings and schedules of outlets. Positions indicated are approximate only. Check locations of outlets and make necessary adjustments in position to conform with Architectural features, symmetry, and lighting arrangement.

2. PRODUCTS

2.1 Ductwork and Accessories

Provide ductwork constructed, reinforced, sealed, and installed to withstand 1-½ times the working static pressure.

Provide Low Pressure Ductwork 500 Pa (2" W.G.) for supply ductwork and plenums on systems without terminal mixing boxes or air valves, supply ductwork downstream from terminal mixing boxes or air valves, outdoor air ductwork and plenums, return air ductwork and plenums, exhaust and relief air ductwork and plenums, unless noted otherwise.

Low pressure insulated flexible ductwork shall be equal to Thermaflex Type M-KC.

2.2 Duct Sealing

Duct sealing low pressure ductwork 500 Pa (2" W.G.) and under shall be SMACNA seal class A. Seal all supply, return and exhaust duct joints, longitudinal as well as transverse joints as follows:

Slip Joints: Apply heavy brush-on high pressure duct sealant. Apply second application after the first application has completely dried out. Where metal clearance exceeds 1.5 mm (1/16") use heavy mastic type sealant.

Flanged Joints: Soft elastomer butyl or extruded form of sealant between flanges followed by an application of heavy brush-on high pressure duct sealant.

Other Joints: Heavy mastic type sealant.

Duct sealing medium pressure ductwork to 1000 Pa (4"W.G.) shall be the same as 500 Pa ductwork except provide a combination of woven fabrics and sealing compound followed by an application of high pressure duct sealant.

Duct tapes as a sealing method are not permitted, except on residential ductwork - minimum 2 wraps

of 2" wide (50mm) foil duct tape is acceptable.

Do not insulate any section of the ductwork until it has been inspected and approved of duct sealant application, by the Consultant.

2.3 Duct Hangers and Supports

Hangers and Supports to SMACNA standards.

Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

Maximum size duct supported by strap hanger: 500 mm.

Hangers: Galvanized steel angle with galvanized steel rods to SMACNA.

Toggle hangers and/or strap hangers shall not be used.

Power actuated fasteners and “drop-in” anchors shall not be used.

2.4 Duct and Breaching Insulation

Round Ducts and Concealed Rectangular Ducts: External flexible insulation, service temperature 5°C to 232°C (41°F to 450°F), glass fiber or mineral fiber flexible blanket for low and medium temperature applications, all service aluminum foil-scrim kraft (FSK) vapour barrier jacket with glass fibre reinforcement, factory applied. Density 12kg/m3 (0.75PCF), Minimum RSI 0.49/25mm (R 2.8/in) (installed)

2.5 Ductwork Finish Jackets

Thermocanvas Jacket: fire rated, 170g (6 oz) fire retardant canvas jacket for covering mechanical insulation indoors, 25/50 fire class, plain wave cotton, no dyes.

Utility Finish: Over rigid insulation for rectangular ductwork and flexible insulation for round ductwork. Apply continuous metal corner bead to all corners. Adhere vapor retarder tape over all joints and breaks in vapor retarder, and at all corners.

Aluminum Jacket: 51 mil (22 ga.) thick stucco or smooth aluminum jacketing with longitudinal slip joints and 50mm (2") end laps with factory applied protective liner on interior surface.

2.6 Grilles, Louvres and Diffusers

Acceptable Manufactures for Air Terminals: E.H. Price, Titus, Anemostat, Nailor.

Acceptable Manufacturers for Louvres: Airoilite, Penn, Airstream, West Vent, Nailor, Ruskin.

Provide baffles to direct air away from walls, columns or other obstructions within the radius of diffuser operation.

Provide plaster frame for diffusers located in plaster surfaces and anti-smudge frames or plaques on diffusers located in rough textured surfaces such as acoustical plaster.

Provide 30 mm margin frame on grilles with [concealed fastening].

Provide opposed blade balance damper, accessible from grille face on all grilles located in drywall ceilings or bulkheads.

Fabricate goosenecks of minimum 1.3 mm (18 ga.) galvanized steel. Mount on minimum 300 mm (12 in.) high curb base where size exceeds 225 mm x 225 mm (9 in. x 9 in).

Refer to Grilles and Diffuser schedule for types and capacities.

Capacity as scheduled.

3. EXECUTION

3.1 Ductwork and Accessories

Fabricate ductwork in accordance with SMACNA Duct Construction Standards - metal and flexible, NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems, and NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems

Prior to fabrication of ductwork, check all ceiling spaces and heights and conflicts with other trades.

Duct sizes indicated are inside clear dimensions. For acoustically lined or internally insulated ducts allow for insulation thickness and maintain interior clear dimensions indicated.

Connect outlet terminals to low pressure ducts with 900mm (36") maximum length of stretched flexible duct. Hold in place with strap or clamp, caulk sealed. Do not use flexible duct to change directions.

Provide a flexible connection where low pressure ducts are connected to fan equipment, terminal boxes or any other apparatus. Joint shall be screwed or bolted flexible gasketed joint, minimum 50mm (2") wide.

Provide fire dampers where ducts cross fire separations. Fire dampers shall be ULC listed and “dynamic”; rated to close under airflow. Refer to architectural drawings for fire separation ratings and locations.

Provide balancing dampers where indicated on drawings and at points on low pressure supply, return and exhaust ducts where branches are taken from larger ducts.

Modify ceiling system where required to accommodate grilles and diffusers.

Size round ducts, installed in place of rectangular ducts, from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by permission from the Consultant.

Exposed round ductwork to be spiral lock seam type only.

Provide duct hangers and supports in accordance with SMACNA manuals.

Confirm the existing base building standards prior to submitting tender.

Ductwork shall be galvanized steel unless noted otherwise.

3.2 Duct Hangers and Supports

Duct support shall be:

Up to 750mm duct size: angle size 25x25x3 mm with 6mm rod size

For concrete: manufactured concrete inserts.

For steel joist: manufactured joist clamp.

For steel beams: manufactured beam clamps.

3.3 Valves

Install valves in accessible locations with stems upright or angled 45° above horizontal unless approved otherwise. Valves must be accessible without removing adjacent piping.

Provide stem extensions on all insulated valves.

Provide ball valves in piping NPS 2 and smaller and butterfly valves or gate valves in piping NPS 2-½ and larger for shut-off, equipment isolation, throttling, bypass or manual flow control services. Ball valves used for shut-off / isolation shall be full port.

Throttling valves are not to be used for shut-off; additional valves shall be installed for isolation purposes.

Provide isolation valves at branch take-offs, to isolate each piece of equipment, upstream of all meters, gauges, automatic air vents, and as indicated.

Provide isolation valves in all systems such that floor by floor for horizontal systems, all risers in vertical systems and zone areas on a large horizontal system can be isolated.

Use swing or soft seated spring loaded check valves in horizontal and vertical up-flow pipes and on the discharge of pumps. Spring loaded water check valves shall be located eight (8) pipe diameters downstream of pumps or elbows. Use silent check valves on discharge of pumps and in vertical pipes with downward flow, and as indicated.

Do not install balancing or throttling valve on discharge of pumps equipped with VFD. Install pressure ports for flow measurement.

3.4 Duct and Breaching Insulation

Duct Insulation Minimum Thickness Table (ASHRAE 90.1 Zone 5 and 6)

Rigid Exterior Duct Insulation				
Duty	Plenum(4)	Duct Location		
		Interior		Exterior
		Conditioned Space	Unconditioned Space	
Minimum Insulation Thickness in mm (in.)				
Cooling Only Air Supply	25 (1")	25 (1")	40 (1-1/2")	50 (2")
Heating or H/C Air Supply	25 (1")	25 (1")	40 (1-1/2")	75 (3")
Outdoor Air Supply	40 (1-1/2")	40 (1-1/2")	40 (1-1/2")	0
Combustion Air	40 (1-1/2")	40 (1-1/2")	40 (1-1/2")	0
Return Air	0	0	40 (1-1/2")	75 (3")
Exhaust Air (1)(2)	0	0	25 (1")	25 (1")
Grease Hood Exhaust (5)	N/A	40 (1-1/2")	40 (1-1/2")	0
Tempered Air Supply or Makeup Air	0	0	40 (1-1/2")	75 (3")
Mixed Air (3)	25 (1")	25 (1")	40 (1-1/2")	75 (3")
See note (6) for factory installed duct and plenums				

Note (1): Air temperatures 15°C to 49°C (60°F to 120°F).

Note (2): Provide 38mm (1-½") flexible duct insulation on all exhaust air ductwork from outside wall or roof to damper but a minimum of 1.5 m (5 ft.) inside building.

Note (3): Mixed Air includes tempered air downstream of heat recovery units.

Note (4): Plenums located outside the building shall be insulated to the values listed in the exterior column.

Note (5): Provides 1 hour fire rating. Thickness shall be doubled for 2 hour applications.

Note (6): Factory installed ductwork and plenums provided with equipment need not comply with this table provided they meet the requirements of the relevant CSA Standard for that equipment and is insulated to RSI 0.58 (R3.3) or greater. Refer to NECB article 5.2.12.1 for relevant CSA Standards.

3.5 Duct Finishes Table

Indoors concealed; factory finish

Indoors exposed in mechanical room and elsewhere; canvas jacket as per TIAC standard CRF/1 - CRD/1

Indoors, exposed in utility areas, parkade, etc.; Utility finish as per TIAC code CRF/2 - CRD/2

Indoor exposed in utility areas, parkade, etc. provide a utility finish as per TIAC code CRF/2 and CRD/2

Outdoors; aluminum jacket as per TIAC code CRF/3 - CRD/3

Sizes NPS 1-½ to 8 - 50mm thick.

Heating water piping 61-93°C (142-200°F) in a conditioned space:

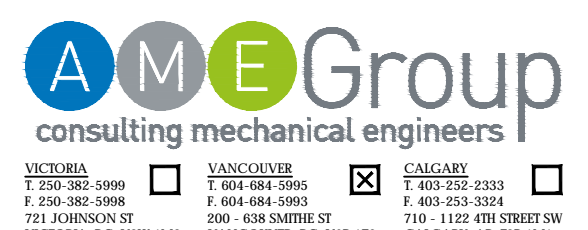
Sizes NPS 1 to NPS 1-¼ - 40mm thick.

Sizes NPS 1-½ to 8 - 50mm thick.

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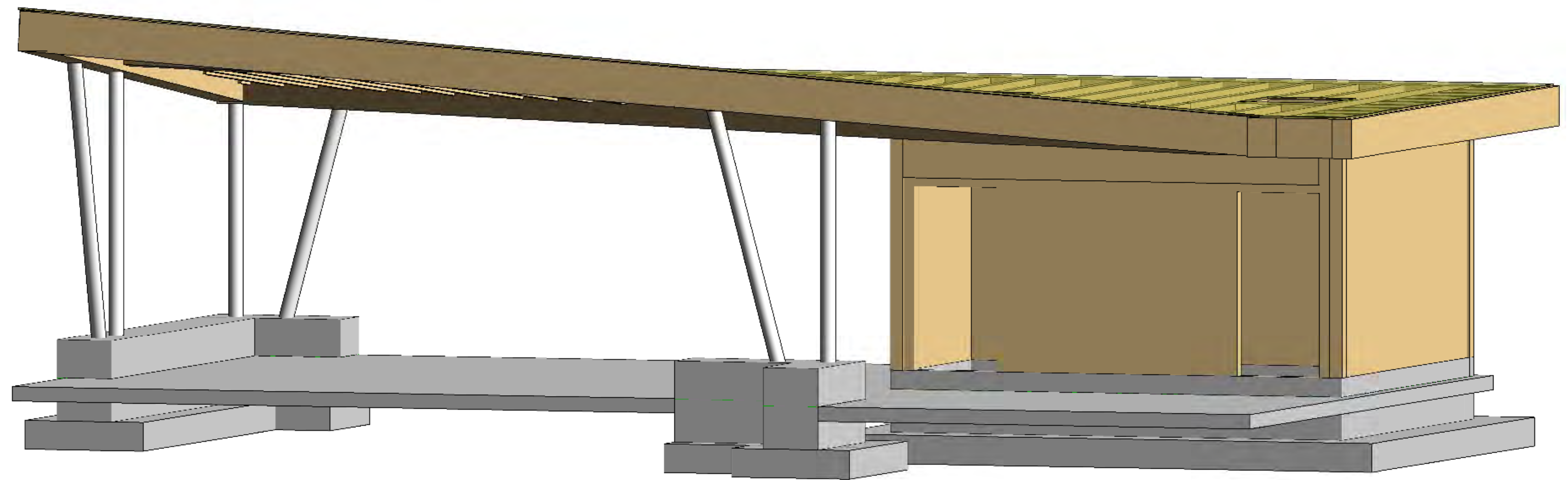
Architect	
Consultant	

Consultant Team	 VICTORIA 1 250 382 3999 F. 250 382 3998 213 BROADVIEW ST VICTORIA, BC V8W 1M8	VANCOUVER F. 604 484 3999 F. 604 484 3995 100-108 HARRIS ST VANCOUVER, BC V6B 1E3	CALGARY F. 403 253 3323 F. 403 253 3321 710 1125 052 STREET SW CALGARY, AB T2R 1M1
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Consultant Team

Issues / Revisions			
No.	Date	YMD	Notes
1	2020-09-01	ISSUED FOR COORDINATION	
2	2021-04-01	ISSUED FOR BP REVIEW SET	
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6	2021-10-05	ISSUED FOR TENDER	

Seal					
Permit to Practice No:	1000236				
2021-09-03					
Sheet Title	MECHANICAL SPECIFICATION III				
Project ID	000b-1039-20	Drawn	BB	Checked	MK/JC
Scale	NOT TO SCALE	Date	SEP 03, 2021		
Sheet No.	M2.03				



NOTE: THIS DRAWING IS
HALF SCALE WHEN PRINTED
TO 11" x 17" FORMAT

PRELIMINARY
FOR DISCUSSION ONLY
SUBJECT TO REVISION

DESIGN PHASE

No.	DESCRIPTION	BY	DATE
4	IFT		2021.10.05
3	IFT		2021.09.15
2	95% DD		2021.07.08
1	ISSUED FOR REVIEW		2020.10.18
REVISIONS			

Scale



REGIONAL DISTRICT OF NANAIMO

**JACK BAGLEY WASHROOM
PAVILION**

Drawn: DA	Designed Checked: DE	Date
Designed: MH	Discipline Review: JT	Date

COVER

Drawing No.

**32345
ST
01**

Sheet No.

TIMBER JOINERY SPECIFICATIONS

- TENONS:**
 - 7 1/2" (IN SMALLER DIRECTION) OR LARGER POSTS, RAFTERS OR GIRTS: 2"(W)x4 1/2"(D) TENON TYP.
 - SMALLER THAN 7 1/2" (IN SMALLER DIRECTION) BRACES AND STRUTS: 1 5/8"(W) x4"(D) TENON TYP.
 - DEPTH MAY BE REDUCED IN CASES OF TENON INTERFERENCE (SEE DETAILS)
 - BOTH SIDE WALLS OF MORTISES SHALL BE GREATER THAN OR EQUAL TO THE MORTISE WIDTH.
- HOUSINGS:**
 - 1/2" HOUSINGS FOR BRACES AND STRUTS
 - MIN. 1" HOUSINGS OR SLOPED SHOULDER FOR BEAMS, RAFTERS, PURLINS, JOISTS AND ALL OTHER MEMBERS. LARGER HOUSINGS MAY BE SPECIFIED.
 - MINIMUM RELISH BELOW HOUSING ON RECEIVING MEMBER TO BE 1/4 OF THE RECEIVING MEMBER DEPTH. LARGER DISTANCE MAY BE SPECIFIED.
- PEGS:**
 - 1" PEGS FOR ALL CONNECTIONS EXCEPT WHEN BOTH MALE AND FEMALE MEMBERS ARE SMALLER THAN 6" (IN SMALLER DIRECTION).
 - PEG HOLES ARE TYPICALLY 1/16" DRAUGHT BORED.
 - PEGS ARE KILN-DRIED, CLEAR, STRAIGHT-GRAIN, DEFECT-FREE WHITE OAK, SLOPE OF GRAIN LESS THAN 1:15
 - MINIMUM PEG END DISTANCE (FROM CENTER OF PEG TO END OF TENON) IS 2xPEG DIAMETERS.
 - MINIMUM PEG EDGE DISTANCE (FROM CENTER OF PEG TO FACE OF MORTISED MEMBER) IS 2.5x PEG DIAMETERS.
 - PEG SPACING IS 2.5x PEG DIAMETERS O/C U.N.O.
 - PEGS TO BE LOCATED AS CLOSE TO THE BEARING SURFACE AS POSSIBLE WITHOUT EXCEEDING ABOVE SPECIFICATIONS.
- WEDGES, SPLINES AND FREE TENONS:**
 - FABRICATED FROM CLEAR STRAIGHT-GRAIN DEFECT-FREE WOOD STOCK WITH A SPECIFIC GRAVITY EQUAL TO OR EXCEEDING THAT OF THE RECEIVING MEMBERS.
- COMMON RAFTERS:**
 - HOUSE RAFTERS 1" WHERE FLUSH FRAMED OR BIRDSMOUTH WITH 1 1/2" MINIMUM SEAT.
 - BIRDSMOUTH DEPTH NOT TO EXCEED 1/4 OF RAFTER DEPTH ATTACH W/ 3/8" SFS INTEC BLUE MAX OR GRK RSS FASTENERS (MIN. 3" PENETRATION IN SUPPORTING MEMBER).
- PURLINS AND JOISTS:**
 - HOUSE 1" INTO SUPPORTING MEMBER U.N.O.
 - ATTACHED W/ 3/8" SFS INTEC BLUE MAX OR GRK RSS FASTENERS (OPPOSING SCREWS SET AT 45 ANGLE).
- HOLD DOWNS, HANGERS AND STRAPS:**
 - SIMPSON STRONG-TIE AS SPECIFIED ON FOUNDATION OR FRAMING PLANS (BY OTHERS UNLESS SPECIFICALLY DETAILED ON THESE DRAWINGS).

SHORING NOTES

- THE DESIGN OF THE SHORING FOR THE EXCAVATION IS THE RESPONSIBILITY OF THE CONTRACTOR.
- SHORING IS NOT TO IMPOSE LOADS ON THE STRUCTURE DURING OR AFTER CONSTRUCTION.
- SHORING IS TO BE PROVIDED IN AREAS WHERE REQUIRED AND UNLESS NOTED, IS TO BE REMOVED ONCE THE FOUNDATION IS IN PLACE, AT STRENGTH AND PROPERLY AND PERMANENTLY SUPPORTED.
- UNDERPINNING AND PROTECTION OF ADJACENT STRUCTURES IS THE RESPONSIBILITY OF THE CONTRACTOR.

TIMBER FRAMING

- ALL SAWN TIMBER TO BE DOUGLAS FIR No.1 OR BETTER.
- ALL TIMBER SIZES ARE NOMINAL DIMENSIONS OF GROSS SECTION PRIOR TO SEASONING.
- CONFIRM ALL DIMENSIONS, CONNECTION GEOMETRY AND CONSTRUCTABILITY OF THE ASSEMBLIES BEFORE PROCEEDING WITH FABRICATION. REPORT DISCREPANCIES TO THE ENGINEER.
- TIMBER FRAME SUPPLIER TO SUBMIT DIGITAL PDF COPY OF SHOP DRAWINGS FOR REVIEW AND APPROVAL OF THE ENGINEER PRIOR TO PROCEEDING WITH THE FABRICATION.
- ALL CONNECTIONS TO MEET THE REQUIREMENTS OF THE APPLICABLE BUILDING CODE AND CSA 086-14 ENGINEERING DESIGN IN WOOD.
- TEMPORARY SUPPORT AND TEMPORARY BRACING OF THE TIMBER ELEMENTS DURING ERECTION AND CONSTRUCTION IS THE RESPONSIBILITY OF THE CONTRACTOR.
- PROVIDE MECHANICAL ANCHORAGE OF TIMBER FRAME POSTS TO THE FOUNDATION BY MEANS OF A FRAMING STRAP, KNIFE PLATE, OR OTHER MEANS.

MATERIAL SPECIFICATIONS

- WOOD**
- TO CONFORM WITH CSA/CAN 086.14 ENGINEERING DESIGN IN WOOD (LIMIT STATES DESIGN)
- FRAMING**
- GRADES AND TYPES TO BE AS FOLLOWS U.N.O.:
 - BEAMS & MULTI-PLY BEAMS: PARALLAM BY TRUS-JOIST MACMILLAN LTD. OR APPROVED EQUAL
 - WOOD BASED SHEATHING: ORIENTED STRANDBOARD TO CAN-0473.0-93 GRADE 0-2, PLYWOOD TO CSA 0325-07
 - STRUCTURAL JOISTS & PLANKS: SPF #2 OR BETTER
 - STRUCTURAL LIGHT FRAMING: SPF #2 OR BETTER
 - WOOD POSTS & BUILT UP COLUMNS: SPF #2 OR BETTER
 - RIM BOARD: 1 1/4" LSL 1.3E

TIMBER

- TO MEET NLGA VISUAL GRADING RULES U.N.O.:
 - SPECIES: D. FIR-L
 - GRADE: No.1 OR BETTER
- FINISH SIZE: 1/2" UNDERSIZE NOMINAL DIMENSIONS OF GROSS SECTION PRIOR TO SEASONING. (EG. 8x8 CALLED OUT = 7 1/2"x7 1/2" NOMINAL)

GLULAM

- TO MEET CAN/CSA 0122-16 REQUIREMENTS, WESTLAM OR APPROVED EQUAL
 - SPECIES: D.FIR
 - GRADE: 24F EX FOR SINGLE SPAN BEAM
 - 24F EX FOR 2 OR MORE SPAN CONTINUOUS BEAMS
 - 16c-E FOR COLUMNS

STEEL

- PROVIDE STRUCTURAL STEEL TO CSA/CAN-G40.20-13/G40.21-13 OR ASTM STANDARD A 992/A992M. THE FOLLOWING SHOULD HAVE GRADES MINIMUM OF:
 - HOLLOW STRUCTURAL SECTIONS — 350W CLASS 'C'
 - COLUMN BASE PLATES — 300W
 - MISCELLANEOUS PLATES — 260W
- ALL STRUCTURAL STEEL TO BE GALVANIZED. GALVANIZATION: TO CAN/CSA G164, HOT -DIP, MIN. ZINC COATING 610 g/m². ALL GALVANIZATION DAMAGED DURING CONSTRUCTION TO BE TOUCHED UP.
- SHOP COAT PRIMER FOR STEEL CONNECTIONS: TO CAN/CGSB-1.40.
- PAINT AND FINISHES TO ARCHITECT SPECIFICATIONS

WELDING

- WELDING TO BE METAL ARC WELDING TO CSA W59 BY WELDERS APPROVED BY THE CANADIAN WELDING BUREAU TO REQUIREMENTS OF CSA W47.1. CERTIFICATE TO BE MADE AVAILABLE UPON REQUEST.
- WELD REINFORCEMENT STEEL TO CSA W186.

HARDWARE

- TO CONFORM TO THE FOLLOWING U.N.O.:
 - BOLTS: ASTM A307, A325, A325M, A490, A490M OR F182.
 - THREADED ROD: ASTM A307
 - LAG BOLTS: ASTM A307
 - DRIFT PINS: ASTM A307 OR CSA/CAN-G40.21 300W
 - SCREWS: GRK RSS, SFS INTEC BLUE MAX OR SPAX T-STAR
 - WASHERS: MALLEABLE CAST IRON
 - SPLIT RINGS: 2 1/2"Ø OR 4"Ø AS SPECIFIED
 - SHEAR PLATES: ASTM A47 GRADE 32510
 - STEEL ROD: ASTM A449 OR ASTM A307
- HOT DIP GALVANIZE ALL HARDWARE PERMANENTLY EXPOSED TO WEATHER OR WHERE STAINING OF TIMBER IS A CONCERN. PAINT AND FINISHES TO ARCHITECT SPECIFICATION.

CONCRETE

- CAST-IN-PLACE CONCRETE AND CONSTITUENT MATERIAL SHALL COMPLY WITH CSA A23.1.
- CONCRETE SHALL BE PROPORTIONED AND PRODUCED IN ACCORDANCE WITH CSA A23.1 OR CSA A23.4.
- CONCRETE SHALL BE MIXED, PLACED AND CURED IN ACCORDANCE WITH CSA A23.1 OR CSA A23.4.

CONCRETE IS TO BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:

ELEMENT	COMPRESSIVE STRENGTH (MPa) 28 DAYS	EXPOSURE CLASS	SPECIAL REQUIREMENTS & REMARKS
FOOTINGS	35	F2	AIR 5-8% SLUMP 80 ± 30
FOUNDATION WALLS	35	F2	AIR 5-8% SLUMP 80 ± 30

EXCAVATION AND BACKFILL

- THE OWNER SHALL OBTAIN THE SERVICES OF A QUALIFIED TESTING AGENCY TO PERFORM COMPACTION TESTS AS REQUESTED BY THE ENGINEER.
- EXCAVATE TO THE LEVELS NOTED ON THE DRAWINGS FOR THE EXTENT OF THE STRUCTURE. STRIP THE OVER-EXCAVATED AREA OF ALL SILT. FOOTING LEVELS SHOWN ARE NOT FINAL AND MAY VARY ACCORDING TO SITE CONDITIONS. EXTEND ALL FOOTINGS TO A BEARING LAYER APPROVED BY THE GEOTECHNICAL ENGINEER.
- FILL TO THE DESIGN SUBGRADE WITH PITRUN GRAVEL COMPACTED TO 98% STANDARD PROCTOR DENSITY.
- KEEP EXCAVATION FREE OF WATER WHILE FILL AND CONCRETE FOUNDATION IS PLACED.
- PROTECT BOTTOM OF EXCAVATION FROM FROST. DO NOT PLACE CONCRETE ON FROZEN SOIL.
- REMOVE ALL VEGETATION, ORGANIC SOIL AND CONSTRUCTION DEBRIS FROM BUILDING AND CONSTRUCTION AREA TO EXPOSE INORGANIC SUBGRADE SOIL. THE EXPOSED EXCAVATION MUST BE INSPECTED FOR APPROVAL PRIOR TO PROOF ROLLING. PROOFROLL THE EXPOSED INORGANIC SUBGRADE SOIL TO PROVIDE A GOOD BASE FOR COMPACTING THE FIRST LIFT OF MATERIAL TO THE SPECIFIED DENSITY.
- ANY SOFT SUBGRADE SOIL ENCOUNTERED SHOULD BE SUB-EXCAVATED AND REPLACED WITH FREE DRAINING PITRUN GRAVEL. SOFT SUBGRADE SOIL WILL LIKELY BE ENCOUNTERED DURING SITE PREPARATION. COMPACT FREE DRAINING PITRUN GRAVEL TO NOT LESS THAN 95% STANDARD PROCTOR DRY DENSITY.
 - A MINIMUM OF 200 [8"] THICK NON-PLASTIC CRUSHED GRAVEL MUST BE PLACED BENEATH THE ENTIRE SLAB AND ABOVE THE PREPARED SUBGRADE SOIL. THE CRUSHED GRAVEL MUST BE UNIFORMLY COMPACTED TO 95% STANDARD PROCTOR DRY DENSITY. THE GRAVEL SHALL MEET THE FOLLOWING GRADATION STANDARD:

SIEVE SIZE	% PASSING BY WEIGHT
19mm [3/4"]	100
12.5mm [1/2"]	70-100
4.75mm [3/16"]	40-60
1.18mm [0.0469"]	25-45
0.30mm [0.0117"]	10-25
0.075mm [0.0029"]	2-12
- THE SLAB BASE GRAVEL AND SUBGRADE SOIL MUST BE PROTECTED FROM RAIN, SNOW, EXCESSIVE DRYING AND INGRESS OF FREE WATER DURING AND AFTER THE CONSTRUCTION TO PREVENT ANY FOUNDATION MOVEMENT.
- REFER TO ARCHITECTURAL DRAWINGS FOR GROUND ELEVATIONS AND DRAINAGE SLOPES.
- CONFIRM EXACT LOCATIONS OF ALL UTILITY LINES WITH RESPECTIVE UTILITY COMPANIES PRIOR TO THE COMMENCEMENT OF EXCAVATION.

ROUGH CARPENTRY

- WOOD FRAMING TO CONFORM TO NLGA STANDARD GRADING RULES FOR CANADIAN LUMBER AND CSA 086-14 ENGINEERING DESIGN IN WOOD (LIMIT STATES DESIGN)
- THE ROOF SHEATHING AND SUPPORTING ROOF MEMBERS HAVE BEEN DESIGNED AS A DIAPHRAGM. DIAPHRAGM CONNECTION REQUIREMENTS FOR THE ROOF SHEATHING ARE: 64 (2 1/2") LONG COMMON NAILS @ 75 (3") O/C AT SUPPORTED PANEL EDGE AND AT 300 (12") O/C ALONG INTERMEDIATE FRAMING MEMBERS.
- THE WALL SHEATHING AND SUPPORTING MEMBERS HAVE BEEN DESIGNED AS SHEAR WALLS. SHEAR WALL CONNECTION REQUIREMENTS FOR THE WALL SHEATHING ARE: 64 (2 1/2") LONG COMMON NAILS @ 150 (6") O/C AT SUPPORTED PANEL EDGE AND AT 300 (12") O/C ALONG INTERMEDIATE FRAMING MEMBERS.
- WIRE NAILS, SPIKES AND STAPLES TO CSA R2003.
- ALL FRAMED EXTERIOR WALLS TO BE 2x6 (38x140) @ 400 (16") O/C U.N.O. ON PLANS.
- ALL FRAMED INTERIOR WALLS (INCLUDING KNEE WALLS) TO BE 2x6 (38x140) @ 400 (16") O/C U.N.O. ON PLANS.
- SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS. NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCING WORK.

DESIGN DATA

- DESIGN CODE : BCBC 2018
- IMPORTANCE FACTOR (Is) = 1
- ROOF**
- DEAD LOADS:
- ROOFING & INSULATION ————— 0.19 kPa
- LIVE LOADS:
- ROOF ————— 1.00 kPa
- ENVIRONMENTAL LOADS:
- DESIGN SNOW LOAD (Ss) ————— 2.10 kPa
 - RAIN LOAD (S_r) ————— 0.40 kPa
- FLOOR**
- LIVE LOADS:
- WASHROOMS ————— 2.40 kPa
- WIND LOADS: HOURLY WIND PRESSURE (1/50) ————— 0.39 kPa
- SEISMIC DATA: Sa(0.2) = 0.948
 Sa(0.5) = 0.882
 Sa(1.0) = 0.525
 Sa(2.0) = 0.323
 PGA = 0.419
 SITE CLASS: D

SOIL CONDITIONS:

THE FOUNDATION HAS BEEN DESIGNED BASED ON THE GEOTECHNICAL INVESTIGATION REPORT 704-ENG.VGE03721-01 DATED JULY 6, 2020 BY TETRA TECH CANADA INC. ON THE FOLLOWING ASSUMED VALUES:

- SERVICE BEARING CAPACITY ————— 75 kPa
- ULTIMATE BEARING CAPACITY ————— 150 kPa
- FROST DEPTH ————— 0.6 m

DESIGN DEFLECTION LIMITS:

- DEFLECTION LIMITS (SERVICEABILITY) LESSER OF U.N.O.:
- ROOFS, TOTAL LOAD = SPAN / 180
 - WALLS, WIND LOAD = SPAN / 360

ABBREVIATIONS

AIFB ASPHALT IMPREGNATED FIBRE BOARD	JT. JOINT
ALT. ALTERNATE	LG. LONG
ARCH. ARCHITECTURAL	L.L. LIVE LOAD
B.C.E. BOTTOM CHORD EXTENSION	LLH LONG LEG HORIZONTAL
BLL BOTTOM LOWER LAYER	LLV LONG LEG VERTICAL
BUL BOTTOM UPPER LAYER	LSH LONG SIDE HORIZONTAL
BM. BEAM	LSV LONG SIDE VERTICAL
BOT. BOTTOM	L.V. LENGTH VARIES
BPO BAR PLACING ORDER	L.W. LONG WAY
BTWN BETWEEN	MAX. MAXIMUM
BRG. BEARING	MECH. MECHANICAL
CANT. CANTILEVER	MIN. MINIMUM
C.J. CONTROL JOINT	N.I.C. NOT IN CONTRACT
CL. CENTER LINE	N.S. NEAR SIDE
CL.R. CLEAR	N.T.S. NOT TO SCALE
COL. COLUMN	O/C ON CENTRE
CONC. CONCRETE	O.F. OUTSIDE FACE
CONT. CONTINUOUS	OPP. OPPOSITE
C.P. COMPLETE PENETRATION	OWSJ OPEN WEB STEEL JOIST
C/W COMPLETE WITH DETAIL	PLA POINT LOAD ABOVE
DET. DEAD LOAD	P/T PRESSURE TREATED
D.O. DO OVER (DITTO)	R.D. ROOF DRAIN
DP. DEEP	REINF. REINFORCING
DWG. DRAWING	R/W REINFORCED WITH
DWLS DOWELS	S.D.L. SUPERIMPOSED DEAD LOAD
E.E. EACH END	SIM. SIMILAR
E.F. EACH FACE	S.I.P. STRUCTURAL INSULATED PANEL
ELEC. ELECTRICAL	S.O.G. SLAB ON GRADE
EL. ELEVATION	STAG. STAGGERED
ELEV. ELEVATION	STR. STIRRUP
E.S. EACH SIDE	S.W. SHORT WAY
E.W. EACH WAY	TEMP. TEMPERATURE
EXIST. EXISTING	REINFORCING
EX. EXTRA	THK. THICK
EXT. EXTERIOR	THRU THROUGH
F.D. FLOOR DRAIN	T.J. TIE JOIST
F.S. FAR SIDE	TLL TOP LOWER LAYER
FTG. FOOTING	T.O. TOP OF
GALV. GALVANIZED	T.O/C TOP OF CONCRETE
G.L. GRID LINE	T.O.S. TOP OF STEEL/SLAB
H1E HOOK ONE END	TUL TOP UPPER LAYER
H2E HOOK 2 ENDS	TYP. TYPICAL
H.D.G. HOT DIPPED GALVANIZED	T & B TOP AND BOTTOM
HOR. HORIZONTAL	T & G TONGUE AND GROOVE
HORIZ. HORIZONTAL	U.N.O. UNLESS NOTED OTHERWISE
I.F. INSIDE FACE	U/S UNDERSIDE
INT. INTERIOR	VERT. VERTICAL
	WT. WALL THICKNESS
	W.P. WORK POINT

GENERAL

- THE CONTRACTOR SHALL EXAMINE ALL CONTRACT DOCUMENTS, CHECK DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER FOR CLARIFICATION PRIOR TO COMMENCING CONSTRUCTION. DISCREPANCIES NOT REPORTED ARE THE RESPONSIBILITY OF THE CONTRACTOR. CHECK AND VERIFY ALL DIMENSIONS WITH THE ARCHITECTURAL DRAWINGS BEFORE COMMENCING WITH ANY WORK. NOTIFY THE ARCHITECT OF ANY ERRORS OR OMISSIONS.
- READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH THE ARCHITECTURAL DRAWINGS.
- TEMPORARY SUPPORT AND TEMPORARY AND PERMANENT BRACING OF LOAD BEARING AND NON-LOAD BEARING ELEMENTS DURING CONSTRUCTION TO RESIST DEAD, LIVE AND CONSTRUCTION LOADS IS THE RESPONSIBILITY OF THE CONTRACTOR. DESIGN OF THE TEMPORARY SUPPORTS IS THE RESPONSIBILITY OF THE CONTRACTOR.
- DO NOT CONSTRUCT FROM THESE DRAWINGS UNLESS MARKED "ISSUED FOR CONSTRUCTION".
- THE GENERAL CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR REVIEW BY THE ENGINEER OF RECORD. ALLOW ADEQUATE TIME FOR REVIEW BY THE ENGINEER OF RECORD PRIOR TO FABRICATION OR ERECTION. SHOP DRAWINGS SHALL BE REVIEWED BY THE GENERAL CONTRACTOR PRIOR TO SUBMISSION FOR REVIEW BY THE ENGINEER OF RECORD. SHOP DRAWINGS SHALL BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROJECT PROVINCE OR STATE OF JURISDICTION. THE SHOP DRAWING ENGINEER SHALL ENSURE THAT THE FABRICATION AND ERECTION OF THESE ELEMENTS ARE IN ACCORDANCE WITH THEIR DESIGN AND THAT THE DESIGN IS IN ACCORDANCE WITH ALL RELEVANT CODES AND REGULATIONS. SHOP DRAWINGS SHALL BE SUPPLIED FOR REVIEW FOR THE FOLLOWING BUT NOT LIMITED TO:
 - REINFORCING STEEL FOR CONCRETE
 - STRUCTURAL STEEL SHAPES AND PLATES
 - TIMBER
 - ENGINEERED WOOD PRODUCTS
 - WOOD DECKING
- ALL DESIGN TO CONFORM TO THE BCBC 2018, CAN/CSA 086-14, CAN/CSA A23.3-19, CAN/CSA S16-14(R19) AND ALL OTHER APPLICABLE CODES AND PRACTICES AND BEST PRACTICES.
- FIELD REVIEWS: NOTIFY THE ENGINEER 48 HOURS IN ADVANCE FOR FIELD REVIEWS AND APPROVAL OF THE FOLLOWING:
 - CONCRETE REINFORCEMENT BEFORE EACH CONCRETE POUR
 - STRUCTURAL STEEL BEFORE COVERING UP
 - WOOD FRAMING BEFORE COVERING UP
- THE DESIGN HAS BEEN PREPARED BASED ON THE ASSUMPTION THAT THE OWNER AND/OR OPERATOR HAS A SITE SAFETY PLAN IN PLACE TO ADDRESS AND MITIGATE SAFETY HAZARDS, BOTH COMMON AND SPECIFIC TO THIS PROJECT.
- TYPICAL DETAILS AND GENERAL NOTES APPLY UNLESS NOTED OTHERWISE ON PLANS.
- GENERAL CONTRACTOR TO ADVISE AND COORDINATE WITH CONSULTANTS IF CONFLICTS ARISE BETWEEN SPECIFICATIONS AND DRAWINGS PRIOR TO PROCEEDING WITH SHOP DRAWINGS, FABRICATION, AND/OR CONSTRUCTION.

CONCRETE FORMWORK

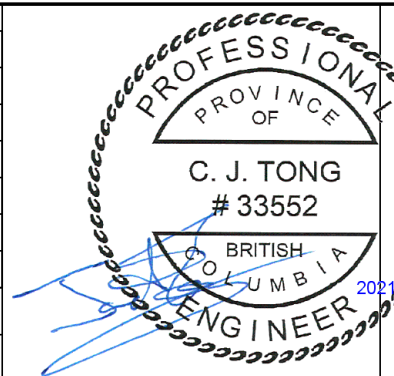
- CONSTRUCT FORMWORK IN ACCORDANCE WITH WCB REGULATIONS AND CSA S269.1-16. FORMWORK DESIGN IS THE RESPONSIBILITY OF THE CONTRACTOR. DO NOT POUR CONCRETE UNTIL FORMWORK HAS BEEN INSPECTED AND CERTIFIED BY THE FORMWORK ENGINEER.
- NO COLUMN OR WALL FORMS SHALL BE REMOVED BEFORE CONCRETE HAS REACHED 75% OF DESIGN STRENGTH OR 4 DAYS, WHICHEVER COMES LATER, AND REPLACE IMMEDIATELY WITH ADEQUATE RESHORING.
- NO SLAB OR BEAM FORM SHALL BE REMOVED BEFORE CONCRETE HAS REACHED 75% OF DESIGN STRENGTH.
- THE STRENGTH OF CONCRETE IS TO BE DETERMINED BY FIELD CURED CYLINDERS.
- RE-USE FORMWORK AND FALSEWORK SUBJECT TO REQUIREMENTS OF CSA-A23.1/A23.2

NOTE: THIS DRAWING IS HALF SCALE WHEN PRINTED TO 11" x 17" FORMAT

PRELIMINARY
FOR DISCUSSION ONLY
SUBJECT TO REVISION

DESIGN PHASE

No.	DESCRIPTION	BY	DATE
4	IFT		2021.10.05
3	IFT		2021.09.15
2	95% DD		2021.07.08
1	ISSUED FOR REVIEW		2020.10.18



Scale 1 : 1

ISL Engineering and Land Services

REGIONAL DISTRICT OF NANAIMO

JACK BAGLEY WASHROOM PAVILION

Drawn: DA Designed: DE Checked: DE Date

Designed: MH Discipline Review: JT Date

GENERAL NOTES

Drawing No. **32345 ST 02**

Sheet No.

WOOD SHEAR WALL NOTES

- ALL PANEL EDGES ARE TO BE BLOCKED.
- SHEATHING NAILING IS AT 300mm (12") O/C TO INTERMEDIATE SUPPORTS.
- NAIL SPACING IS FOR 75mm (3") COMMON NAILS. ALTERNATE NAILS MAY REQUIRE REDUCED SPACING. STAPLES ARE NOT ACCEPTABLE FOR SHEAR WALLS.
- HOLD-DOWN ANCHOR LOCATIONS ARE SHOWN ON PLAN AS PER SHEAR WALL SCHEDULE. LOCATE HOLD-DOWNS AT SHEAR WALL ENDS IF NOT INDICATED OTHERWISE. ALL HOLD-DOWNS TO BE INSTALLED W/ MIN. 3-PLY POST.
- HOLD-DOWN REFERENCES ARE TO BE SIMPSON STRONG-TIE PRODUCTS.
- HOLD-DOWN ANCHORS ARE THREADED ROD AS SPECIFIED BY THE MANUFACTURER C/W NUT EMBEDDED IN CONCRETE U.N.O.
- BLOCK BETWEEN FLOORS AT THE DOWN LOCATIONS. REFER TO TYPICAL DETAILS FOR BLOCKING REQUIREMENTS.
- WHERE BOTH SIDES ARE SHEATHED, PANEL EDGES ARE TO BE STAGGERED.
- WALL SHEATHING TO EXTEND TO UNDERSIDE OF FLOOR OR ROOF SHEATHING ABOVE.
- HOLD-DOWNS ARE TO BE CARRIED DOWN TO FOUNDATION.
- HOLES UP TO 125mm [5"] SQUARE DO NOT REQUIRE BLOCKING AND E.N.
- HOLES FROM 125mm [5"] SQUARE TO 400mm [16"] SQUARE REQUIRE BLOCKING AND E.N.
- HOLES LARGER THAN 400mm [16"] SQ. ARE NOT ALLOWED.
- HOLE SIZE INCLUDES THE LENGTH OF THE OVERCUT.
- MAX. ACCUMULATED LENGTH OF OPENINGS SHALL NOT EXCEED 20 PERCENT OF THE WALL LENGTH.
- OPENING MUST BE A MIN. 300mm [12"] FROM SILL PLATE, TOP PLATES AND END POSTS.
- RECOMMEND CIRCULAR BORED HOLES OR RADIUS CORNER CUTS.
- END POSTS SHOULD NOT BE CUT FOR ANY REASON, STUDS AND TOP PLATE MAY BE NOTCHED PER TYPICAL DETAILS

GLUED LAMINATED CONSTRUCTION CONT.

- PROTECT PROTECTIVE SEALER FROM DAMAGE BEFORE AND DURING ERECTION.
- TOUCH UP DAMAGED AREAS ON SITE WITH SPECIFIED SEALER.
- ERECT GLUE-LAMINATED MEMBERS IN ACCORDANCE WITH REVIEWED ERECTION DRAWINGS.
- BRACE AND ANCHOR MEMBERS UNTIL PERMANENTLY SECURED BY THE STRUCTURE. MAKE ADEQUATE PROVISIONS FOR THE ERECTION STRESSES.
- SPLICE AND JOIN ONLY AT PLACATIONS AS INDICATED ON REVIEWED ERECTION DRAWINGS.
- DO NOT FIELD CUT OR ALTER MEMBERS WITHOUT THE ENGINEER'S. IF APPROVED, TREAT CUT ENDS WITH PRESERVATIVE.
- SUBMIT A MOISTURE AND HUMIDITY CONTROL PLAN. PLAN TO IDENTIFY METHODS OF CONTROL OF MOISTURE WITHIN THE WOOD DURING CONSTRUCTION. PLAN IS TO BE DEVELOPED TO FOLLOW THE SUPPLIER'S RECOMMENDATIONS FOR MITIGATION OF CRACKS, CHECKS AND DEFECTS IN THE FINISHED PRODUCT. PROVIDE RELATIVE HUMIDITY GAUGES AND PORTABLE HUMIDIFIERS OR OTHER EQUIPMENT NECESSARY AS REQUIRED TO ADHERE TO THE PLAN.

TIMBER FASTENERS

- THE FOLLOWING TIMBER SCREWS ARE ACCEPTABLE UNLESS SPECIFICALLY NOTED ON DRAWINGS:
 - A. PARTIALLY THREADED SELF-TAPPING**

MANUFACTURER	FASTENER TYPE
GRK FASTENER	RSS LTF
HECO	TOPIX (TAPERED SCREW HEAD U.N.O.)
SFS INTEC	SFS WFC-T (COUNTERSUNK HEAD)
	SFS WFR-T (COUNTERSUNK HEAD)
	SFS WFD-T (HEX-HEAD [W/ WASHER FOR TIMBER TO TIMBER])
SWG (WURTH)	ASSY 3.0 SK
	ASSY 3.0 KOMBI (HEX-HEAD [W/ WASHER FOR TIMBER TO TIMBER])
SPAX	T-STAR (COUNTERSUNK, PAN-HEAD OR HEX-HEAD AS REQ'D BELOW)

SIMPSON SDS SCREWS ARE ONLY ACCEPTABLE WHERE SPECIFICALLY INDICATED ON STRUCTURAL DRAWINGS.
 - B. FULLY THREADED SELF-TAPPING**

MANUFACTURER	FASTENER TYPE
HECO	TOPIX CC
SFS INTEC	SFS WT-T
	SFS WFR-T
	SFS W8
SWG (WURTH)	ASSY PLUS VG (CYLINDER HEAD OR COUNTERSUNK HEAD)
SPAX	T-STAR
- SCREW TYPES SPECIFIED ON STRUCTURAL DRAWINGS SUPERSEDE THE INFORMATION ABOVE U.N.O..
- WHERE SELF-TAPPING TIMBER SCREWS ARE USED IN COMBINATION WITH EXPOSED STEEL PLATES, OR WHERE FLUSH FINISHED IS REQUIRED, USE SCREWS WITH TAPERED SCREW HEAD (COUNTERSUNK) UNLESS NOTED OTHERWISE. COUNTERSUNK HOLE IN STEEL TO RECEIVE TAPERED SCREW HEADS. HOLE TO MATCH MANUFACTURER'S SPECIFICATION.
- WHERE SELF-TAPPING SCREWS ARE USED IN COMBINATION WITH STEEL PLATES NOT EXPOSED TO VIEW, USE SCREWS WITH A HEX HEAD U.N.O..
- METRIC CONVERSIONS:

DIAMETER	LENGTH
8mm (5/16")	25mm (1")
10mm (3/8")	ROUND UP TO NEAREST STANDARD
12mm (1/2")	ROUND UP TO NEAREST STANDARD
- FOR PARTIALLY THREADED SCREWS, EMBED FULL THREAD INTO SECONDARY MEMBER OR AS SPECIFIED.
- HOLES IN STEEL PLATE TO MATCH THE SCREW TYPE USED.
- WHERE PRE-DRILLING OF SCREWS IS RECOMMENDED BY THE SCREW MANUFACTURER, HOLE DIAMETER TO BE STRICTLY AS PER MANUFACTURER'S RECOMMENDATIONS.
- WOOD TO WOOD CONNECTIONS TO HAVE WASHER OR PAN-HEAD U.N.O..
- THE FOLLOWING PRE-ENGINEERED CONCEALED CONNECTORS ARE ACCEPTABLE. UNLESS SPECIFIED ON STRUCTURAL DRAWINGS:

MANUFACTURER	FASTENER TYPE
HARRER	SHERPA
PITZL	HPV
KNAPP	MEGANT
- THE INSTALLATION OF CONNECTOR AND SCREW TYPE TO BE STRICTLY AS PER MANUFACTURER'S SPECIFICATIONS AND EUROPEAN APPROVALS.
- ALL OTHER FASTENING SYSTEMS ARE SPECIFIED ON DRAWINGS, OR ENGINEERING BY SUPPLIER IF NOT SPECIFIED. REFER TO WOOD FRAME GENERAL NOTES WHERE APPLICABLE.

GLUED LAMINATED CONSTRUCTION

- GLUE LAMINATED CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:
 - CAN/CSA-0122-16 (2016), STRUCTURAL GLUED-LAMINATED TIMBER
 - CAN/CSA-0177-06 (2006), QUALIFICATION CODE FOR MANUFACTURERS OF STRUCTURAL GLUE-LAMINATED TIMBER.
- SUBMIT SHOP DRAWINGS FOR APPROVAL.
- SHOP DRAWINGS FOR MEMBERS TO INDICATE, STRESS GRADE, SERVICE GRADE AND APPEARANCE GRADE, SHOP APPLIED FINISHES, CAMBER, CUTS, LEDGERS, HOLES AND CONNECTION DETAILS
- EACH ERECTION AND SHOP DRAWING SUBMISSION, FOR ITEMS DESIGNED BY FABRICATOR OR MANUFACTURER, SHALL BEAR SIGNATURE AND STAMP OF A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA, CANADA.
- MANUFACTURE STRUCTURAL GLUE-LAMINATED MEMBERS IN PLANT CERTIFIED BY THE CSA AS MEETING THE REQUIREMENTS OF CAN/CSA-0177, CLASS X.
- SUBMIT CERTIFICATE IN ACCORDANCE WITH CAN/CSA-0177, APPENDIX B AT COMPLETION OF FABRICATION.
- PLACE AUTHORIZATION LABELS ON GLUE-LAMINATED MEMBERS INDICATING MANUFACTURED IN CSA CERTIFIED PLANT.
- DELIVER HANDLE STORE AND PROTECT MATERIALS OF THIS SECTION IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- APPLY PROTECTIVE SEALER TO GLUE-LAMINATED UNITS BEFORE SHIPPING UNLESS SPECIFIED OTHERWISE.
- WRAP QUALITY GRADE MEMBERS WITH A MOISTURE RESISTANT WRAPPING PRIOR TO LEAVING PLANT.
- USE PADDED NON-MARRING SLINGS FOR HANDLING GLUE LAMINATED UNITS.
- PROTECT CORNERS WITH WOOD BLOCKING.
- SLIT UNDERSIDE OF MEMBRANE COVERING DURING STORAGE AT SITE. DO NOT DEFACE MEMBERS.
- STORE GLUE-LAMINATED UNITS AND PROTECT FROM WEATHER, BLOCK OFF THE GROUND AND SEPARATE WITH STRIPPING, SO THAT AIR MAY CIRCULATE AROUND ALL FACES OF THE UNITS.
- COVER GLUE-LAMINATED UNITS WITH OPAQUE MOISTURE RESISTANT MEMBRANE IF STORED OUTSIDE.
- LAMINATING STOCK: DOUGLAS FIR-LARCH TO CAN/CSA-0122.
- ADHESIVE TO CAN/CSA 0112 SERIES, TO GRADE OF SERVICE REQUIRED IN ACCORDANCE WITH CAN/CSA-0122.
- SEALER FOR GLUE-LAMINATED MEMBERS: PENETRATING TYPE, CLEAR, NON-YELLOWING LIQUID.
- FASTENING:
 - SPLIT RING CONNECTIONS: HOT ROLLED CARBON STEEL, SAE 1010.
 - MEETING REQUIREMENTS OF SAE HANDBOOK.
 - SHEAR PLATE CONNECTORS:
 - PRESSED STEEL TYPE: HOT ROLLED CARBON STEEL, SAE 1010
 - MEETING REQUIREMENTS OF SAE HANDBOOK.
 - MALLEABLE IRON TYPE: TO ASTM A47/A47M, GRADE 350.
 - LAG SCREWS: AS SPECIFIED IN CSA STANDARD B34.
 - BOLTS TO ASTM A307.
 - SIDE PLATES: TO CAN/CSA-G40.20/G40.21 OR ASTM A36.
 - DRIFT PINS: TO ASTM A307.
 - GLUE-LAMINATED RIVETS: HOT DIP GALVANIZED TO CAN/CSA-G40.20/G40.21.
 - NAILS AND SPIKES TO CSA B111.
- SHOP COAT PRIMER FOR STEEL CONNECTIONS: TO CAN/CSGB-1.40.
- GALVANIZING: TO CAN/CSA-G164, HOT DIP, MIN. ZINC COATING 610g/m².
- PRESERVATIVE: SEE ARCHITECTURAL.
- FIRE RETARDANT: SEE ARCHITECTURAL.
- FABRICATE MEMBERS TO FOLLOWING CLASSIFICATIONS:
 - STRESS GRADE: BEAMS TO 24f-EX BENDING GRADE, COLUMNS TO 16c-E
 - COMPRESSION GRADE UNLESS NOTED OTHERWISE ON THE DRAWINGS.
 - SERVICE GRADE: EXTERIOR.
 - APPEARANCE GRADE: QUALITY.
- MARK LAMINATED MEMBERS FOR IDENTIFICATION DURING ERECTION. MARKS ARE NOT TO BE VISIBLE IN FINAL ASSEMBLY.
- DO NOT APPLY SEALER TO AREAS WHICH ARE TO RECEIVE STAINED FINISH OR PRESERVATIVE TREATMENT.
- DESIGN CONNECTIONS TO CAN/CSA-086, AND CAN/CSA S16 UNLESS SPECIFICALLY DETAILED TO RESIST SHEARS, MOMENTS AND FORCES INDICATED.
- CONNECTIONS TO BE GALVANIZED, OR PAINTED AFTER FABRICATION, AS INDICATED.

CONCRETE REINFORCEMENT NOTES

- TIE ALL BARS SECURELY IN PLACE TO PREVENT DISPLACEMENT. SUPPORT SLAB REINFORCEMENT ON SUITABLE CHAIRS OR SUPPORTS AT MAXIMUM 1.2m CENTRES. PROVIDE CORNER BARS TO MATCH HORIZONTAL WALL REINFORCEMENT.
- CLEAR COVER TO REINFORCEMENT (PRINCIPAL REINFORCEMENT) IS:

CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	75mm
EXPOSED TO EARTH OR WEATHER	50mm
- ALL BOTTOM STEEL TO BE CONTINUOUS AND SPLICED WHERE REQUIRED.
- UNLESS OTHERWISE NOTED, USE CLASS B TENSION SPLICE FOR ALL REINFORCING STEEL.
- PROVIDE MINIMUM 2-15M BARS AROUND ALL OPENINGS LARGER THAN 450mm AT EACH SIDE OF OPENING AND ON DIAGONALS. EXTEND 600mm PAST CORNER. PROVIDE 1-15M 1200mm DIAGONAL AT EACH CORNER OF ALL OPENINGS.
- THE DESIGNATION OF REINFORCEMENT IN DRAWINGS IS AS FOLLOWS:
 - BARS IN TOP OF BEAMS AND SLABS OR IN NEAR FACE OF WALL ARE SHOWN AS A SOLID LINE.
 - BARS IN BOTTOM OF BEAMS AND SLABS OR IN FAR FACE OF WALL ARE SHOWN AS A DASHED LINE: _____
 - STRAIGHT BARS: 6-15M4500 MEANS 6-15M BARS, 4500 LONG
 - BENT BARS:
 - 13-A15M1500 MEANS 13-15M BARS, 1500 LONG HOOKED ONE END 180°
 - 3-C15M1200 MEANS 3-15M BARS, 1200 LONG, HOOKED ONE END 90°
 - THE BAR LENGTHS NOTED ARE EXCLUSIVE OF THE STANDARD HOOK.
- FOUNDATION WALL REINFORCEMENT
 - PROVIDE CONTROL JOINTS AT 12m MAXIMUM SPACING FOR ALL WALLS IN CONTACT WITH GRADE AND ALL EXTERIOR WALLS EXPOSED TO THE WEATHER.
 - PROVIDE MINIMUM REINFORCEMENT FOR WALLS AS SHOWN ON PLAN.
 - INSTALL ALL WALL REINFORCEMENT CONTINUOUSLY WITH HOOKS OR CORNER BARS AT ALL WALL JUNCTIONS. EXTEND HOOKS TO FAR FACE OF WALL. LOCATE CORNER BARS ON OUTSIDE FACE OR CENTRE OF WALL.
 - AT ENDS OF ALL WALLS, INSTALL 2-15M VERTICAL LAPPED 600mm U.N.O. ON WALL SCHEDULE.
 - PROVIDED MINIMUM 2-15M BARS AROUND ALL OPENINGS LARGER THAN 450mm, EXTENDING 600mm PAST CORNERS. PROVIDE 1-15M1200 DIAGONAL AT EACH CORNER OF ALL OPENINGS.
- SPLICES
 - WHERE SPLICES ARE DIMENSIONED ON THE DRAWINGS, SUCH DIMENSIONS SHALL APPLY. USE TENSION AND COMPRESSION SPLICES AT LOCATIONS INDICATED ON THE DRAWINGS. USE TENSION SPLICE WHERE NO SPLICE IS INDICATED ON THE DRAWINGS.
 - LENGTH OF SPLICE:

		TENSION SPLICE (CLASS B)					
		CONCRETE STRENGTH (MPa)					
BAR SIZE	COMP. SPLICE	20	25	30	35	40	45
15M	470 (19")	647 (26")	579 (23")	530 (21")	490 (20")	458 (18")	432 (17")

NOTES:
MULTIPLY ABOVE VALUES BY:
1.5 FOR EPOXY COATED REINFORCEMENT
1.7 FOR EPOXY COATED TOP REINFORCEMENT

CONCRETE NOTES

- CONCRETE IS TO BE TESTED IN ACCORDANCE WITH CSA A23.1-14/A23.2-14 AND BY A QUALIFIED TESTING AGENCY AS REQUESTED BY THE ENGINEER. THREE TEST CYLINDERS SHOULD BE TAKEN FOR EVERY 75 CU METERS OR LESS OF CONCRETE PLACED. A MINIMUM OF ONE TEST OF THREE CYLINDERS IS REQUIRED PER POUR.
- ENSURE SLEEVES, TIES, ANCHOR BOLTS, PIPE HANGERS AND ANY OTHER INSERTS OR OPENINGS REQUIRED IN THE CONCRETE BY OTHER TRADES ARE COMPLETED.
- INSTALL ALL CONSTRUCTION JOINTS AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
- COLD WEATHER CONCRETING
 - COLD WEATHER CONCRETING IS TO COMPLY WITH CSA/CAN-A23.1 AND ACI STANDARD 306R-10.
 - USE HOT WATER WHEN TEMPERATURE IS BELOW +3°C.
 - A MAXIMUM OF 1/2% CALCIUM CHLORIDE MAY BE USED EXCEPT FOR POST TENSIONED AND PARKING SLABS.
 - WHERE SUPPLEMENTARY HEAT IS PROVIDED, USE APPROVED CONCRETE HEATERS WITH EXHAUST VENTED AWAY FROM SURFACE OF CONCRETE.
 - FOR TEMPERATURES BELOW -10°C, PROVIDE CONCRETE POUR PROCEDURES TO ENGINEER FOR REVIEW
- PROCEDURES (TEMPS SPECIFIED ARE MINIMUM TEMPS):

FOUNDATIONS ABOVE 0°C:	NO SPECIAL REQUIREMENTS
-3°C TO 0°C:	COVER WITH INSULATION BLANKET FOR FIRST 24 HOURS
BELOW -3°C:	DO NOT POUR ON FROZEN SOIL. COVER AND PROVIDE SUPPLEMENTARY HEAT FOR FIRST 24 HOURS. ALTERNATIVELY USE INSULATED BLANKET

FLOOR SLAB ON GRADE 0°C TO +3°C:	COVER WITH POLY RAISED UP ON 2x4 SLEEPERS
-3°C TO 0°C:	COVER WITH INSULATION BLANKET FOR FIRST 36 HOURS
BELOW -3°C:	DO NOT POUR ON FROZEN SOIL. COVER WITH BLANKET AND HEAT FOR FIRST 36 HOURS. FOR SUSPENDED SLABS, PROVIDE HEAT TO SPACE BENEATH

STRUCTURAL STEEL

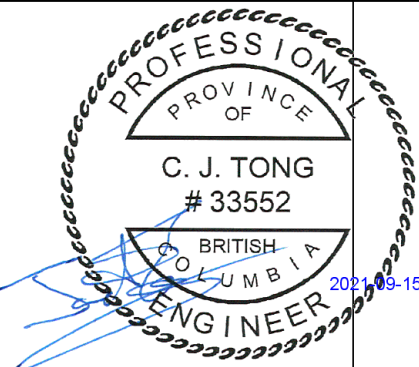
- FABRICATE AND ERECT STRUCTURAL STEEL TO CSA S16-14.
- DESIGN OF CONNECTIONS BY STEEL FABRICATOR UNLESS DETAILED ON THE DRAWINGS. USE MIN. 2 BOLTS PER CONNECTION AND DESIGN FOR BEARING CONNECTIONS WITH THREADS INCLUDED IN THE SHEAR PLANE. SPECIALTY STRUCTURAL ENGINEER TO DESIGN CONNECTION FOR FACTORED REACTION SHOWN ON PLAN. WHERE REACTIONS ARE NOT NOTED, DESIGN CONNECTION FOR END REACTION DUE TO A UNIFORMLY DISTRIBUTED LOAD CAUSING A MOMENT EQUAL TO THE MOMENT CAPACITY OF THE BEAM.
- ANCHOR BOLTS TO ASTM A36 OR A307 UNLESS NOTED. OTHERWISE STRUCTURAL BOLTS AND NUTS TO ASTM A325 OR ASTM F3125/F3125M OR ASTM F1554 GRADE 36. TIGHTEN ALL BOLTS WITH AN IMPACT WRENCH.
- ALL ANCHOR BOLTS, NUTS AND WASHER TO BE HOT DIP GALVANIZED GALVANIZATION: TO CAN/CSA G164, HOT-DIP, MIN. ZINC COATING 610 g/m². ALL GALVANIZATION DAMAGED DURING CONSTRUCTION TO BE TOUCHED UP. PAINT AND FINISHES TO ARCHITECT SPECIFICATION.
- PROVIDE A CONTINUOUS 35 MPa GROUT BED BENEATH BASE PLATES AND OTHER CONNECTIONS BEARING ONTO CONCRETE.
- SUBMIT SHOP DRAWINGS TO THE ENGINEER AND RECEIVE APPROVAL PRIOR TO FABRICATION. SHOW ALL DETAILS, INCLUDING FIELD WELDS, AND MATERIAL SPECIFICATIONS. SHOP DRAWINGS TO BE SEALED BY A PROFESSIONAL ENGINEER FOR DESIGN OF CONNECTIONS.
- MINIMUM SIZE OF FIELD WELD, 2mm LESS THAN THE THICKNESS OF THE MATERIAL BUT NOT LESS THAN 6mm.
- TOUCH UP ALL FIELD WELDS WITH PRIMER AFTER SLAG HAS BEEN REMOVED.
- METAL DECK: SEE ARCHITECTURAL DRAWINGS.
- STEEL COLUMNS MAY ONLY BE CALLED UP AT THE BASE OF THE COLUMN.
- PROVIDE 6mm CAP PLATES ON ALL HSS SECTIONS UNLESS NOTED OTHERWISE.
- STEEL FABRICATOR SHALL BE CERTIFIED BY CANADIAN WELDING BUREAU UNDER REQUIREMENTS OF CSA W47.1-09, DIVISION 1 OR 2. WELDING TO BE METAL ARC WELDING TO CSA W59-13. PROVIDE COPY OF CERTIFICATE FOR REVIEW BY THE STRUCTURAL ENGINEER.

NOTE: THIS DRAWING IS HALF SCALE WHEN PRINTED TO 11" x 17" FORMAT

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4	IFT		2021.10.05
3	IFT		2021.09.15
2	95% DD		2021.07.08
1	ISSUED FOR REVIEW		2020.10.18
REVISIONS			



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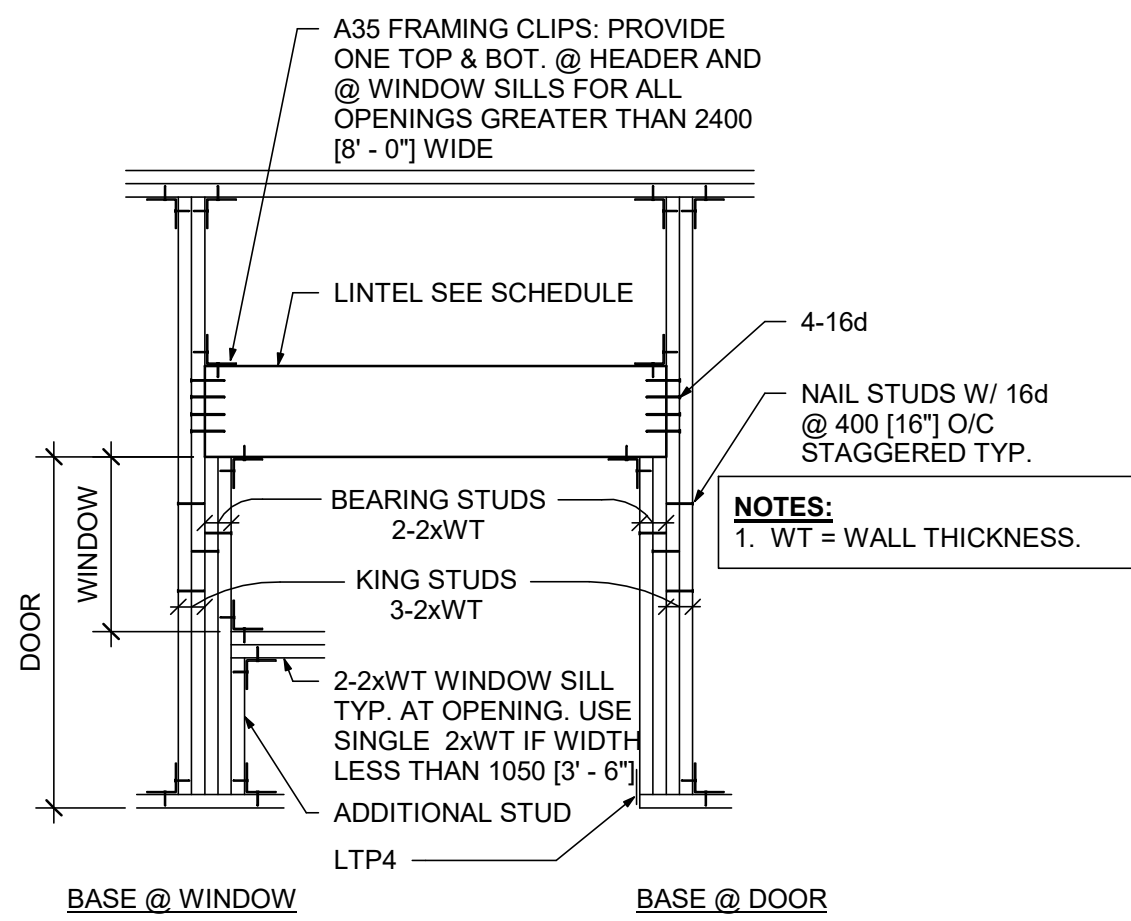
REGIONAL DISTRICT OF NANAIMO

JACK BAGLEY WASHROOM PAVILION

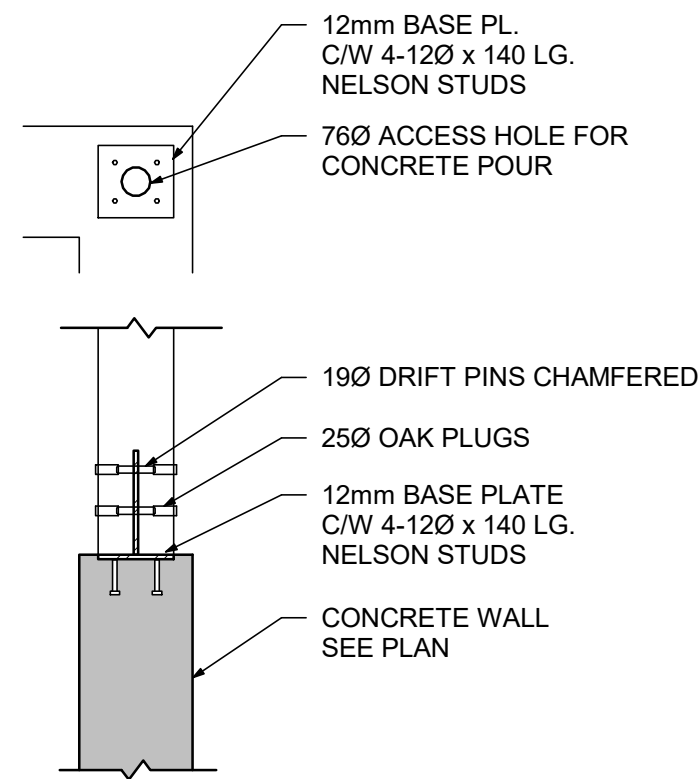
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Designed: MH	Discipline Review: JT	Date	

GENERAL NOTES

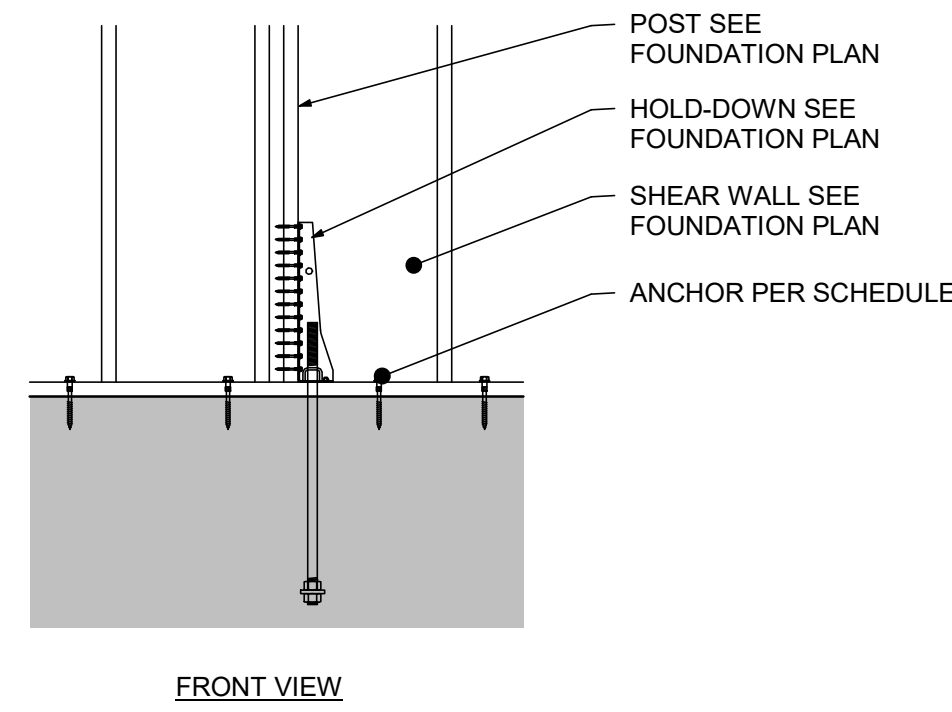
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Sheet No.



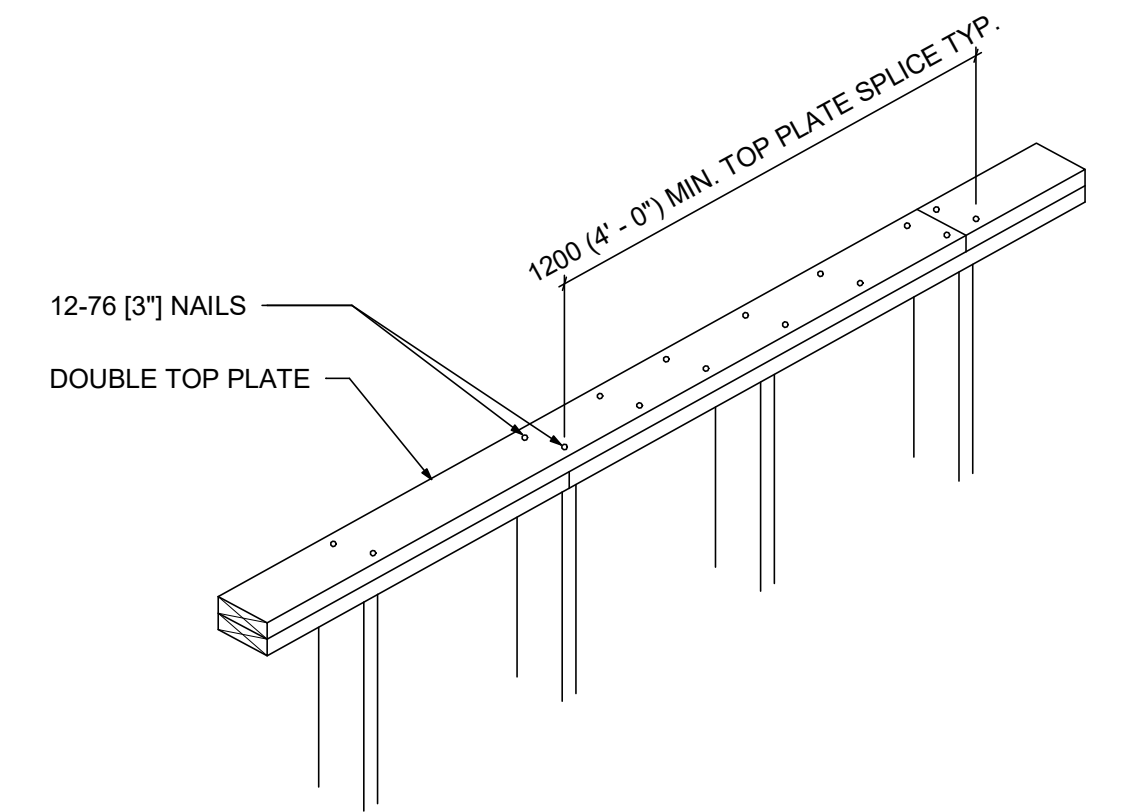
9 TYPICAL LINTEL FRAMING
ST04 1:20



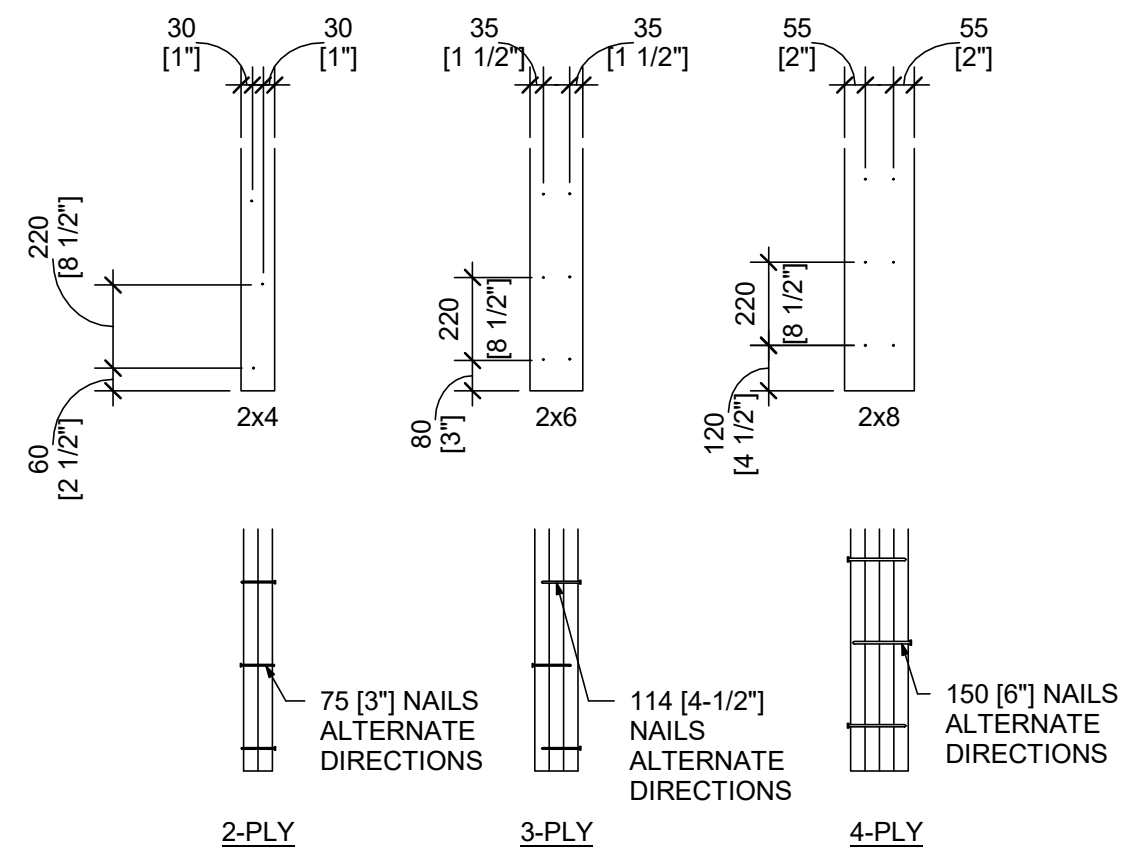
8 TIMBER POST BASE
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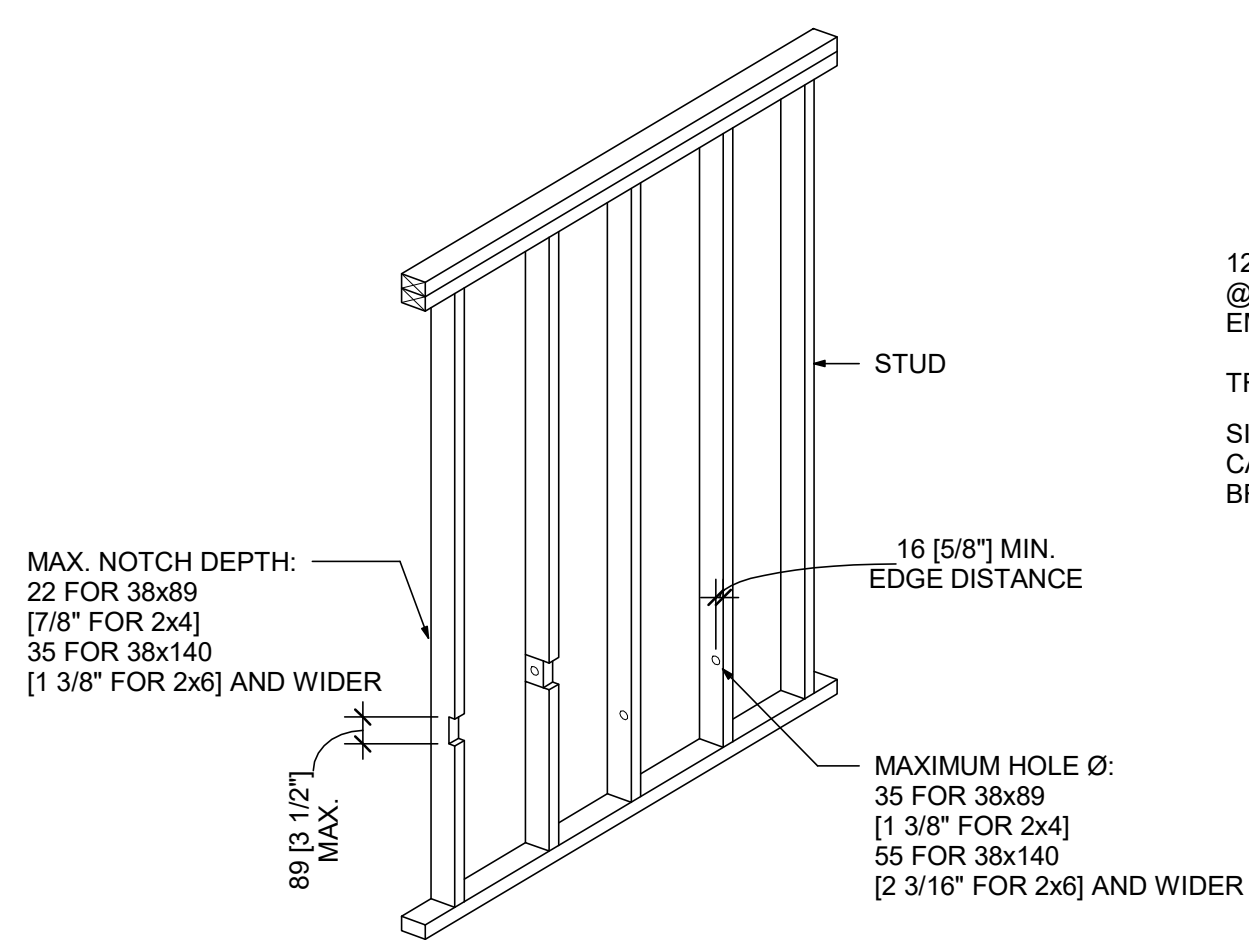
7 SHEAR WALL TO CONCRETE CONNECTION
ST04 1:20



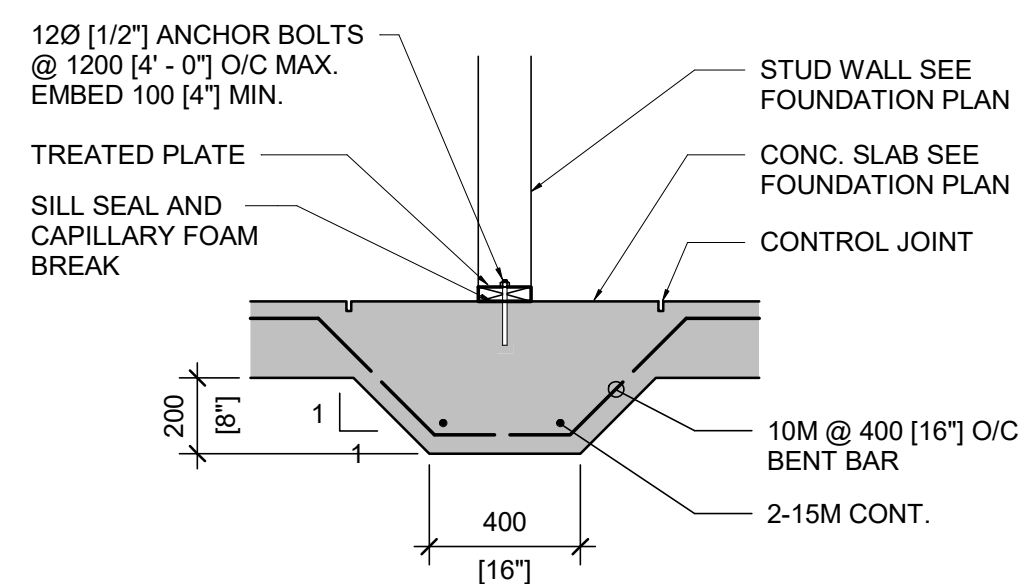
6 TYPICAL TOP PLATE SPLICE
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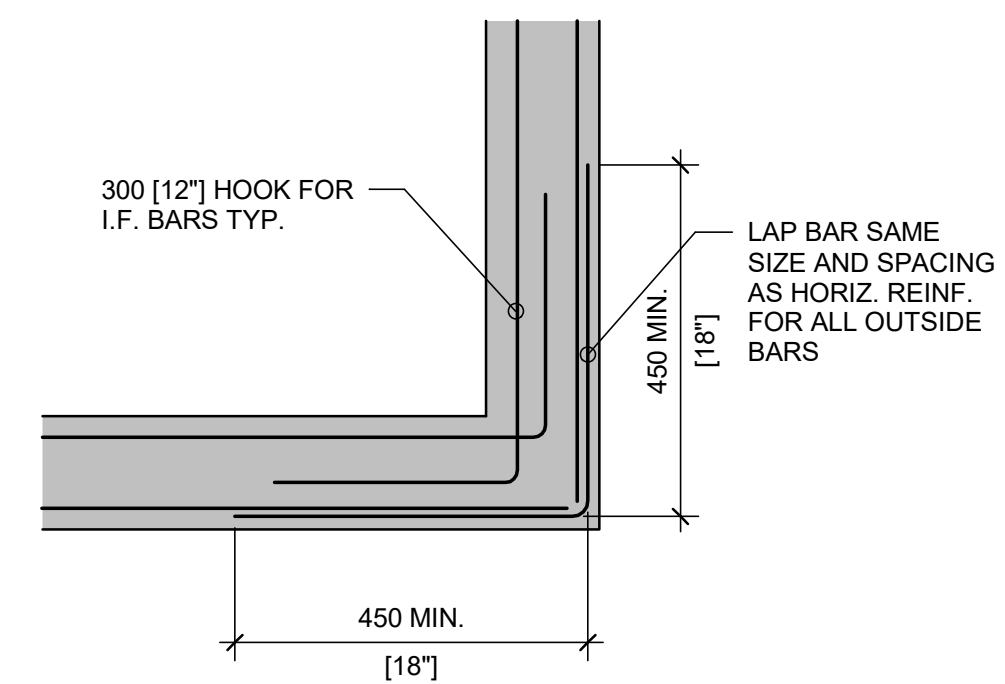
5 BUILT-UP POST NAILING DETAILS
ST04 1:20



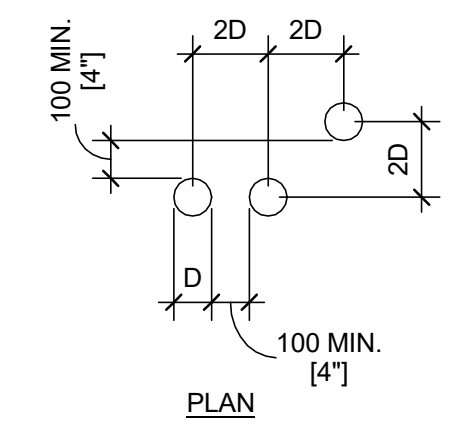
4 DRILLING & NOTCHING DETAIL
ST04 1:20



3 THICKENED SLAB UNDER STUD WALL
ST04 1:20



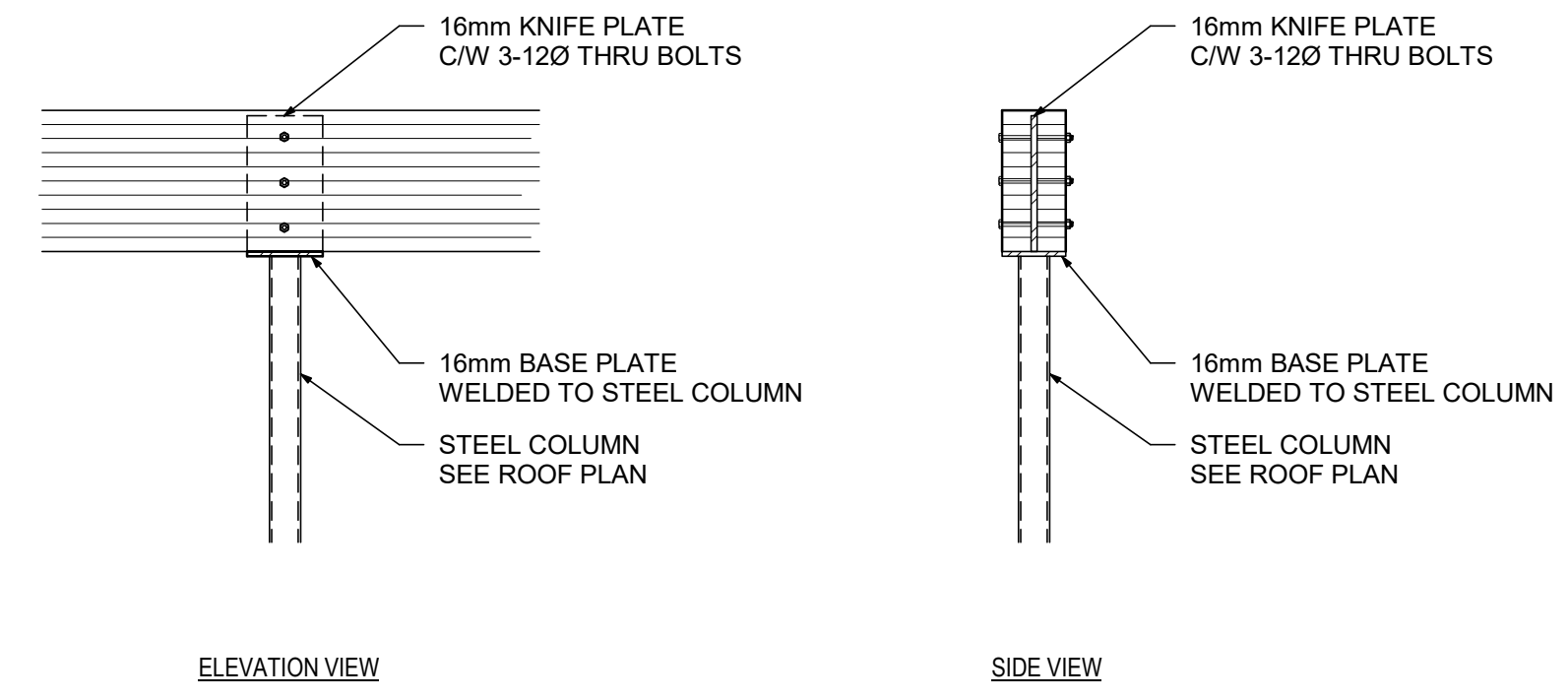
2 GRADE BEAM / WALL CORNER DETAIL
ST04 1:20



NOTES:
1. SPACING OF SLEEVE THROUGH FLAT SLAB AND WALL TO BE NO LESS THAN INDICATED ABOVE.
2. MAXIMUM SLEEVE DIAMETER OF 100 [4\"/>
3. MAINTAIN CLEAR DISTANCE OF 1.5x SLAB THICKNESS FROM FACE OF COLUMN.
4. 50 [2\"] MAXIMUM CONDUIT SIZE WITH MIN. SPACING 100 [4\"] O/C.
5. COVER FROM SLEEVE TO NEAREST REINFORCING BAR TO BE 1.5\"/>
6. CONDUITS ARE NOT ALLOWED TO CROSS.
7. WRITTEN PERMISSION FROM ENGINEER IS REQUIRED FOR CONDUITS LARGER THAN 50 [2\"/>

1 SLEEVE / CONDUIT SPACING THROUGH SLAB AND CONC. WALLS
ST04 1:20

10 GLULAM BEAM TO STEEL COLUMN
ST04 1:20

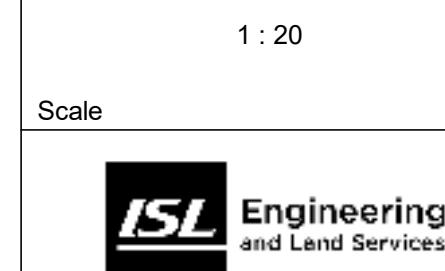
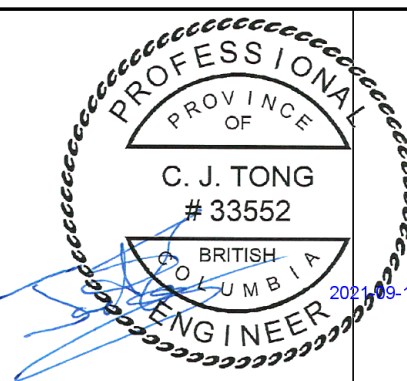


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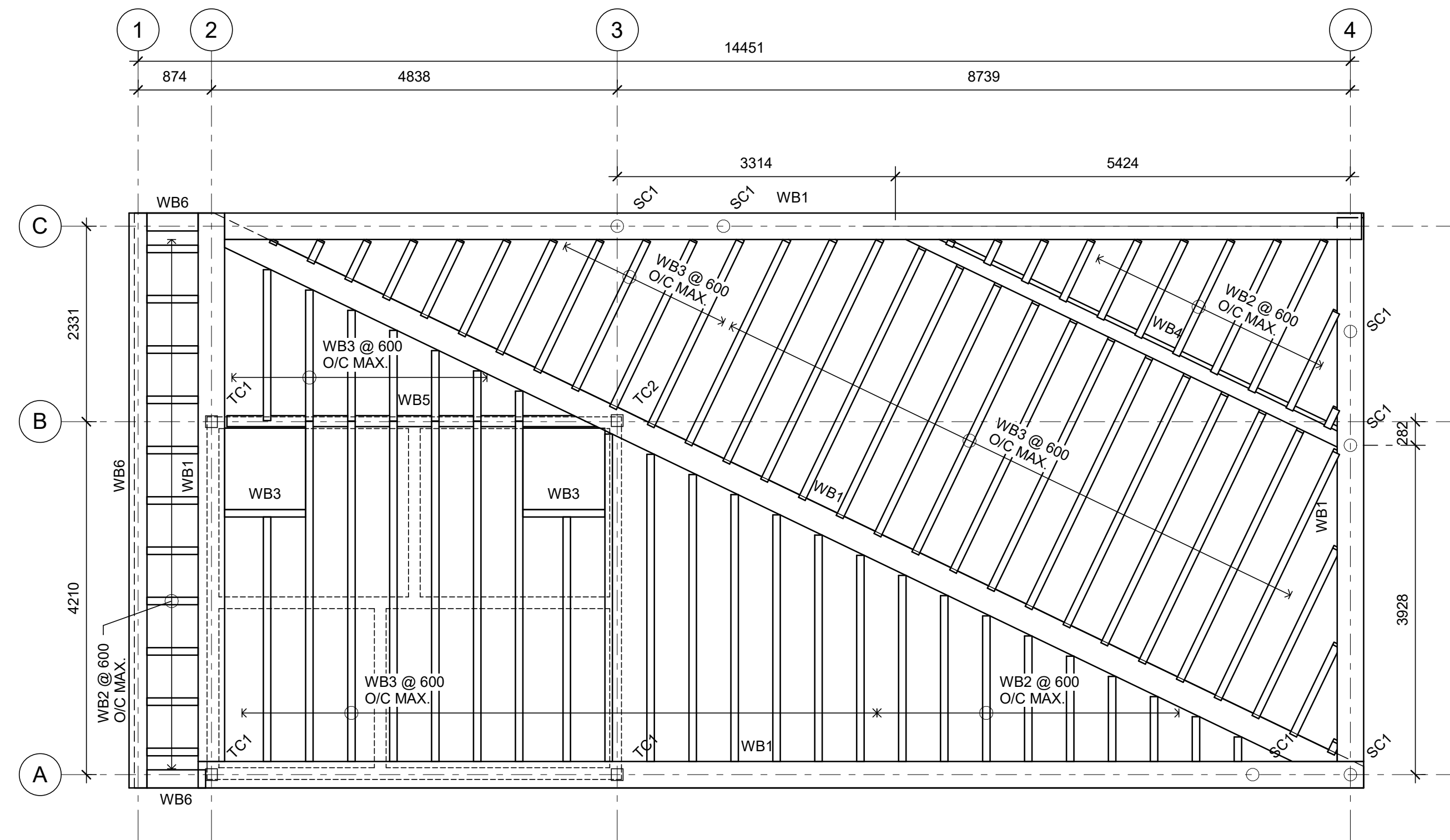
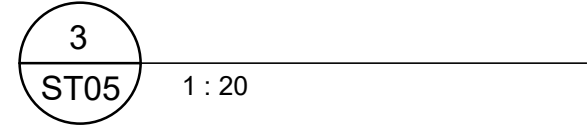
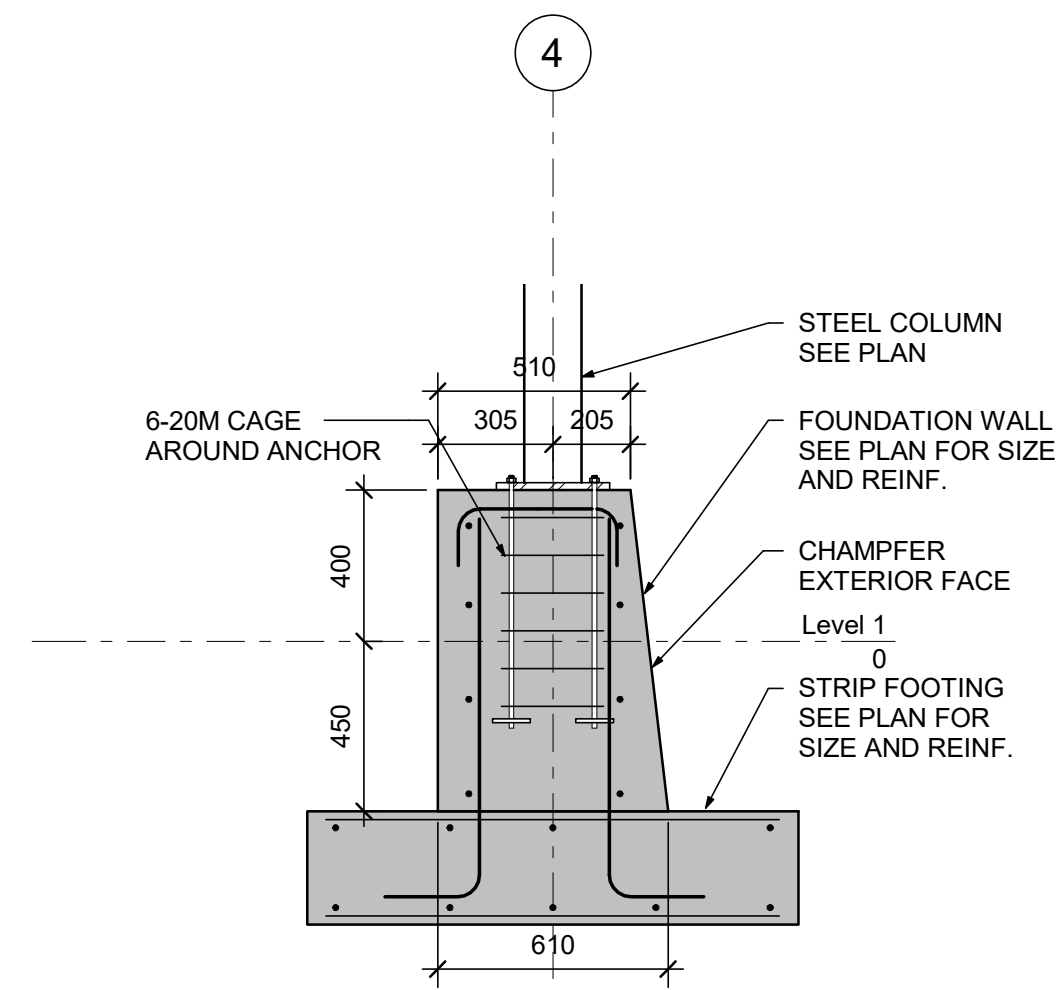
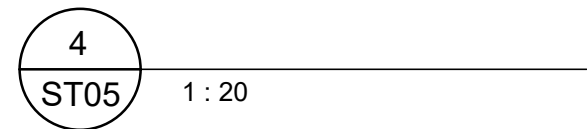
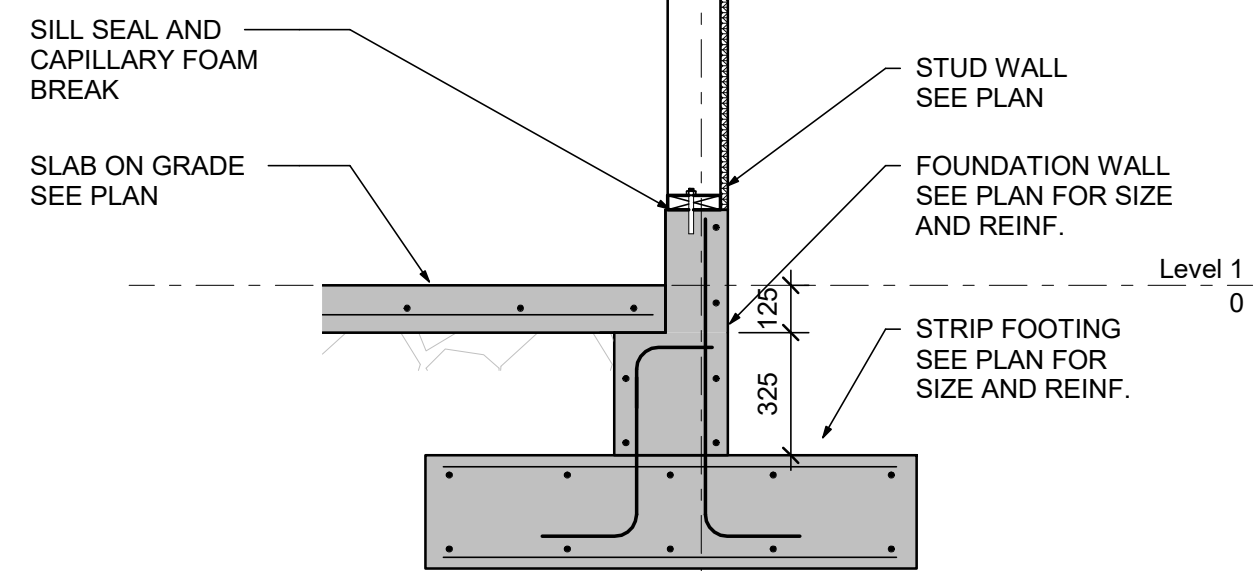
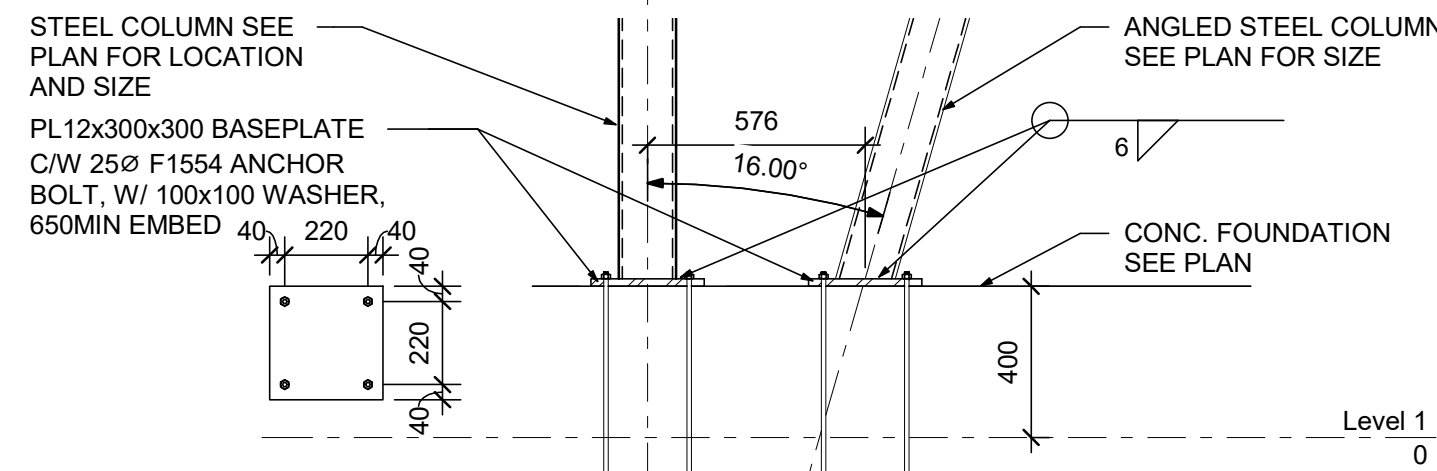
JACK BAGLEY WASHROOM PAVILION

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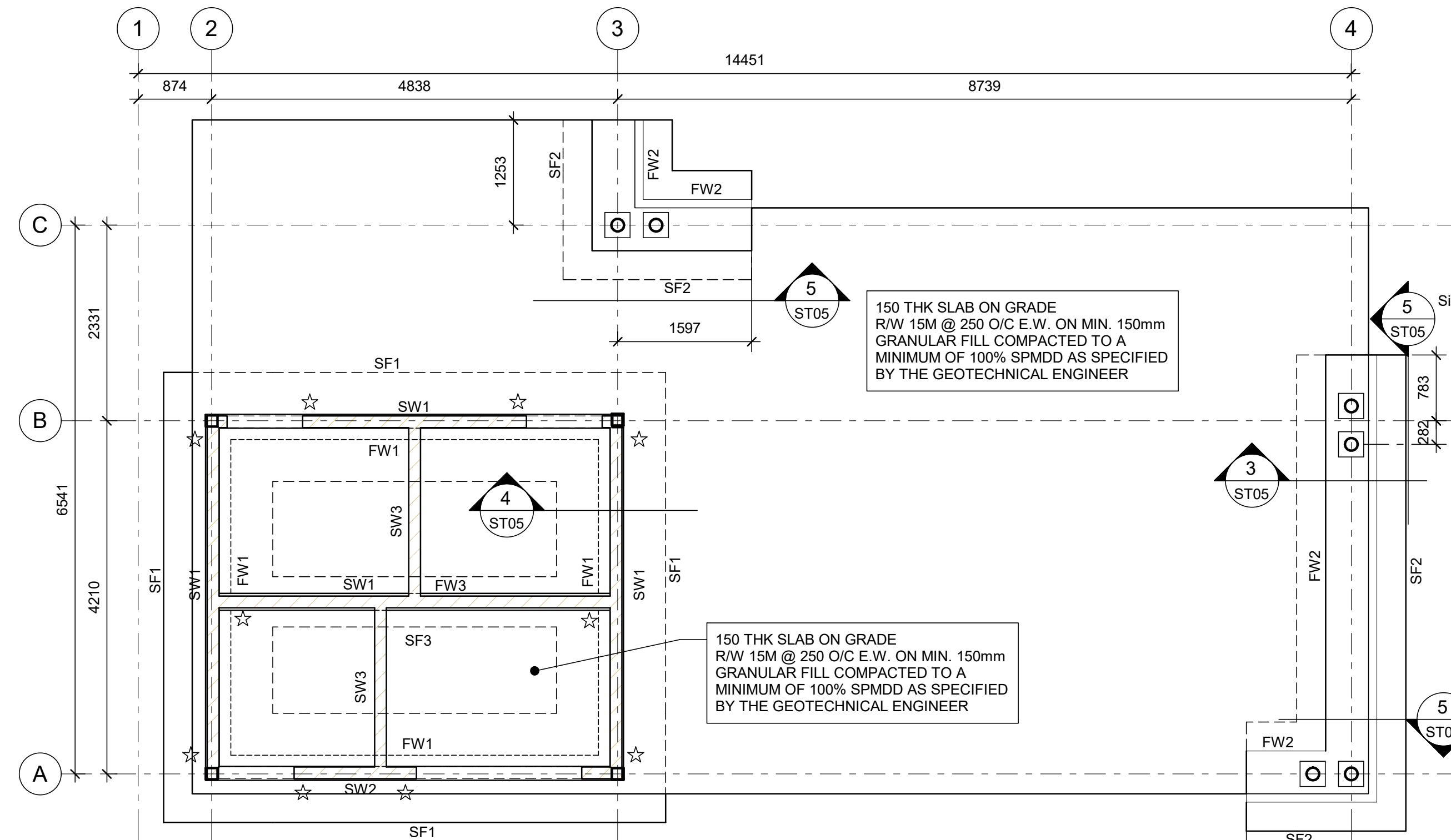
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TYPICAL DETAILS

Drawing No.
32345 ST 04
Sheet No.



ROOF PLAN
1:50



FOUNDATION PLAN
1:50

NOTE:
1. STUD WALLS 2x6 @ 400 O/C W/ BLOCKING
19 PLYWOOD SHEATHING BOTH SIDES

STEEL COLUMN SCHEDULE		
MARK	DESCRIPTION	BASEPLATE
SC1	HSS152x9.5	

TIMBER COLUMN SCHEDULE		
MARK	DESCRIPTION	COMMENTS
TC1	140x140 DFIR #1	
TC2	130x152 DFIR #1	

WOOD BEAM SCHEDULE		
MARK	DESCRIPTION	COMMENTS
WB1	315x418 GLULAM 24E	
WB2	89x140 SPF #1	
WB3	89x235 SPF #1	
WB4	175x342 GLULAM 24E	
WB5	130x418 GLULAM 24E	
WB6	215x418 GLULAM 24E	

FOUNDATION WALL SCHEDULE		
MARK	DESCRIPTION	REINFORCEMENT
FW1	300 CONC. WALL	15M @ 250 E.W.
FW2	610 CONC. WALL	15M @ 200 E.W.
FW3	200 CONC. WALL	15M @ 250 E.W.

STRIP FOOTING SCHEDULE		
MARK	DESCRIPTION	REINFORCEMENT
SF1	1300x300 DP	5-15M T&B W/ 15M @ 250 O/C
SF2	1300x300 DP	5-15M T&B W/ 15M @ 200 O/C
SF3	600x300 DP	3-15M T&B W/ 15M @ 250 O/C

SHEAR WALL SCHEDULE					
MARK	SHEATHING	EDGE FASTENING	BLOCKING	HOLD-DOWN	ANCHORAGE
SW1	1/2" OSB 2 SIDES	2 1/2" NAILS @ 4" O/C	YES	HDU2-SDS2.5	1/2"Ø ANCHOR BOLT @ 24", C/W HILTI HY200 6" MIN EMBED
SW2	1/2" OSB 2 SIDES	2 1/2" NAILS @ 2" O/C	YES	HDU2-SDS2.5	1/2"Ø ANCHOR BOLT @ 24", C/W HILTI HY200 6" MIN EMBED
SW3	1/2" OSB 2 SIDES	2 1/2" NAILS @ 3" O/C	NO	HDU2-SDS2.5	1/2"Ø ANCHOR BOLT @ 24", C/W HILTI HY200 6" MIN EMBED
ROOF & FLOOR CONNECTION		CONTINUE WALL FRAMING AND SHEATHING TO U/S OF SHEATHING C/W 8d COMMON NAILS @ 100 [4"] O/C U.N.O.			

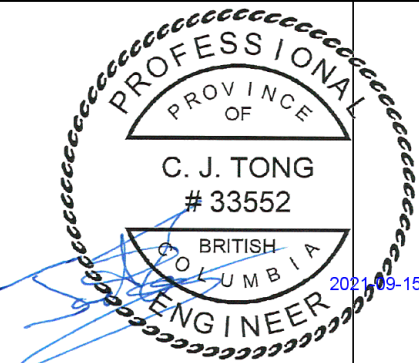
1. HOLD DOWN ANCHORS SPECIFIED TO BE INSTALLED ON ALL LOWER LEVELS TO FOUNDATION U.N.O.
2. ☆ INDICATES HOLD DOWN ANCHOR LOCATION.
3. ALL BLOCKING TO BE 38 [1 1/2"] MIN.

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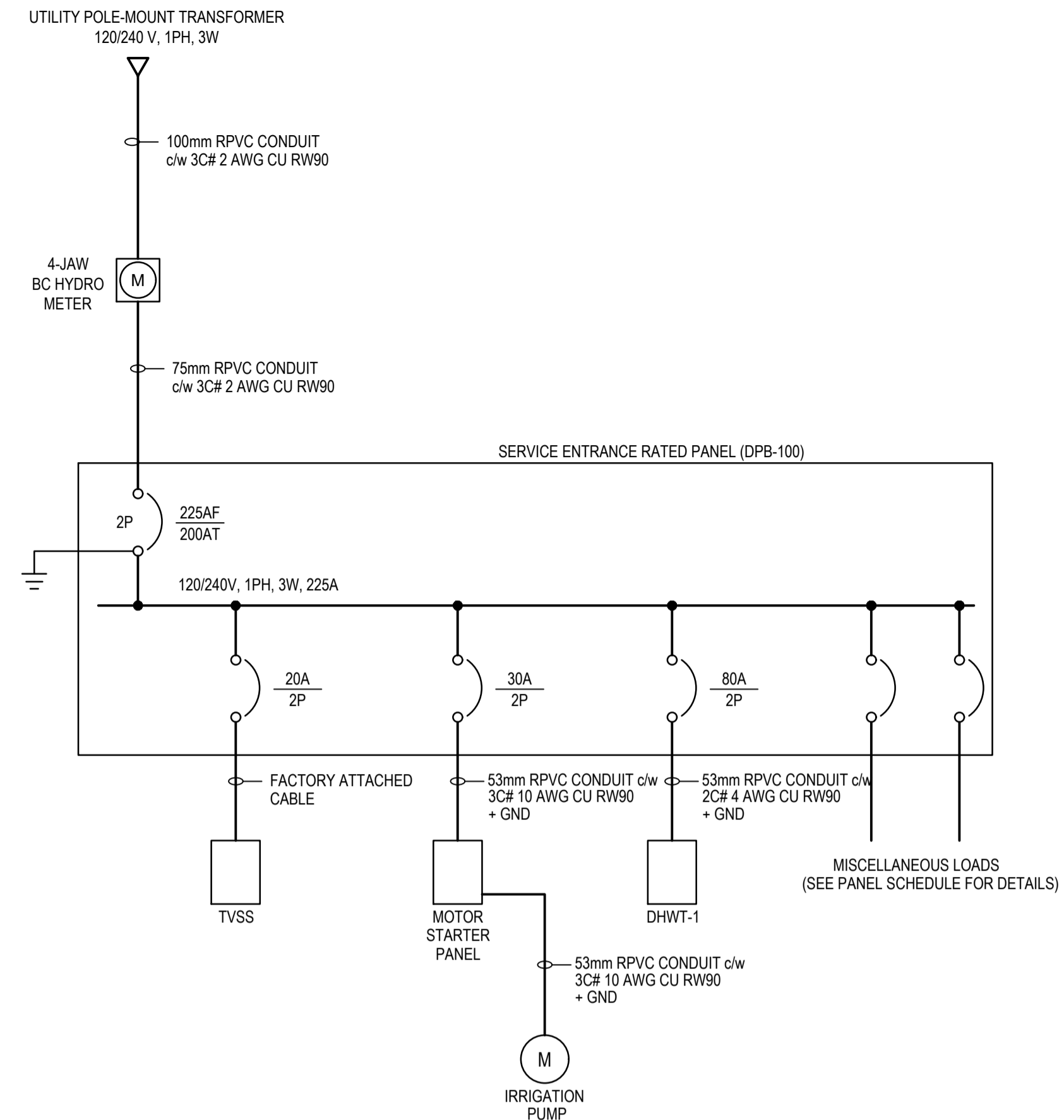
As indicated
Scale
ISL Engineering and Land Services

REGIONAL DISTRICT OF NANAIMO
JACK BAGLEY WASHROOM PAVILION
Drawn: DA Designed: DE Date
Designed: MH Discipline Review: JT Date

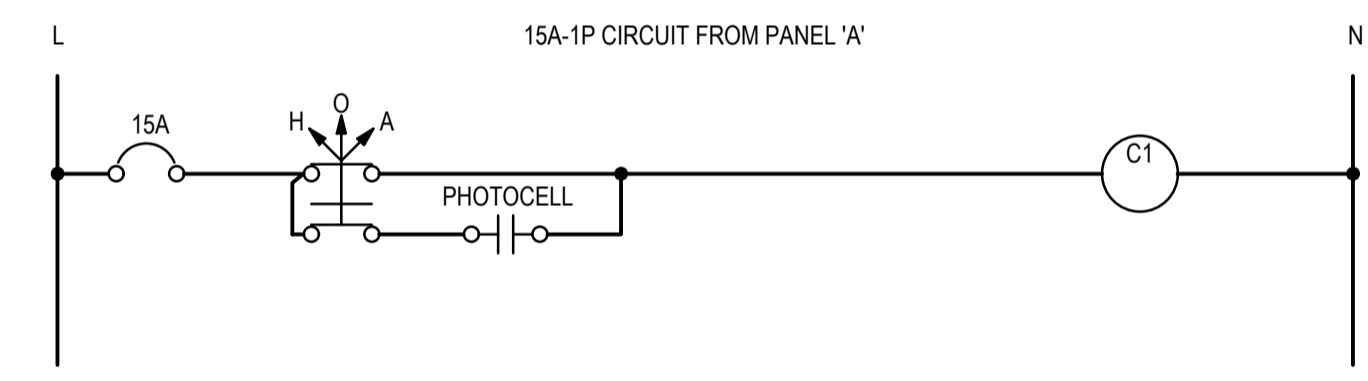
FOUNDATION AND ROOF FRAMING PLAN
Drawing No. **32345 ST 05**
Sheet No.

SPECIFICATIONS

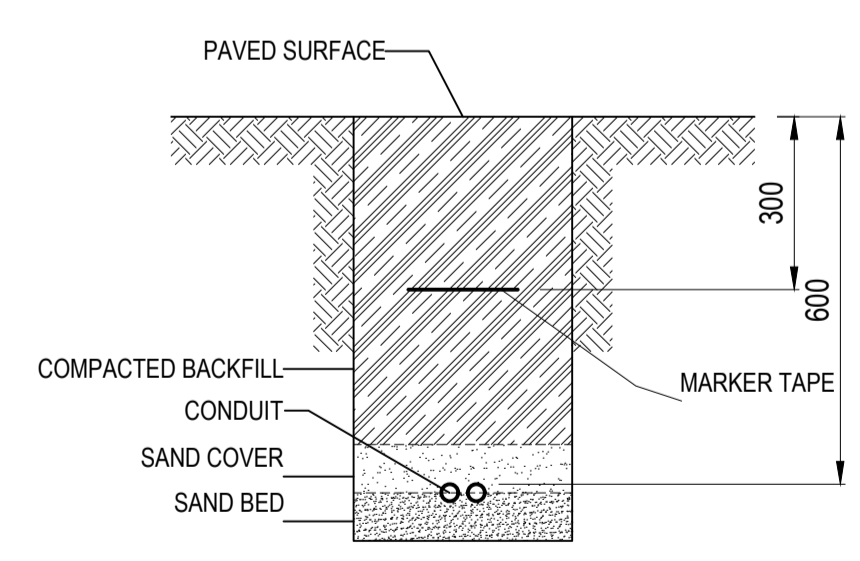
- 1.0 GENERAL
- 1.1 WORK SHALL INCLUDE THE FURNISHING OF ALL LABOR AND MATERIALS, UNLESS SPECIFICALLY NOTED OTHERWISE, TO COMPLETE AND PUT INTO OPERATING CONDITION ALL ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN.
- 1.2 INSTALLATION SHALL CONFORM TO SEISMIC STANDARD AS OUTLINED IN BRITISH COLUMBIA BUILDING CODE.
- 1.3 ALL MATERIALS, SUPPLIED UNDER THIS CONTRACT, SHALL BE NEW, INDUSTRIAL GRADE AND CARRY CSA APPROVAL. MAINTAIN UNIFORMITY OF MANUFACTURER FOR ANY PARTICULAR ITEM.
- 1.4 INSTALLATION SHALL MEET ALL THE REQUIREMENTS OF CANADIAN ELECTRICAL CODE, PART 1 - C22.1, AS ADOPTED AND AMENDED BY BC REGULATORY AUTHORITY.
- 1.5 INSTALLATION SHALL MEET ALL THE STANDARD SPECIFICATIONS AND DETAILS OUTLINED IN ARCHITECT SPECIFICATIONS FOR THIS PROJECT.
- 1.6 RESPONSIBILITY AS TO WHICH TRADE PROVIDES REQUIRED ARTICLES OR MATERIALS RESTS SOLELY WITH THE GENERAL CONTRACTOR. EXTRAS WILL NOT BE CONSIDERED BASED ON GROUNDS OF DIFFERENCE IN INTERPRETATION OF SPECIFICATIONS AS TO WHICH TRADE INVOLVED SHALL PROVIDE CERTAIN SPECIALTIES OR MATERIALS.
- 1.7 AT COMPLETION, ELECTRICAL INSTALLATION SHALL BE LEFT IN A CLEAN FINISHED CONDITION TO SATISFACTION OF THE ENGINEER.
- 2.0 SCOPE OF WORK
- 2.1 PROVIDE ALL NECESSARY ELECTRICAL SERVICES FOR A COMPLETE AND OPERABLE SYSTEM INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING MAIN COMPONENTS:
 - 1. PERMITS, BONDS AND WARRANTIES;
 - 2. POWER SERVICE AND DISTRIBUTION;
 - 3. CONDUIT AND CABLE SYSTEM;
 - 4. LIGHTING AND RECEPTACLES AS SPECIFIED;
 - 5. IRRIGATION PACKAGE ELECTRICAL INSTALLATIONS.
- 2.2 OBTAIN REQUIRED PERMITS TO COMPLETE THE WORK.
- 2.3 UPON COMPLETION OF WORK, SUBMIT CERTIFICATE OF ACCEPTANCE FROM INSPECTION AUTHORITY TO THE ENGINEER.
- 2.4 SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
- 2.5 ALTERNATES SHALL BE CONSIDERED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
- 2.6 THE LOCATION AND ARRANGEMENT OF ELECTRICAL EQUIPMENT AS SHOWN ON THE DRAWINGS IS A CLOSE APPROXIMATION ONLY. SUBMIT SCALABLE SHOP DRAWINGS WITH LOCATION AND ARRANGEMENT OF ELECTRICAL EQUIPMENT. THE ENGINEER RESERVES THE RIGHT TO APPROVE SHOP DRAWINGS AND RECOMMEND CHANGES. ALL SUCH CHANGES SHALL BE DONE AT NO COST TO THE OWNER. PROVIDE 1 YEAR WRITTEN WARRANTY FOR ALL EQUIPMENT AND SYSTEMS SUPPLIED UNDER DIVISION 16.
- 2.7
- 3.0 BC HYDRO SERVICE
- 3.1 COORDINATE UTILITY POWER SERVICE DIRECTLY WITH BC HYDRO, INCLUDING SERVICE APPLICATION SUBMISSION AND CONNECTION.
- 3.2 PERMANENT POWER INSTALLATION SHALL MEET ALL BC HYDRO REQUIREMENTS. COORDINATE SITE INSPECTIONS DIRECTLY WITH BC HYDRO.
- 3.3 BC HYDRO CHARGES RELATED TO TEMPORARY CONSTRUCTION POWER CONNECTION SHALL BE PAID BY CONTRACTOR.
- 3.4 BC HYDRO CHARGES RELATED TO PERMANENT POWER CONNECTION SHALL BE PAID BY OWNER.
- 3.5 THE LOCATION AND ARRANGEMENT OF TRANSFORMER AS SHOWN ON THE DRAWING IS PROPOSED ONLY. LOCATE TRANSFORMER PER FINAL BC HYDRO APPROVED DRAWINGS.
- 3.6 POWER SOURCE TRANSFORMER LOCATION SHALL BE IDENTIFIED BY BC HYDRO. ALLOW FOR PROVISIONS OF POWER SERVICE CONDUIT UP TO LENGTH OF 150m FROM PROPERTY LINE.
- 3.7 THE UTILITY METER SHALL BE RECESSED MOUNT, IN NEMA 4 STAINLESS STEEL ENCLOSURE, WITH LOCKABLE COVER. USE HAMMOND ECLIPSE JUNIOR SERIES, SINGLE DOOR ENCLOSURE.
- 4.0 GROUNDING
- 4.1 SUPPLY AND INSTALL GROUNDING SYSTEM CONSISTING OF 3 ROD ELECTRODES BURIED AT A DEPTH OF AT LEAST 1m BELOW FINISHED GRADE IN UNDISTURBED SOIL.
- 4.2 ROD ELECTRODES SHALL BE COPPER CLAD STEEL, 19mm DIAMETER x 3m LENGTH AND AT LEAST 3m APART. ROD ELECTRODES SHALL BE LOCATED MINIMUM 1.5m AWAY FROM BURIED STRUCTURE.
- 4.3 GROUNDING CONDUCTOR SHALL BE BARE STRANDED COPPER, SOFT ANNEALED AND TINNED, SIZE AS INDICATED. MINIMUM SOIL COVER - 450mm. ONLY EXOTHERMIC WELD OR COMPRESSION CONNECTION TO ROD ELECTRODES SHALL BE ALLOWED. MECHANICAL CONNECTION SHALL NOT BE ACCEPTABLE.
- 4.4 PROVIDE A COMPLETE GROUNDING SYSTEM, INCLUDING GROUNDING LUGS INSIDE THE PANEL BOARD.
- 5.0 CUTTING AND PATCHING
- 5.1 CO-ORDINATE WITH GENERAL CONTRACTOR FOR ALL CUTTING AND PATCHING REQUIRED FOR THE ELECTRICAL INSTALLATION. STRUCTURAL MEMBERS SHALL NOT BE CUT WITHOUT THE CONSENT OF THE STRUCTURAL ENGINEER.
- 6.0 AS-BUILT AND OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
- 7.0 WIRE AND CABLING
- 7.1 ALL WIRING SHALL BE RW 90 COPPER WITH 600 VOLT INSULATION AND BEAR CSA LABELLING, UNLESS SPECIFIED OTHERWISE.
- 7.2 THE MINIMUM SIZE OF THE CONDUCTOR FOR POWER WIRING SHALL BE NO.12 AWG.
- 7.3 COLOR CODING OF CONDUCTORS SHALL BE AS PER CANADIAN ELECTRICAL CODE.
- 7.4 PROVIDE RAIN TIGHT FITTINGS FOR ALL CABLE AND CONDUIT CONNECTIONS.
- 7.5 ALL CONTROL WIRES FOR 24 VAC ELECTRIC CONTROL VALVES SHALL BE NO. 14 AWG; COMMON WIRE SHALL BE NO. 12 AWG.
- 7.6 ALL CONDUITS AND JUNCTION BOXES SHALL BE INSTALLED RECESSED WITHIN WALLS, CEILINGS AND FLOOR SLABS WITH ACCESS PANELS AS REQUIRED BY CODE. ELECTRICAL CONTRACTOR SHALL COORDINATE THIS WORK WITH BUILDING CONTRACTOR.
- 8.0 LIGHT SWITCHES & RECEPTACLES:
- 8.1 LIGHT SWITCHES AND RECEPTACLES SHALL BE BLACK FINISH c/w STAINLESS STEEL COVER.
- 8.2 LIGHT SWITCH MOUNT HEIGHT 1220mm ABOVE FINISHED FLOOR.
- 8.3 RECEPTACLES MOUNT SINK HEIGHT, COORDINATE WITH MILLWORK.
- 8.4 RECEPTACLES: CSA TYPE 5-15 R, 125V, 15 Amp, GFCI DUPLEX RECEPTACLE WITH LOCKABLE COVER, THOMAS&BETTS, CKNM SERIES.
- 8.5 SWITCHES: 15Amp, 120V, SINGLE POLE, THREE-WAY SWITCH c/w STAINLESS STEEL COVER PLATE.
- 9.0 IRRIGATION VENDOR SYSTEM
- 9.1 SEE VENDOR PACKAGE DETAILS FOR COMPLETE WIRING REQUIREMENTS OF ELECTRICAL IRRIGATION SYSTEM.
- 9.2 RUN 53mm RPVC CONDUIT ADJACENT TO WATER MAINLINE, FOR 24 VAC ELECTRICAL CONTROL VALVES (IRRIGATION CONTROL WIRING PROVIDED BY OTHERS). SEE IRRIGATION SYSTEM DRAWINGS TO LOCATE CONTROL VALVES BOXES AND CONDUIT ROUTING.
- 9.3 PROVIDE 35mm RPVC CONDUITS / FITTINGS FOR CONTROL WIRING BETWEEN PUMP STARTER, MASTER VALVE AND FLOW SENSOR INSIDE SERVICE MECHANICAL ROOM (CONTROL WIRING PROVIDED BY OTHERS). SEE IRRIGATION SYSTEM DRAWINGS FOR DEVICE LOCATIONS.
- 9.4 PROVIDE IRRIGATION PUMP STARTER PANEL AND ASSOCIATED WIRING. CONFIRM IRRIGATION PUMP DETAILS PRIOR TO ORDERING. PROVIDE POWER WIRING FOR IRRIGATION CONTROLLER.
- 10.0 FAUCETS, TOILETS AND URINALS ELECTRIC SYSTEM
- 10.1 SEE VENDOR PACKAGE DETAILS FOR COMPLETE ELECTRICAL WIRING REQUIREMENTS.
- 10.2 FOR FAUCETS, TOILETS AND URINALS CONTROLS, USE ONE DELTA TRANSFORMER, 110VAC TO 24VAC, CLASS II, 100VA, UP TO 25 ELECTRONIC VALVES; CATALOGUE # 060772A.
- 11.0 LIGHTING
- 11.1 REFER TO ARCHITECTURAL REFLECTED CEILING PLAN (A1.03) FOR EXACT LOCATION OF LUMINAIRES.
- 11.2 LUMINAIRE TYPE 'L1': 48" LINEAR LED, w/ ACRYLIC LENS, SURFACE MOUNT WALL AT 8' A.F.F., LITHONIA MODEL # CLX L48 3000LM SEF RDL MVOLT G210 40K 80CRI WH c/w MOUNTING BRACKET.
- 11.3 LUMINAIRE TYPE 'L2': OUTDOOR ARCHITECTURAL WALL PACK, WALL MOUNT AT 10' A.F.F., LITHONIA MODEL # WDG2E LED P3 40K 80CRI VW MVOLT DDBXD w/ MOUNTING ACCESSORIES.
- 11.4 LUMINAIRE TYPE 'L3': PARKING GARAGE LED, CEILING SURFACE MOUNT ON JOIST, LITHONIA MODEL # DSXPG LED 30C 700 40K ASY MVOLT c/w SURFACE MOUNTING ACCESSORIES.
- 11.5 LUMINAIRE TYPE 'L4': 36" LINEAR LED, w/ ACRYLIC LENS, SURFACE MOUNT WALL AT 8' A.F.F., LITHONIA MODEL # CLX L36 3000LM SEF RDL MVOLT G210 40K 80CRI WH c/w MOUNTING BRACKET.
- 11.6 PROVIDE 1 SPARE LUMINAIRE OF EACH TYPE.
- 11.7 EMERGENCY LIGHTING: WALL MOUNT AT 8FT. A.F.F., LITHONIA MODEL # INDX1236-LP05V5.
- 11.8 LUMINAIRE MAKE AND MODEL AS SHOWN OR PRE-APPROVED EQUAL.
- 12.0 LIGHTING CONTROL CABINET
- 12.1 CUSTOM NEMA 4 ENCLOSURE c/w DOOR MOUNT 3-POSITION 'HAND-OFF-AUTO' SWITCH.
- 12.2 LIGHTING CONTACTOR: 120V, 20AMP, 2 POLE, CUTLER HAMMER CN35 SERIES OR PRE-APPROVED EQUAL.
- 12.3 DIGITAL TIMER: NSI TORK MODEL # DIN100B OR PRE-APPROVED EQUAL.
- 13.0 PANEL-BOARD
- 13.1 PANEL-BOARD SHALL BE CUTLER HAMMER POW-R-LINE 1A SERIES OR PRE-APPROVED EQUAL.
- 13.2 PROVIDE PANEL-BOARD WITH NEUTRAL AND GROUND LUGS.
- 14.0 IRRIGATION PUMP MOTOR STARTER
- 14.1 FULL VOLTAGE NON-REVERSING STARTER c/w NEMA 12 ENCLOSURE AND ACCESSORIES AS SHOWN IN WIRING SCHEMATICS.
- 14.2 CUTLER HAMMER FREEDOM SERIES OR PRE-APPROVED EQUAL.
- 15.0 BUILDING SECURITY
- 15.1 PROVIDE DEDICATED DUPLEX RECEPTACLE AT LOCATION OF FUTURE SECURITY PANEL, AS SHOWN IN SERVICE ROOM.
- 15.2 PROVIDE 4 ROUND JUNCTION BOXES c/w COVER PLATES ABOVE EACH DOOR FOR FUTURE SECURITY DEVICE. PROVIDE 2 WEATHER-PROOF JUNCTION BOXES c/w COVER PLATES, LOCATION AS SHOWN ON LAYOUT, FOR FUTURE SECURITY DEVICE.
- 15.3 PROVIDE 27mm RPVC CONDUIT w/ PULL STRING FROM EACH SECURITY JB TO TERMINATE AT LOCATION OF FUTURE SECURITY PANEL IN SERVICE ROOM.



SINGLE LINE DIAGRAM



EXTERIOR LIGHTING CONTROLS WIRING



- NOTES:**
1. SAND BED AND COVER AS PER SPECIFICATIONS.
 2. COMPACTION AS PER SPECIFICATIONS.
 3. TRENCH WIDTH AS PER SPECIFICATIONS OR AS REQUIRED.
 4. RE-STORE SURFACE TO ORIGINAL CONDITIONS.

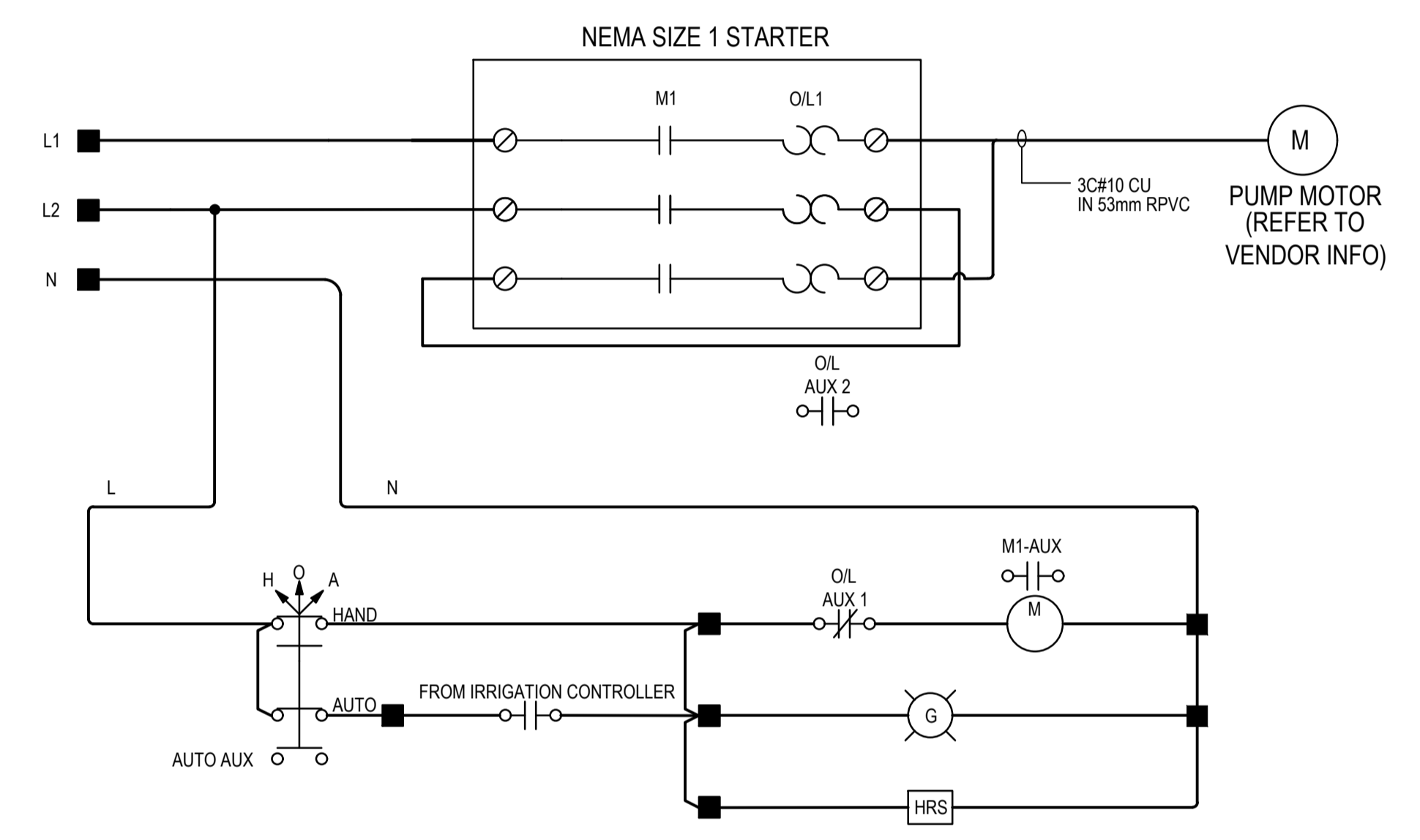
TYPICAL TRENCH DETAIL

LOAD	DESCRIPTION	BKR	CIRCUIT	BKR	DESCRIPTION	LOAD
100W	SERVICE ROOM LTG.	15	1	2	TOILET ROOMS LTG.	150W
1000W	SERVICE ROOM REC.	15	3	4	TOILET ROOMS REC.	1000W
13000W	HOT WATER TANK HWT-1	80	5	6	STORAGE ROOM LTG. & REC.	500W
		2P	7	8	OUTDOOR SEATING AREA LTG.	1000W
1000W	HEAT RECOVERY UNIT	15	9	10	FUTURE SECURITY PANEL	
		2P	11	12	TOILET ROOM#1 HEATER	500W
500W	SERVICE ROOM HEATER	15	13	14	TOILET ROOM#2 HEATER	500W
		2P	15	16	STORAGE ROOM HEATER	500W
5000W	IRRIGATION PUMP	30	17	18		
		2P	19	20		
500W	IRRIGATION CONTROLLER	15	21	22		
			23	24		
	SPARE	15	25	26		
	SPARE	15	27	28		
			29	30		

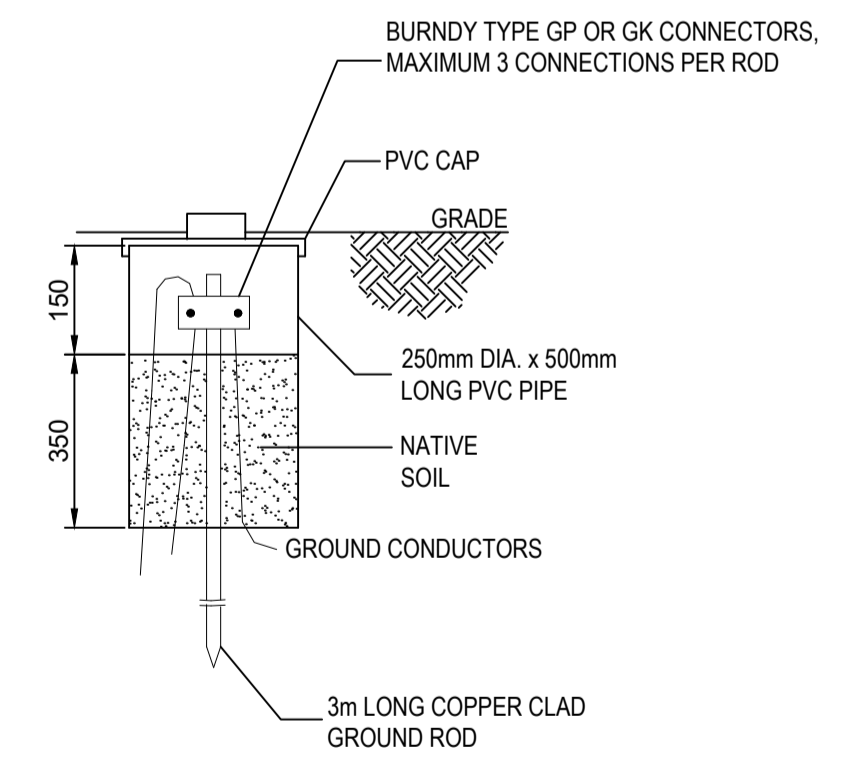
NOTES:

1. PROVIDE RAIN-TIGHT PANEL COMPLETE WITH NEUTRAL AND GROUND LUGS.

PANEL SCHEDULE



PUMP MOTOR WIRING



NOTES:

1. CONNECTIONS SHALL BE ACCESSIBLE FOR INSPECTION AT ALL TIMES. HIGH-COMPRESSION OR CAD-WELD CONNECTIONS ONLY. MECHANICAL CONNECTIONS NOT PERMITTED.
2. MINIMUM 3 GROUND RODS SPACED MINIMUM 3m APART, IN UNDISTURBED SOIL, TO COMPLETE GROUNDING SYSTEM.
3. DO NOT DRIVE GROUND RODS INTO FROZEN SOIL.

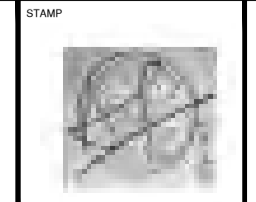
TYPICAL GROUNDING DETAIL

PLOT DATE: September 3, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD	OWNR
A	75% DETAILED DESIGN	XX	AG	AR	
B	95% DETAILED DESIGN / BUILDING PERMIT	JUL 8, 2021	AG	AR	
C	IFT / REVISED FOR BUILDING PERMIT	SEP3, 2021	AG	AR	
D	IFT	OCT5, 2021	AG	AR	



**JACK BAGLEY PARK REDEVELOPMENT
ELECTRICAL SPECIFICATIONS AND DETAILS**

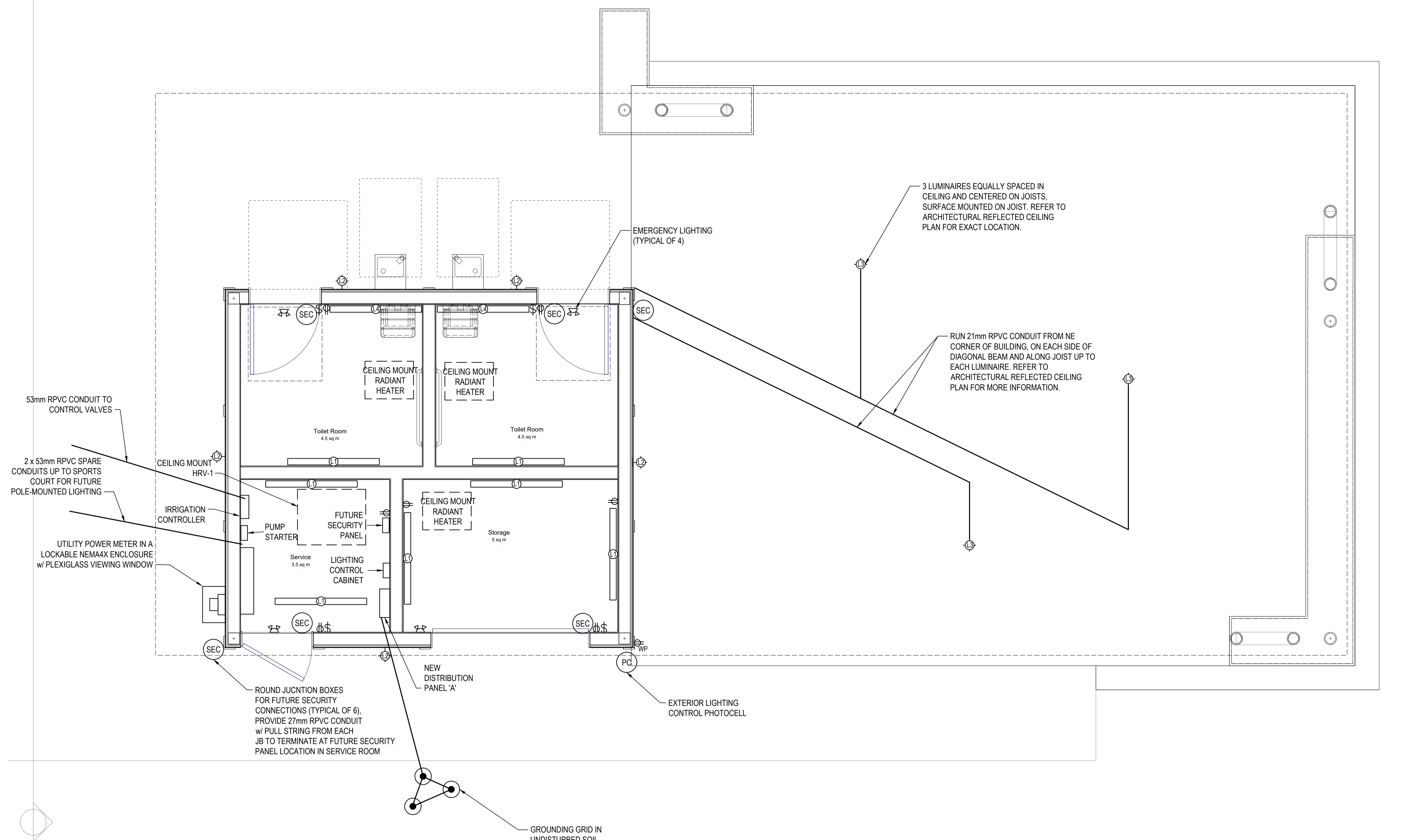


SCALE		DATE		DWG. NO.
-----		Jul-08		
DRAWN BY: AG		DESIGN BY: AG		OF: 02
CHECKED BY: AR		APPROVED BY: AR		

32345

DETAILED DESIGN

DESIGN NO.



File: G:\Projects\32000\32000\32345_RDev_Park_Redevelopment02_CADD\20_Drafting\01_Production_Sheets\32345-EL.dwg

REV NO	REVISIONS	DATE	DRAWN	APPRD	OWNER
A	75% DETAILED DESIGN	XX	AG	AR	
B	95% DETAILED DESIGN / BUILDING PERMIT	JUL 8, 2021	AG	AR	
C	IFT / REVISED FOR BUILDING PERMIT	SEP 3, 2021	AG	AR	
D	IFT	OCT 5, 2021	AG	AR	

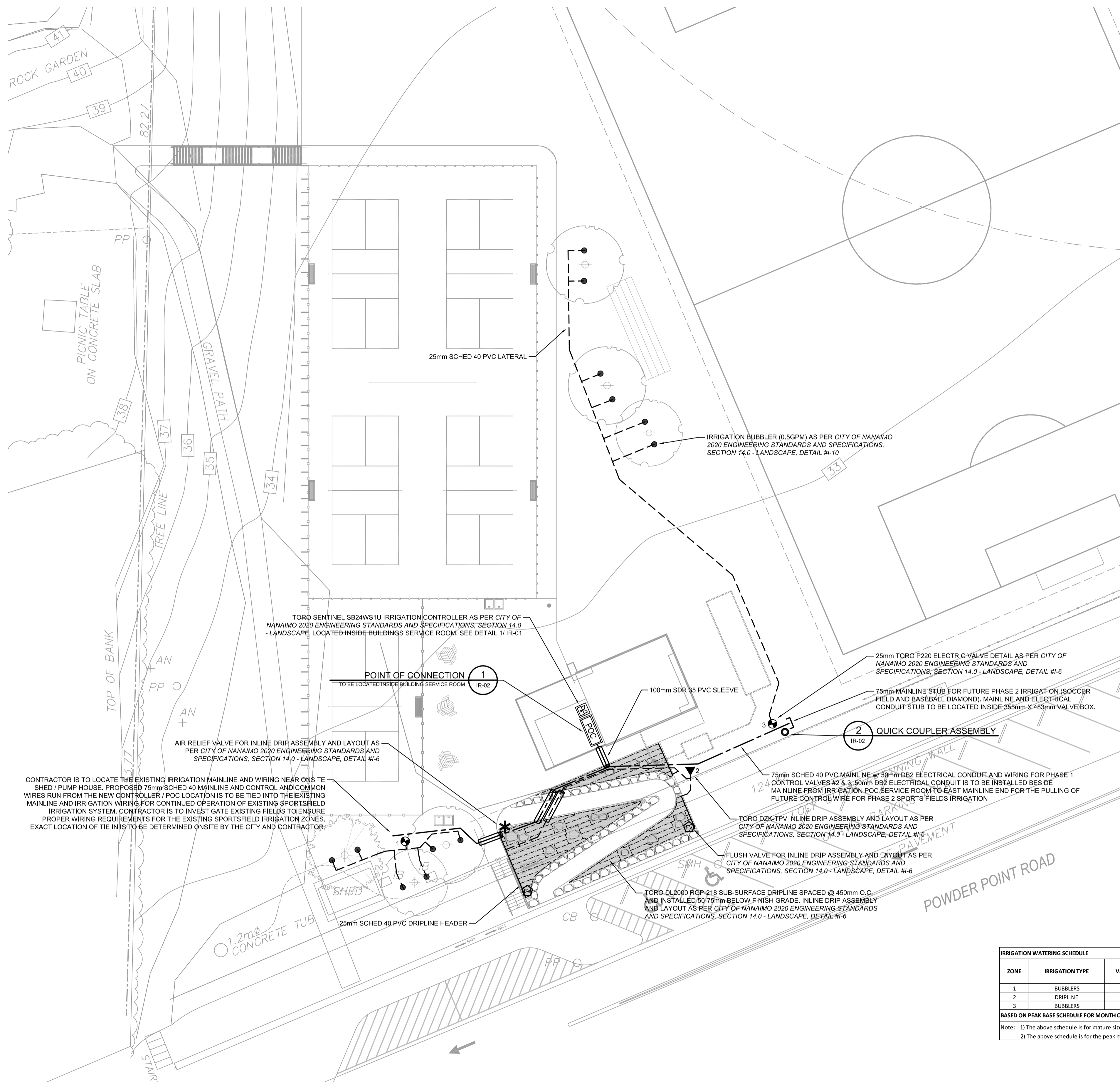


JACK BAGLEY PARK REDEVELOPMENT ELECTRICAL BUILDING PLAN



SCALE		DATE		DWG. NO.
----		Jul-08		EL-02
DRAWN BY	AG	DESIGN BY	AG	OF
CHECKED BY	AR	APPROVED BY	AR	02
				REV. C

32345



IRRIGATION LEGEND:

- TORO DL2000 RGP-218 SUB-SURFACE DRIPLINE SPACED AT @ 450mm O.C. AND INSTALLED 50-75mm BELOW FINISH GRADE
- 25mm SCHED 40 PVC LATERAL HEADER
- 25mm SCHED 40 PVC LATERAL
- 75mm SCHED 40 PVC MAINLINE
- SDR 35 PVC SLEEVE (SIZE TWO TIMES PIPE DIAMETER OR SUM OF PIPES PASSING THROUGH THE SLEEVE) @ 300mm DEPTH BELOW FINISH GRADE, SIDEWALKS AND PATHWAYS @ 600mm DEPTH BELOW DRIVEWAYS AND ROADWAYS. INSTALL 50mm Ø WIRE CONDUIT ADJACENT TO ALL MAINLINE SLEEVES. ALL SLEEVES ARE TO EXTEND SLEEVING MINIMUM 300mm BEYOND EDGE OF ADJACENT HARD SURFACE.
- TORO SENTINEL SB24WS1U IRRIGATION CONTROLLER AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE
- ▲ TORO DZK-TPV INLINE DRIP ASSEMBLY AND LAYOUT AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, DETAIL #1-6
- 25mm TORO P220 ELECTRIC VALVE DETAIL AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, DETAIL #1-9
- * AIR RELIEF VALVE FOR INLINE DRIP ASSEMBLY AND LAYOUT AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, DETAIL #1-6
- ⌘ FLUSH VALVE FOR INLINE DRIP ASSEMBLY AND LAYOUT AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, DETAIL #1-6
- IRRIGATION BUBBLER (0.5GPM) AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, DETAIL #1-10
- 2 QUICK COUPLER ASSEMBLY (IR-02)
- 1 IRRIGATION POINT OF CONNECTION (IR-02) TO BE LOCATED INSIDE BUILDING SERVICE ROOM

NOTES:

1. ALL PRODUCTS, MATERIALS, AND CONSTRUCTION METHODS USED IN THIS LANDSCAPE RENOVATION PROJECT SHALL CONFORM TO AS PER CITY OF NANAIMO 2020 ENGINEERING STANDARDS AND SPECIFICATIONS, SECTION 14.0 - LANDSCAPE, 2020.
2. THE INFORMATION SHOWN ON THESE DRAWINGS IS SCHEMATIC IN NATURE. PLANT MATERIAL, STRUCTURES, AND LANDSCAPE FEATURES TAKE PRECEDENCE OVER IRRIGATION. CONFIRM ANY LAYOUT REVISIONS WITH THE CONSULTANT.
3. CONTRACTOR SHALL VERIFY THE EXISTENCE, LOCATION, AND TYPE OF ALL UNDERGROUND UTILITIES AND SERVICES PRIOR TO COMMENCING ANY CONSTRUCTION OR DEMOLITION ACTIVITIES.
4. PRODUCTS LISTED IN THE LEGEND PROVIDE THE MINIMUM STANDARDS FOR WHICH ALL PRODUCT SUBSTITUTION REQUESTS MUST ATTAIN TO BE CONSIDERED.
5. STATIC WATER PRESSURE: 70PSI
6. SLEEVE ALL IRRIGATION UNDER ALL WALKWAYS & DRIVEWAYS w/ SDR 35 PVC AT MINIMUM TWICE DIAMETER OF IRRIGATION PIPE. WIRE CONDUIT SHALL BE INSTALLED ADJACENT TO MAINLINE SLEEVING UNDER HARD SURFACES. WATER LINES AND WIRE SHALL NOT SHARE SAME SLEEVE.
7. WIRE SPLICES SHALL BE MADE W/ 3M DBR/Y-6 CONNECTORS & HOUSED IN LOCKING VALVE BOX. PROVIDE 600mm MINIMUM LENGTH WIRE SLACK COILED INSIDE VALVE BOX AND AT CHANGES IN MAINLINE DIRECTION.
8. CONTRACTOR SHALL MONITOR AND ADJUST THE WATER SCHEDULE SEASONALLY AND AS NEEDED TO ENSURE THAT PLANT WATER REQUIREMENTS ARE MET & NOT EXCEEDED.

CONTRACTOR IS TO LOCATE THE EXISTING IRRIGATION MAINLINE AND WIRING NEAR ON-SITE SHED / PUMP HOUSE. PROPOSED 75mm SCHED 40 MAINLINE AND CONTROL AND COMMON WIRES RUN FROM THE NEW CONTROLLER / POC LOCATION IS TO BE TIED INTO THE EXISTING MAINLINE AND IRRIGATION WIRING FOR CONTINUED OPERATION OF EXISTING SPORTSFIELD IRRIGATION SYSTEM. CONTRACTOR IS TO INVESTIGATE EXISTING FIELDS TO ENSURE PROPER WIRING REQUIREMENTS FOR THE EXISTING SPORTSFIELD IRRIGATION ZONES. EXACT LOCATION OF THE INIS TO BE DETERMINED ONSITE BY THE CITY AND CONTRACTOR.

IRRIGATION WATERING SCHEDULE												
ZONE	IRRIGATION TYPE	VALVE SIZE	LATERAL SIZE	DESIGN FLOW (gpm)	DESIGN PRESSURE (psi)	PRECIPITATION RATE ("/hr)	PLANT TYPE	SOIL TYPE	WATERING (days/week)	PEAK RUN TIME (mins/day) PER WATERING DAY	# CYCLES PER DAY	CYCLE TIMES (mins)
1	BUBBLERS	25mm	25mm	3.0	30	N/A	TREES	CLAY / LOAM	5	21	2	11
2	DRIPLINE	25mm	25mm	8.5	30	0.40	SHRUBS	CLAY / LOAM	5	17	1	17
3	BUBBLERS	25mm	25mm	3.0	30	N/A	TREES	CLAY / LOAM	5	21	2	11
BASED ON PEAK BASE SCHEDULE FOR MONTH OF JULY (ET-0.18"/DAY)										TOTAL PEAK RUN TIME	59	

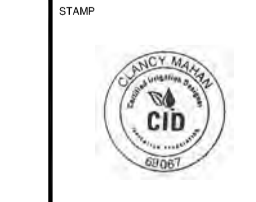
Note: 1) The above schedule is for mature size trees and shrubs and should be adjusted to the growth stage.
 2) The above schedule is for the peak month of July and should be reduced to 73% for May, 84% for June, 82% for August and 56% for September.

1 PHASE 1 IRRIGATION PLAN
 IR-01
 1:200

PLOT DATE: September 2, 2021

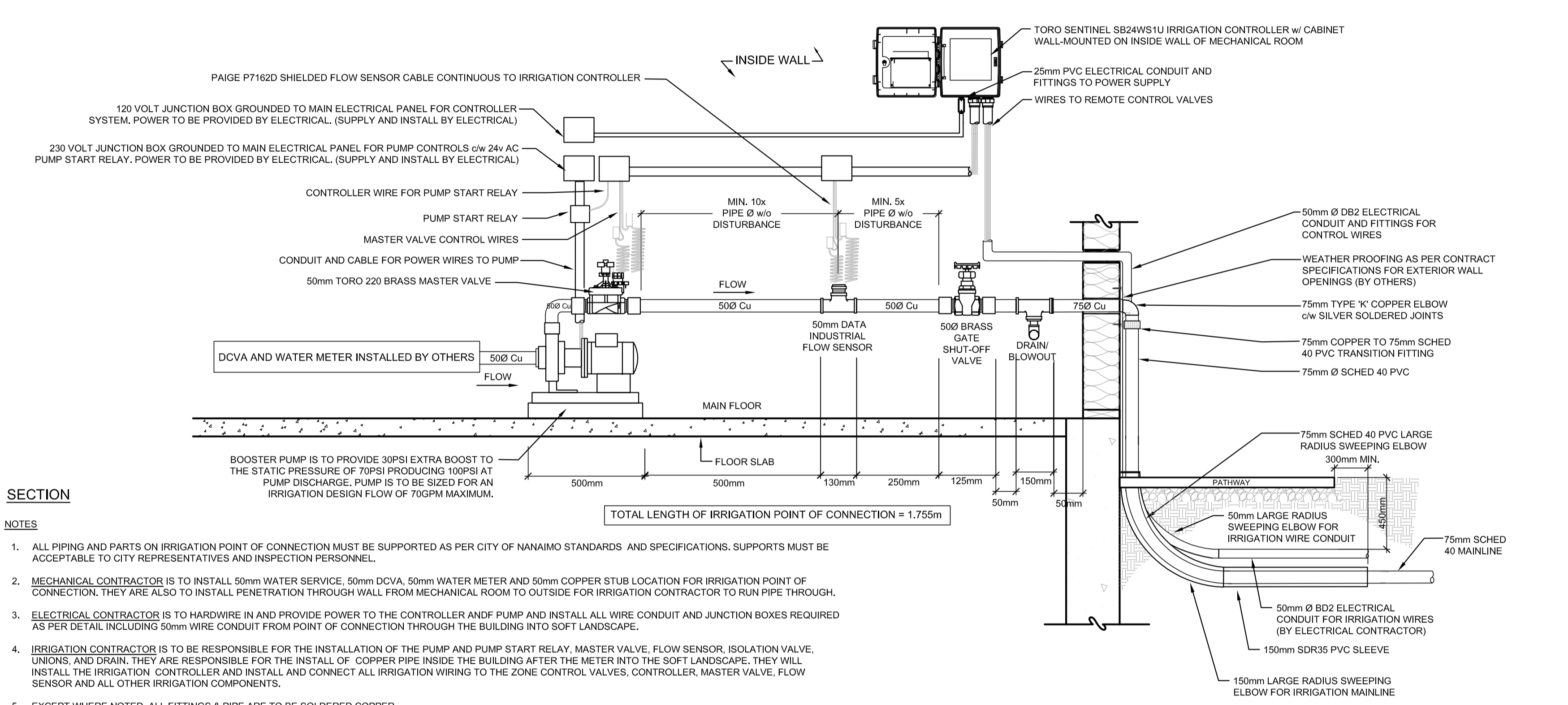
REV NO	REVISIONS	DATE	DRAWN	APPRD
1	ISSUE FOR 75% DD/BP	03-31-21	DB	CM
2	ISSUE FOR 95% DD/BP	07-08-21	DB	CM
3	ISSUE FOR IFT / REISSUED FOR BP	09-03-21	DB	CM
4	IFT	10-05-21	DB	CM

JACK BAGLEY PARK
 PHASE 1 IRRIGATION PLAN



SCALE	AS SHOWN	DATE	03-31-2021	DWG. NO.	1 OF 2
DRAWN BY	DB	DESIGN BY	DB		
CHECKED BY	CWM	APPROVED BY	CWM		REV. 0

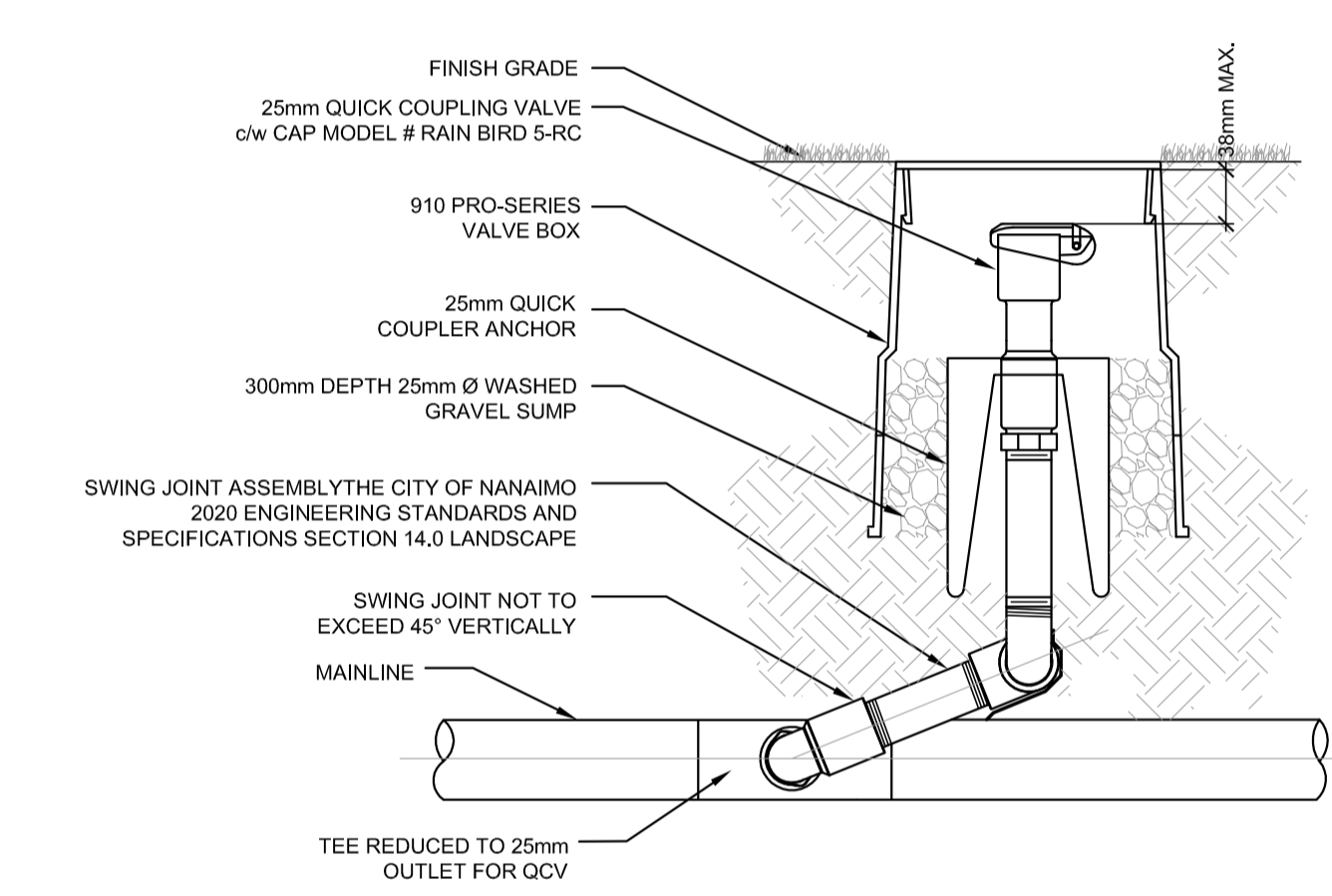
IR-01



SECTION

NOTES

1. ALL PIPING AND PARTS ON IRRIGATION POINT OF CONNECTION MUST BE SUPPORTED AS PER CITY OF NANAIMO STANDARDS AND SPECIFICATIONS. SUPPORTS MUST BE ACCEPTABLE TO CITY REPRESENTATIVES AND INSPECTION PERSONNEL.
2. MECHANICAL CONTRACTOR IS TO INSTALL 50mm WATER SERVICE, 50mm DCVA, 50mm WATER METER AND 50mm COPPER STUB LOCATION FOR IRRIGATION POINT OF CONNECTION. THEY ARE ALSO TO INSTALL PENETRATION THROUGH WALL FROM MECHANICAL ROOM TO OUTSIDE FOR IRRIGATION CONTRACTOR TO RUN PIPE THROUGH.
3. ELECTRICAL CONTRACTOR IS TO HARDWIRE IN AND PROVIDE POWER TO THE CONTROLLER AND PUMP AND INSTALL ALL WIRE CONDUIT AND JUNCTION BOXES REQUIRED AS PER DETAIL INCLUDING 50mm WIRE CONDUIT FROM POINT OF CONNECTION THROUGH THE BUILDING INTO SOFT LANDSCAPE.
4. IRRIGATION CONTRACTOR IS TO BE RESPONSIBLE FOR THE INSTALLATION OF THE PUMP AND PUMP START RELAY, MASTER VALVE, FLOW SENSOR, ISOLATION VALVE, UNIONS, AND DRAIN. THEY ARE RESPONSIBLE FOR THE INSTALL OF COPPER PIPE INSIDE THE BUILDING AFTER THE METER INTO THE SOFT LANDSCAPE. THEY WILL INSTALL THE IRRIGATION CONTROLLER AND INSTALL AND CONNECT ALL IRRIGATION WIRING TO THE ZONE CONTROL VALVES, CONTROLLER, MASTER VALVE, FLOW SENSOR AND ALL OTHER IRRIGATION COMPONENTS.
5. EXCEPT WHERE NOTED, ALL FITTINGS & PIPE ARE TO BE SOLDERED COPPER.
6. WHERE SOLDERED VALVES ARE BEING USED, COPPER TO FEMALE I.P.T. ADAPTERS MUST BE SUPPLIED TO ACCOMMODATE METER TAILPIECES.



SECTION
2
 IR-02 25mm QUICK COUPLER VALVE
 N.T.S.

1
 IR-01 IRRIGATION SYSTEM POINT OF CONNECTION
 N.T.S.

PLOT DATE: September 2, 2021

REV NO	REVISIONS	DATE	DRAWN	APPRD	CHKD
1	ISSUE FOR 75% DD.BP	03-31-21	DB	CM	
2	ISSUE FOR 95% DD.BP	07-08-21	DB	CM	
3	ISSUE FOR IFT / REISSUED FOR BP	09-03-21	DB	CM	
4	IFT	10-05-21	DB	CM	

JACK BAGLEY PARK
 IRRIGATION DETAIL PLAN

ISL
 ion
 #503, 4190 Lougheed Hwy, Burnaby, B.C. V5C 6A8
 T: (604)629-2696 F: (604)629-2698

SCALE	AS SHOWN	DATE	03-31-2021	DWG. NO.
DRAWN BY	DB	DESIGN BY	DB	2 OF 2
CHECKED BY	CWM	APPROVED BY	CWM	REV. 0

9022.39 DESIGN NO.
 IR-02